OHIO

Nursing Continuing Education

Elite Learning
by Colibri Healthcare

24 hours
$38.95

COMPLETE YOUR CE NOW BEFORE 10/31/2023

Elite Learning's
STRESS-FREE SOLUTION
to completing your CE.
This book satisfies all your requirements.

BUY NOW AND SAVE!

ACCREDITED PROVIDER
AMERICAN NURSES CREDENTIALING CENTER

Accepted by your state board and ANCC accredited

ELITELEARNING.COM/BOOK
Complete this book online with book code: **ANCCOH2423**

Elite courses are rated
4.8/5 stars
★★★★½

WHAT'S INSIDE

FREQUENTLY ASKED QUESTIONS

What are the requirements for license renewal?

Licenses Expire	Contact Hours	Mandatory
RNs expire 10/31 of the odd year. LPNs expire 10/31 of the even year.	24 (All hours are allowed through home-study/online courses)	Must complete 1 contact hour Category A

How much will it cost?

Course Title	Contact Hours	Price
Laws and Rules for Ohio Nurses, 2nd Edition	1	$14.95
Basic Psychiatric Concepts	6	$35.95
Diabetes Prevention and Management for Healthcare Professionals	5	$25.95
Hypertension Management: Evidence-Based Guidelines	4	$31.95
Stroke Management in the Acute Care Setting	5	$29.95
Using Evidence in Clinical Nursing Practice, 2nd Edition	3	$23.95
Best Value - Save $123.75 - All 24 Hours	24	$38.95

How do I complete this course and receive my certificate of completion?
See the following page for step by step instructions to complete and receive your certificate.

Are you an Ohio board-approved provider?
Colibri Healthcare, LLC is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation. The program entitled "Laws and Rules for Ohio Nurses, 2nd Edition" has been approved for 1 contact hour Category A. The approval number is OBN-008-92-2230-02142023. The approval period runs from February 14, 2023 through February 13, 2025. This program may be repeated as often as desired during the approval period.

Are my contact hours reported to the Ohio board?
No, the board performs random audits at which time proof of continuing education must be provided.

What information do I need to provide for course completion and certificate issuance?
Please provide your license number on the test sheet to receive course credit. Your state may require additional information such as date of birth and/or last 4 of Social Security number; please provide these, if applicable.

Is my information secure?
Yes! We use SSL encryption, and we never share your information with third-parties. We are also rated A+ by the National Better Business Bureau.

Important information for licensees:
Always check your state's board website to determine the number of hours required for renewal, mandatory subjects (as these are subject to change), and the amount that may be completed through home-study. Also, make sure that you notify the board of any changes of address. It is important that your most current address is on file.

What if I still have questions? What are your business hours?
No problem, we have several options for you to choose from! Online at EliteLearning.com/Nursing you will see our robust FAQ section that answers many of your questions, simply click FAQs at the top of the page, e-mail us at office@elitelearning.com, or call us toll free at 1-866-344-0971, Monday - Friday 9:00 am - 6:00 pm, EST.

Licensing board contact information:

17 South High Street, Suite 660 I Columbus, OH 43215-3466
Phone (614) 466-3947 I Fax (614) 466-0388
Website: http://www.nursing.ohio.gov

How to complete continuing education

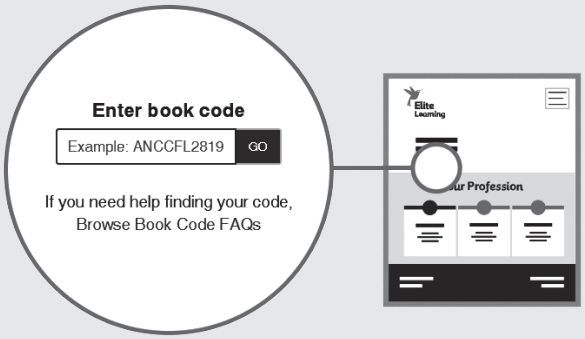
Please read these instructions before proceeding.

Read and study the enclosed courses and complete the self-assessment exercises. To receive credit for your courses, you must provide your customer information and complete the mandatory evaluation. We offer three ways for you to complete. Choose an option below to receive credit and your certificates of completion.

Fastest way to receive your certificate of completion

Online

- Go to **EliteLearning.com/Book**. Use the book code **ANCCOH2423** and enter it in the example box then click **GO**.
- If you already have an account created, sign in to your account with your username and password. If you do not have an account already created, you will need to create one now.
- Follow the online instructions to complete your affirmation. Complete the purchase process to receive course credit and your certificate of completion. Please remember to complete the online survey.



By mail

- Fill out the course participant sheet and evaluation found in the back of this booklet. Please include a check or credit card information and e-mail address. Mail to **Elite, PO Box 37, Ormond Beach, FL 32175**.
- Completions will be processed within 2 business days from the date it is received and certificates will be e-mailed to the address provided.
- Submissions without a valid e-mail will be mailed to the address provided.

By fax

- Fill out the course participant sheet and evaluation found in the back of this booklet. Please include credit card information and e-mail address. Fax to **(386) 673-3563.**
- All completions will be processed within 2 business days of receipt and certificates e-mailed to the address provided.
- Submissions without a valid e-mail will be mailed to the address provided.

Laws and Rules for Ohio Nurses, 2nd Edition (Mandatory)

1 Contact Hour

Release Date: February 14, 2023

Expiration Date: February 13, 2025

Faculty

Brenda Williams, PhD, MBA, RN, has been active in nursing as an RN for 34 years, working in varied areas of nursing, including clinical (hospital, traveling, urgent care, sales, outreach education, management) and insurance (workers' compensation, short-term and long-term health insurance, vocational rehab, utilization review, Medicaid, Medicare, management). She has also taught healthcare business at the collegiate level (political, legal and regulatory, finance/economics, trends in healthcare, social aspects, and policy). She authored five articles for publication in the Ohio Nurse Review in 2016 and 2017 and published her first book in 2020. She is active in advocating for educating the public about dialysis options and is the director of the Parish Nursing Ministry at her church, where she conducts public health research and teaches multiple health classes.

Brenda Williams has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Reviewer: Taryn Hill, PhD, RN, has been a registered nurse for 31 years. Currently, she is the dean of Academic Affairs for Chamberlain University's prelicensure BSN program's Midwest Alliance, including the Columbus and Cleveland, Ohio, campuses; the Indianapolis, Indiana, campus; and the St. Louis, Missouri, campus. Dr. Hill started her nursing career in pediatric nursing on a renal and metabolic unit. Over the years Dr. Hill transitioned into adult end-stage renal disease (ESRD) and cared for patients in the acute, chronic, and peritoneal home dialysis settings. She was a staff nurse and a clinical manager for free-standing outpatient dialysis centers. Dr. Hill began teaching in the clinical setting in 2003 and began working for Chamberlain University in 2007 as a nurse educator. In addition to teaching, Dr. Hill has published several articles with Chamberlain's Nursing Informatics Research Team. Additionally, she has reviewed several books and coauthored a book chapter. Dr. Hill is currently on the Central Ohio Region National Kidney Foundation board and is a member of the medical advisory board for the National Kidney Foundation's Central Ohio Region. Dr. Hill has also served as a board member for the Mid-Ohio District Nurses' Association and chapter president for the Phi Pi Chapter of Sigma Theta Tau International.

Taryn Hill, has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

APN Reviewer: Jonda Hapner-Yengo, MPH, MS, CNP, has been a registered nurse for 26 years and a family nurse practitioner for 9 years. During this time she has worked primarily in public health and management positions at local health departments and federally qualified healthcare centers in New Jersey and Ohio. Currently, she is working at The Ohio State University Student Health Services as a primary care CNP and clinical lead of the preventive medicine program.

LPN Reviewer: Dawnara Brown, MBA, BSHu, CAPM, has been a licensed practical nurse since 2007. She has worked directly with patients for over 19 years at the James Cancer Hospital and The Ohio State University Student Health Services and in industry at Cardinal Health, Abbott Nutrition, and IQVIA for over 6 years. Her nursing and business backgrounds have afforded her the opportunity to assist executives, medical leaders, and healthcare entities in providing safe and effective care while helping to solve complicated healthcare and business issues. Currently, she is working in the Special Projects Unit with the Ohio Department of Medicaid.

Course overview

The following course fulfills the Ohio Law and Rules Category A licensure requirements on standards for competent nursing practice for RNs, APRNs, and LPNs in Ohio. A new addition this year is content regarding the foreign licensed nurse. Within the course is information regarding education, licensing, scope and standards of practice, and patient safety.

Learning objectives

Upon completion of the course, the learner should be able to:

- Discuss the differences among the Ohio Revised Code, the Ohio Administrative Code, and the Ohio Board of Nursing.
- Compare and contrast the difference in leadership roles among registered nurses (RNs), licensed practical nurses (LPNs), and advanced practice registered nurses (APRNs).
- Differentiate between the four forms of licensure: initial, renewal, endorsement, and compact.
- Explain how the "party invitation" of who, what, when, where, and why impacts the scope and standards of nursing.
- Analyze the protocol and subsequent actions of an RN or LPN when disputing a questionable order.

How to receive credit

- Read the entire course online or in print which requires a 1-hour commitment of time.
- Complete the self-assessment quiz questions which are at the end of the course or integrated throughout the course. These questions are NOT GRADED. The correct answer is shown after you answer the question. If the incorrect answer is selected, the rationale for the correct answer is provided. These questions help to affirm what you have learned from the course.
- Depending on your state requirements you will be asked to complete either:
  - An affirmation that you have completed the educational activity.
  - A mandatory test (a passing score of 70 percent is required). Test questions link content to learning objectives as a method to enhance individualized learning and material retention.
- If requested, provide required personal information and payment information.
- Complete the MANDATORY Course Evaluation.
- Print your Certificate of Completion.

CE Broker reporting

Colibri Healthcare, LLC, provider # 50-4007, reports course completion results within 1 business day to CE Broker. If you are licensed in Arkansas, District of Columbia, Florida, Georgia, Kentucky, Michigan, Mississippi, New Mexico, North Dakota, South Carolina, or West Virginia, your successful completion results will be automatically reported for you.

Accreditations and approvals

Colibri Healthcare, LLC is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation.

Individual state nursing approvals

Colibri Healthcare, LLC is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation. In addition to states that accept courses offered by ANCC Accredited Providers, Colibri Healthcare, LLC is an approved Provider of continuing education in nursing by: Alabama Board of Nursing, Provider #ABNP1418 (valid through February 5, 2025); Arkansas State Board of Nursing, Provider #50-4007; California Board of Registered Nursing, Provider #CEP17480 (valid through January 31, 2024); California Board of Vocational Nursing and Psychiatric Technicians (LVN Provider #V15058, PT Provider #V15020; valid through December 31, 2023); District of Columbia Board of Nursing, Provider #50-4007; Florida Board of Nursing, Provider #50-4007; Georgia Board of Nursing, Provider #50-4007; Kentucky Board of Nursing, Provider #7-0076 (valid through December 31, 2023; CE Broker Provider #50-4007); Michigan Board of Nursing, Provider #50-4007; Mississippi Board of Nursing, Provider #50-4007; New Mexico Board of Nursing, Provider #50-4007; North Dakota Board of Nursing, Provider #50-4007; South Carolina Board of Nursing, Provider #50-4007; and West Virginia Board of Registered Nurses, Provider #50-4007. This CE program satisfies the Massachusetts States Board's regulatory requirements as defined in 244 CMR5.00: Continuing Education.

Activity director

Shirley Aycock, DNP, RN, Executive Director of Quality and Accreditation

Disclosures

Resolution of conflict of interest
In accordance with the ANCC Standards for Commercial Support for continuing education, Colibri Healthcare, LLC implemented mechanisms prior to the planning and implementation of the continuing education activity, to identify and resolve conflicts of interest for all individuals in a position to control content of the course activity.

Sponsorship/commercial support and non-endorsement
It is the policy of Colibri Healthcare, LLC not to accept commercial support. Furthermore, commercial interests are prohibited from distributing or providing access to this activity to learners.

Disclaimer

The information provided in this activity is for continuing education purposes only and is not meant to substitute for the independent medical judgment of a healthcare provider relative to diagnostic and treatment options of a specific patient's medical condition.

Course verification

All individuals involved have disclosed that they have no significant financial or other conflicts of interest pertaining to this course. Likewise, and in compliance with California Assembly Bill No. 241, every reasonable effort has been made to ensure that the content in this course is balanced and unbiased.

INTRODUCTION

There is more to nursing than knowing the art and science of it. Every nurse licensed in the state of Ohio, whether a registered nurse (RN), a licensed practical nurse (LPN), or an advanced practice registered nurse (APRN), must know how the Ohio Revised Code (ORC), the Ohio Administrative Code (OAC), and the Ohio Board of Nursing direct nursing decisions and actions. RNs, LPNs, and APRNs each have a distinct role with specific responsibilities. It is important to understand these roles and how they interact to provide competent and safe nursing practice. After graduation, both the RN and LPN candidate will apply for initial nursing licensure. Once licensed, they will enter a two- year renewal process, with RNs renewing in odd years and LPNs renewing in even years. APRNs are registered nurses with advanced education in clinical practice and also must renew licensure and any additional certifications as required. If nurses move between states and territories belonging to the United States, licensure by endorsement is required. Nurses who are licensed in multiple states are required to know and uphold the laws and rules regarding nursing licensure in the states where they are licensed. It is the nurses' responsibility to know, understand, and adhere to licensing requirements in every state where they hold an active nursing license. Compact multistate licensure is an option in certain states that participate in the program. Nurses must practice within their scope and standard of practice, and the ORC and OAC provide information about this. The Nurse Practice Act (NPA) provides guidelines for nurses to question orders that do not seem correct. Nurses are responsible for patient safety and care and therefore need to be aware of applicable rules and regulations to provide the best care.

Meet John, Sarah, and Shannon. Each has just graduated from an accredited nursing program. John graduated as an RN, Sarah graduated as an LPN, and Shannon graduated as an APRN. Follow them through their journeys of education, licensure, scope and practice, decision making when providing patient care, and patient protection through advocacy.

OHIO REVISED CODE, OHIO ADMINISTRATIVE CODE, AND OHIO BOARD OF NURSING

Ohio Revised Code

The Ohio Revised Code (ORC) is a collection of the laws of the state of Ohio (Ohio Legislature, 2022). The ORC consists of 31 titles that are further broken down into chapters. Within each chapter there are subdivisions (Ohio Legislature, 2019). Chapter 4723 contains the laws and rules regarding nursing practice within the state of Ohio and is found within Title 47, Occupations: Professions. The scopes of practice and regulatory requirements for nurses practicing in Ohio are specified in the Ohio Nurse Practice Act, Chapter 4723, the Ohio Revised Code (ORC), and the Ohio Administrative Code (OAC), Chapters 4723-1 through 4723-27. Thus, the scope of practice of licensed nurses (licensed practical nurses, registered nurses, and advanced practice registered nurses) is statutorily defined in Ohio's laws and regulations. The Ohio State legislature (Senate and House) has the authority to adopt or modify practice acts and scopes of practice. The Ohio Board of Nursing abides by the direction of the legislature and thus the legislature grants the board legal authority to regulate the nursing profession.

Ohio Administrative Code

The Ohio Administrative Code (OAC) is a collection of rules that has been adopted by the various state agencies in Ohio. The intent of the rules is to execute the policies and laws that have been passed by the General Assembly (the Ohio Legislature). The chapters related to healthcare range from chapters 4709 through 4779. Chapter 4723 is focused on the Ohio Board of Nursing. Subdivisions of this chapter cover the organization of the board, licensing, definitions, standards of practice, nursing education programs, APRNs, LPNs, RNs, continuing education, dialysis technicians, community health workers, and medication aides (LAWriter Ohio Laws and Rules, n.d.a).

Ohio Board of Nursing

The state legislature of Ohio passed the Nursing Practice Act (NPA) and determined the regulations and scope of practice that nurses must follow (Ohio Board of Nursing, n.d.a). The Ohio Board of Nursing (OBN) enforces the NPA's laws through rules (OAC) that more clearly define the laws for licensure and the nurse's scope of practice. This is done by determining the standards for safe nursing care; defining the scope of practice for RNs, LPNs, and APRNs; and granting, renewing, and revoking nursing licenses (Ohio Board of Nursing, n.d.a).

Ohio and the other 49 states, the District of Columbia, American Samoa, Guam, the Northern Mariana Islands, and the Virgin Islands have agreed to form a board called the National Council of State Boards of Nursing (NCSBN), which administers the NCLEX-RN and NCLEX-PN Examinations for initial licensure (NCSBN, 2022a).

Ohio's State Board of Nursing must have 13 members who are U.S. citizens and live in Ohio. Further requirements include the following:

- Eight members are RNs that were actively engaged in the practice of nursing five years immediately preceding the member's initial appointment to the board.
- Of the eight members who are RNs, at least two must be APRNs.
- Four members shall be LPNs that were actively engaged in the practice of nursing five years immediately preceding the member's initial appointment to the board.
- One member shall represent the interests of consumers of healthcare. Neither this member nor any person in the member's immediate family can be associated with a health care provider or profession or have a financial interest in the delivery or financing of healthcare.
- Representation of nursing service and nursing education and of the various geographical areas of the state shall be considered in making appointments.
- Nursing organizations can submit up to five names for nomination to a position on the board that the governor and senate will later announce.
- Terms will be four years (ORC 4723.02).
- Members of the board of nursing are appointed by the governor of Ohio.

According to Chapter 4723 of the Ohio Revised Code, the State Board of Nursing's primary duty is to maintain an accurate and complete list of all applicants and those that have received licenses or certificates (OAC 4723 -1-03A).

Case study 1

John, Sarah, and Shannon are discussing the differences between the Ohio Revised Code, the Ohio Administrative Code, and the Ohio Board of Nursing. They agree that the ORC are the laws and the OAC are the rules. They are not so sure what the OBN does.

Self-Assessment Quiz Question #1

What does the OBN do in relation to the ORC and the OAC?

a. The Ohio Board of Nursing enforces the NPA's laws through rules (OAC).
b. The Ohio Board of Nursing is a political party of 13 members that make up the laws.
c. The Ohio Board of Nursing sets the rules for social distancing, mask-wearing, and COVID-19 testing.

DEFINITIONS OF RN, LPN, AND APRN

Registered nurse

The Nurse Practice Act defines an RN as one who "holds a current, valid license issued under this chapter, authorizing the practice of nursing as a registered nurse" (ORC, 4723.01.A). It goes on to define the practice of RNs as "providing, to individuals and groups, nursing care requiring specialized knowledge, judgment, and skills derived from the principles of biological, physical, behavioral, social, and nursing sciences" (ORC 4723.01B).

The RN is responsible for the following (ORC 4723.01B1-6):

- Identifying patterns of human responses to actual or potential health problems amenable to a nursing regimen.
- Executing a nursing regimen through the selection, performance, management, and evaluation of nursing actions.
- Assessing health status for the purpose of providing nursing care.
- Providing health counseling and health teaching.

- Administering medications and treatments and executing regimens authorized by an individual who is authorized to practice in Ohio and is acting within the course of the individual's professional practice (ORC 4723.01B1,2,3,4,5).
- Teaching, administering, supervising, delegating, and evaluating nursing practice.

Licensed practical nurse

The Nurse Practice Act defines a licensed practical nurse (LPN) as "an individual who holds a current, valid license issued under this chapter that authorizes the practice of nursing as a licensed practical nurse" (ORC 4723.01E). The practice of an LPN is defined as "providing to individuals and groups nursing care requiring the application of basic knowledge of biological, physical, behavioral, social, and nursing sciences at the direction of a registered nurse . . . physician, physician assistant, dentist, podiatrist, optometrist, or chiropractor" who is legally authorized to practice in Ohio (ORC 4723.01F).

The LPN is responsible for the following (ORC 4723.01F1-6):

- Observation.
- Patient teaching.
- Care in diverse healthcare settings.
- Contributions to the planning, implementation, and evaluation of nursing.
- Administration of medications and treatments.
- Administration of intravenous therapy to an adult when authorized appropriately.
- Performance of nursing tasks as delegated by a registered nurse.
- Teaching of nursing tasks to LPNs and individuals to whom the licensed practical nurse is authorized to delegate nursing tasks as directed by a registered nurse.

Advanced practice registered nurse

Ohio Laws and Administrative Rules help guide the practice of APRNs; the following regulations can be found in Ohio Legislature (2022). To practice as an APRN, the nurse must first hold an RN license (ORC 4723.011) and then earn certification for the specific type of APRN (ORC 4723.01G,H,I,J). An APRN can be a certified registered nurse anesthetist, a clinical nurse specialist, a certified nurse-midwife, or a certified nurse practitioner (OAC 4723.3.01B1-4 and ORC 4723.01O1-4). As a practitioner, the APRN "provides individuals and groups nursing care that requires knowledge and skill obtained from advanced formal education, training, and clinical experience" (ORC 4723.01P). APRNs develop a "standard care arrangement" in collaboration with the physician or podiatrist, which is a "written formal guide for planning and evaluating a patient's health care" (OAC 4723-8-01H). After a standard care arrangement has been set up, the APRN must work within the quality assurance provisions of the standard care arrangement; failure to do so may result in disciplinary actions (OAC 4723-8-05C). As part of rule 4723-8-05C, which became effective in February 2021, these quality assurance standards include the following (Ohio Legislature, 2022):

- Yearly random chart reviews with a collaborating physician, podiatrist, or dentist, or a member of a quality assurance committee.
- Semiannual review of prescriptions and patterns of prescribing of the APRN.
- After each review, a conference is to be held among all parties involved in the review.
- A process for patient evaluation of care (OAC 4723-8-05D1,2,3).
- Review of the standard care arrangement every two years (OAC 4723-8-04C7a).
- Review and confirmation between the collaborating physician and the APRN that the APRN is meeting expectations of each patient's OARRS report (OAC 4723-8-047d).

As of April 2022, the United States has 27 states that allow APRNs full practice authority, meaning they can function independently without oversight by another provider (AANP, 2022). Ohio, however, is not one of these states. Ohio APRNs have reduced practice authority, meaning they must have an agreement with another healthcare provider to provide patient care or otherwise limits APRN practice (AANP, 2022).

Case study 2

John, Sarah, and Shannon are comparing their responsibilities as health care providers. They note some similarities such as having to be licensed, but they also note dissimilarities. Think about their responsibilities by answering the following questions.

Self-Assessment Quiz Question #2

The RN is responsible for all EXCEPT:

a. Health counseling and teaching.
b. Administering medications and treatments.
c. Identifying patterns of human responses.
d. Housekeeping.

Self-Assessment Quiz Question #3

LPNs are responsible for all EXCEPT:

a. Housekeeping.
b. Administering medications and treatments.
c. Teaching nursing tasks to peers.
d. Observing.

Self-Assessment Quiz Question #4

There are four categories of APRN. Which one is NOT correct?

a. Certified registered nurse anesthetist.
b. Clinical nurse specialist.
c. Certified gerontologist.
d. Certified nurse practitioner.

EDUCATION

Registered nurse programs

A nursing program must abide by the requirements of the Ohio Administrative Code to gain and retain approval of the Board of Nursing (OAC 4723-5-02A). "The [Registered Nursing] curriculum shall be derived from a philosophy, conceptual framework, or organizing theme that is consistently evident throughout the curriculum" (OAC 4723-5-13B).

The following are the objectives, teaching strategies, and evaluation methods that must be integrated into a nursing education program (OAC 4723-5-13C1,2,3,4):

- Developed and written by program faculty.
- In accordance with the law for nursing practice.
- Implemented as written.
- Distributed to each student.

The curriculum shall consist of course content that includes the following (OAC 4723-5-13F):

- Nursing art and science.
- Physical, biological, and technological sciences.
- Social and behavioral sciences.

The nursing program will be administered by a registered nurse with the following qualifications (OAC 4723-5-10A1a,b,c,d,e):

- Completion of an approved registered nursing education program in a jurisdiction as defined in paragraph S of rule 4723-5-01.
- Experience of at least five years in the practice of nursing, including two as a faculty member in a registered nursing education program.
- A masters degree with a major in nursing.
- Current, valid RN license as a registered nurse in the state of Ohio.
- If the program is a baccalaureate or graduate program, a doctoral degree is required (OAC 4723-5-10A1a,b,c,d,e) .
- Associate administrators must meet the same requirements, although a doctorate is not required (OAC 4723-5-102a,b,c,d).

The following are the minimum requirements of faculty teaching in a nursing program:

- Completion of an approved registered nursing education program in a jurisdiction as defined in paragraph S of 4723-5-01 of the OAC (OAC 4723-5-10-3-a).
- Two years of experience as a nurse in the practice as a registered nurse (OAC 4723-5-10-3-b).
- A masters degree:
    - The faculty must have at least two years' experience practicing as an RN; a masters degree (if a bachelor of science degree in nursing [BSN], the masters degree does not have to be in nursing; if not a BSN, "the master's or other academic degree, including, but not limited to a PhD, shall be in nursing"; and a valid RN license—if the nurse does not possess a bachelor of science in nursing degree, the masters or other academic degree, including, but not limited to a PhD, should be in nursing [OAC 4723-5-103a,b,ci,ii,d10-3-c(i)]).
    - If the nurse possesses a bachelor of science in nursing degree, the masters degree may be in nursing or another field (OAC 4723-5-10-3-c(ii)).
- Current, valid licensure as a registered nurse in the state of Ohio.

Licensed practical nurse programs

The curriculum for a LPN program shall have the same setup as an RN program, "including the content that validates the student's acquired knowledge, skills, and behaviors that are necessary to safely and effectively engage in the practice of licensed practical nursing" (OAC 4723- 5-14B,C1,2,3,4,E1,2,3, F1,2,3,4,5,6,7,8). The main difference is in the length of each program. The LPN program will be 30 weeks (OAC 4723-5-14D1) compared to 104 weeks for the RN program (OAC 4723-5-13D1). An additional class on intravenous therapy will be included in the licensed practical nursing education program (OAC 4723-5-14F1-8).

An administrator of an LPN program must have the following qualifications: valid RN license; at least five years of experience in nursing, including two as faculty; and a masters degree. If not a BSN, the masters or other degree, including PhD, must be in nursing. If a BSN degree, then the masters degree does not have to be in nursing. An associate administrator must meet the same requirements as an administrator (OAC 4723-5 11A2,a,b,c,i,ii,d).

Faculty in the LPN program must meet the same requirements, except a BSN is the only degree required in addition to only two years of active practice experience (OAC 4723-5-11A3a,b,c,d).

Advanced practice registered nurse

APRNs must have a master of science or a doctoral degree with a major in a nursing specialty (ANA Enterprise, n.d.a). The educational programs are geared toward four types of APRN: nurse practitioner, clinical nurse specialist, certified registered nurse anesthetist, and certified nurse midwife (ANA Enterprise, n.d.a).

Here are the APRN Education Requirements (American Association of Colleges of Nursing, 2021):

- Three or more courses in advanced pathophysiology, advanced health assessment, and advanced pharmacology.
- Comprehensive coursework to enable the APRN to practice correctly in the chosen population.
- Direct/indirect clinical supervision in accordance with national specialty organizations and accreditation guidelines.

Each of the four APRN roles work with a different patient population and has different duties.

The nurse practitioner's scope of practice is in health promotion, disease prevention, health education, counseling, and diagnosis/treatment of acute/chronic diseases working as a clinical nurse leader in one of six patient populations (American Association of Colleges of Nursing, 2021):

- Women's health, including midwifery (https://nursing.osu.edu/academics/masters/traditional-master-science-nursing/traditional-ms- curriculum)
- Adult gerontology, including specializations in acute care, primary care, and clinical nurse specialist (https://nursing.osu.edu/academics/masters/traditional-master-science-nursing/traditional-ms-curriculum)
- Neonatal.
- Pediatrics, including specializations in acute care and primary care (https://nursing.osu.edu/academics/masters/traditional-master- science-nursing/traditional-ms-curriculum)
- Family/individual across the life span.
- Psych/mental health.

The clinical nurse specialist (CNS) focuses on disease management, health promotion, and prevention, with the coursework depending on the type of subspecialty chosen such as women's health, emergency, diabetes, rehabilitation, mental health, or wounds, to name a few (National Association of Clinical Nurse Specialists, 2022).

Certified registered nurse anesthetists (CRNAs) are capable of providing anesthesia care to all individuals depending on the setting chosen (hospital, outpatient, adult practice, children's clinic) with their educational program, including applied science of anesthesia, principles, evidence-based practice, advanced technologies, clinical decisions, and fieldwork (American Association of Nurse Anesthesiology, 2022).

Certified nurse-midwives (CNMs) are concerned with every aspect of the female life span from gynecology to prenatal and postpartum care (American College of Nurse Midwives, n.d.). CNMs work in many different types of settings, from hospitals to homes (American College of Nurse Midwives, n.d.).

After the completion of an accredited nursing program (RN or LPN) that has been approved by the Ohio Board of Nursing, the new graduate must apply to take the NCLEX-RN® or the NCLEX-PN® Examination (OAC 4723-7-02A,B,C,E1).

Initial

After completion of an Ohio Board of Nursing educational program, the program's administrator will submit a letter of completion to the Ohio Board of Nursing for each graduate. After the prospective nurse applies and pays the fee to take the exam, the Ohio Board of Nursing reviews the application. The candidate must also register with Pearson Vue in order to receive the authorization to test (ATT). If the Board determines that the applicant is eligible for testing, the ATT will be issued by Pearson Vue and will be sent to that applicant. Once the applicant has received their ATT, they can schedule a time to take the NCLEX-RN® or NCLEX-PN®. Applicants who do not take the NCLEX-RN® or NCLEX-PN® exam within one year of graduation will need a second letter of completion sent to the Ohio Board of Nursing in order to be eligible for and schedule the exam (OAC 4723-7-03A,B). The following is required to receive approval for testing:

- Evidence of successful completion of an approved nursing program (OAC 4723-7-02C).
- If the applicant is from another state, the nursing program administrator will send an official transcript (OAC 4723-7-02F2).
- Criminal background check (ORC 4723.09A2b).
- Has not been convicted of, pleaded guilty to, or had a judicial finding of guilt:
  - Aggravated murder (ORC 2903.01), murder (ORC 2903.02), or voluntary manslaughter (ORC 2903.03).
  - Felonious assault (ORC 2903.11).
  - Kidnapping (ORC 2905.01).
  - Rape (ORC 2907.02), sexual battery (ORC 2907.03), or gross sexual imposition (ORC 2907.05).
  - Aggravated arson (ORC 2909.02).
  - Aggravated robbery (ORC 2911.01) or aggravated burglary (ORC 2911.11).
  - Nonpayment of child support (ORC 3123.43).
  - Fraud in obtaining nursing license (ORC 4723.28A).
  - Selling, giving away, or administering drugs or devices for other than intended use (ORC 4723.28B5).
  - Self-use of illegal drugs (ORC 4723.28B8).
  - Misappropriation of funds or valuables (ORC 4723.28B13).
  - Failure to use universal precautions (ORC 4723.28B18).
  - Activities outside of the nursing practice scope (ORC 4723.28B20).

Renewal

License renewal for RNs, APRNS, and LPNs can be found online (OAC 4723-7-09B and OAC 4723-8-08A1,a,b,c,2,B). RNs and APRNs renew in the odd years, and LPNs renew in the even years, both by September 15 (OAC 4723-7-09C; OAC 4723-8-08Ad; and ORC 4723.24C). If the RN license is initially granted "on or after July 1 of an odd-numbered year, that license shall be current through October 31 of the next odd-numbered year" (OAC 4723-7-09J). If the LPN is initially granted "on or after July 1 of an even-numbered year, that license will be current through October 31 of the next even-numbered year" (OAC 4723-7-09K). To renew their license, the RN, APRN, and LPN must demonstrate completion of 24 hours of continuing education (ORC 4723.24C1a and OAC 4723-8-10B1), one of which must be "related to the statutes and rules pertaining to the practice of nursing in this state" (ORC 4723.24C1c). Rule 4723-14-03 fully details continuing education requirements, including that LPNs or RNs can waive the continuing education requirements for one renewal period and eight hours may be obtained by working as a volunteer providing healthcare services (Ohio Laws, 2022).

Specific requirements for APRNS

APRNs will renew their licenses in the odd years, the same as RNs, and must follow these guidelines:

- Submit an application for their specialty (nurse anesthetist, nurse midwife, nurse practitioner, nurse specialist).
- Document that they are currently certified by a national certifying organization.
- Clinical nurse specialist certified before December 31, 2000, does not have to prove certification but must prove continuing education of 12 hours of CE related to the specialty (https://nursing.ohio.gov/wp-content/uploads/2020/10/OhioBoardCEforAPRNs1.0.pdf)
- All APRNs must have completed 24 hours of continuing education in the licensed specialty (https://nursing.ohio.gov/wp- content/uploads/2020/10/OhioBoardCEforAPRNs1.0.pdf)
  - 12 hours of CE in advanced pharmacology (ORC 4723.24C2c and OAC 4723-8-10B2) as part of the 24 required hours.
  - Eight hours can be substituted for CE if the APRN provided healthcare as a volunteer to indigent and uninsured people (OAC 4723-8-10A4a-E3).
- A list of all of the collaborating physicians and podiatrists.
- Fee (OAC 4723-8-08,A1,a,b,c,2,B).

Endorsement

If an already-licensed nurse (RN or LPN) wishes to obtain licensure in another state, the following items need to be documented:

- Proof of a current valid unrestricted nursing license (ORC 4723.09B1a).
- Graduation from a nursing program approved by the National Council of State Boards of Nursing (OAC 4723-7-05A1).
- Proof of two hours of CE (OAC 4723-7-05B4).
- Submit a Nursing Licensure by Endorsement Application along with the corresponding fee (OAC 4723-7-05A2).
- Agree to a criminal records check (OAC 4723-7-05B2d).
- Has not been convicted of, pleaded guilty to, or had a judicial finding of guilt for the same crimes as those listed in initial licensing (ORC 2903. 01,02,03,11; ORC 2905.01; ORC 2907.02,02,05; ORC 2909.02; ORC 2911.01,11; ORC 3123.43; ORC 4723.28A,B5,8,13,18,20).

APRNs that work in another state must do the following:

- Complete an Advanced Practice Registered Nurse License Application and submit the fee to practice in Ohio (OAC 4723-8-09).
- Provide proof of graduation with a masters or doctoral degree in nursing or in a related field that qualifies the applicant to sit for the certification examination of a national certifying organization approved by the board (ORC 4723.41A2).
- Provide proof of passing the certification exam (ORC 4723.41A3).
- Indicate the specialty the nurse seeks (ORC 4723.41A4c).
- Provide proof of authority to practice nursing and be in good standing in the previous jurisdiction (ORC 4723.41B2).

Foreign nurse licensure

When a foreign nurse applies for licensure in Ohio, the following information is required by the Ohio Board of Nursing:

- A full education course-by-course report from the credentialing evaluation service (CES) of the commission of graduates of foreign nursing schools (CGFNS) (OAC 4723-7-04,A1).
- Evidence of obtaining the minimum passing score on the Test of English as a Foreign Language (TOEFL iBt). There are exceptions to this rule. Foreign nurses that were educated in Australia, Ireland, New Zealand, the United Kingdom, South Africa, Trinidad and Tobago, Jamaica, Barbados, or Canada, except that, with respect to Canada, the exception from the requirement does not apply to Quebec unless the individual graduated from McGill university, Dawson college in Montreal, Vanier college in St. Laurent, John Abbot college in Sainte-Anne-de-Bellevue, or Heritage college in Gatineau (OAC 4723-7-04,A2).
- Criminal records check (OAC 4723-7-04,A3).
- Does not have to sign up as a sex offender (ORC 2950, sexual predator, habitual sex offender, sexually oriented offender) (OAC 4723- 7-04,A4).
- Submit a completed Nursing Licensure by Examination Application with fee (OAC 4723-7-04,A5) and complete the registration process (OAC 4723-7-04,A6).

Foreign nurse licensure by endorsement

Registered nurse

The RN must submit the following information:

- Must have been originally licensed by examination to practice as a registered nurse in a jurisdiction of the National Council of State Boards of Nursing (OAC 4723-7-04,B1).
- If licensed before January 1, 1953, must prove a licensing exam was taken (OAC 4723-7-04,B1a).
- If licensed after January 1, 1953, but before July 1, 1982, must have a score of 350 on each subject in the State Board Test Pool Examination (OAC 4723-7-04B1b).
- If licensed between July 1, 1982, and before October 1, 1988, then a score of more than 1600 on the NCLEX-RN (OAC 4723-7-04B1c).
- If licensed after October 1, 1988, must have a "pass" score on the NCLEX-RN (OAC 4723-7-04B1d).

Licensed practical nurse

The same rules apply for the LPN, except (OAC 4723-7-04,3,4b,5b,6-9,E,F1,2):

- If licensed on or after July 1, 1956, but before July 1, 1982, must have a score of at least 350 on the State Board Test Pool Examination (OAC 4723-7-04B2a).
- If licensed on or after July 1, 1982, but before October 1, 1988, must have a score of at least 350 on the NCLEX-PN (OAC 4723-7- 04B2b).
- If licensed after October 1, 1988, must have a "pass" score on the NCLEX-PN (OAC 4723-7-04B2c).

Compact license

If an RN or an LPN wishes to obtain a compact multistate license (the capability to practice in multiple states with one license without a license for each state), the nurse must live in a compact-eligible state. Ohio enacted nurse compact licensure on July 1, 2021, and this will be implemented January 1, 2023.

A nurse whose primary residence is Ohio can have as many individual state licenses as they desire. APRNs cannot participate in the Compact Multistate License program and must hold individual licenses for each jurisdiction or state (NCSBN, 2022b).

Case study 5

John, Sarah, and Shannon are preparing to sit for their RN and LPN exams. John and Sarah are new graduates and will be taking their tests for the first time. Shannon already is a RN and will renew her license with additional requirements because she is an APRN. They are at lunch, comparing their licensure requirements.

Self-Assessment Quiz Question #5

John and Sarah are taking their initial RN and LPN licensing exams. To qualify to sit for the test, each must:

a. Have graduated from an approved nursing program.
b. Sign a document attesting to no criminal activity.
c. Receive an email for authorization to test.
d. Schedule and sit for their exams within one year.

Self-Assessment Quiz Question #6

Shannon is already a RN. She has a graduate degree in nursing to practice as an APRN. She has additional requirements to renew her license in addition to her RN requirements. She must meet all of the requirements EXCEPT:

a. Provide documentation of 24 hours of continuing education.
b. Current certification in her specialty.
c. Names and addresses of all collaborating physicians and podiatrists.
d. Renewal in even years.

Self-Assessment Quiz Question #7

John, Sarah, and Shannon want to apply for compact licenses so they can practice in multiple states. Which statement is NOT true?

a. To apply for a compact license, the RN and the LPN must live in a compact state.
b. Ohio passed legislation to join the nurse licensing compact.
c. APRNs can hold compact licenses.
d. Those with a compact license must work under a physician.

SCOPE AND STANDARDS OF NURSING PRACTICE

The scope and standards of nursing practice covers the services that qualified and licensed RNs, LPNs, and APRNs can perform (ANA Enterprise, n.d.b). There are two steps to defining the scope of practice. They are the Nurse Practice Act, a law that originates at the state legislature, and the regulatory bodies that create the rules and regulations (ANA Enterprise, n.d.a). The standards of practice are found in the Ohio Administrative Code (OAC 4723-4-03A-K5).

Evidence-Based Practice: The Party Invitation

To understand how scope and standards of practice work together, answer "the party invitation":

Who is involved in the scope and standards? RNs and APRNs that maintain active, valid, and nonrestricted licenses.

What do nurses do? Nurses protect their patients through identifying and utilizing each patient's abilities to their best use. Nurses are proactive in preventing further injuries and illness via education and support to patients. Nurses facilitate healing and alleviate suffering to the best of their ability while supporting and advocating for their patients. Nurses are the voice in the public that their patients do not have.

Where do nurses practice? Nurses work wherever there are people because there is always a need for medical care.

When do nurses practice? Nurses practice whenever and wherever they are needed, utilizing knowledge, wisdom, best practices, evidence- based practices, compassion, empathy, and the expertise that can come only from the art and science of nursing.

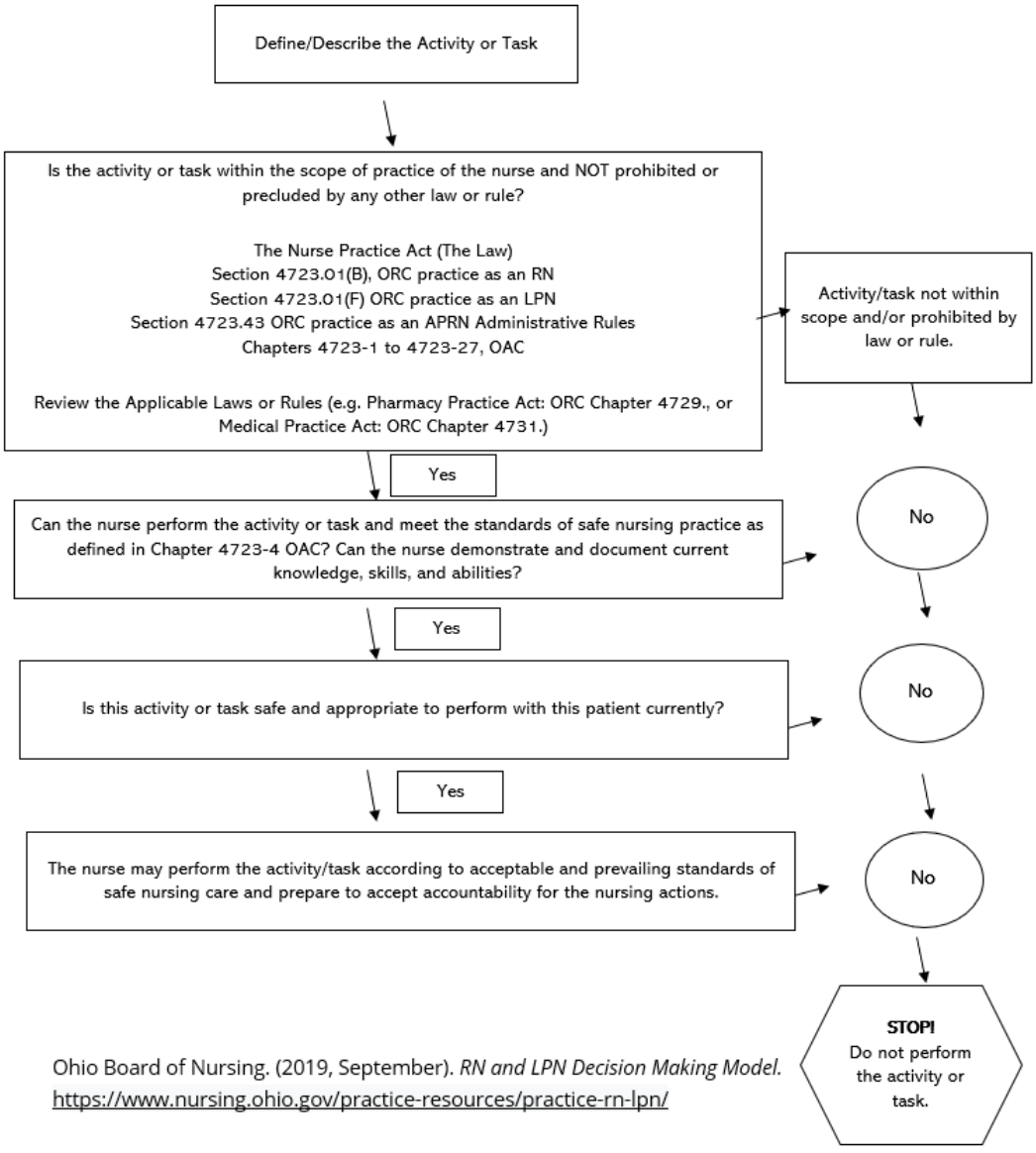
Why does nursing exist? Nursing exists to keep fellow humans alive and operating at the best of their abilities. Nursing exists to support each patient through the various stages of life from pregnancy to birth to death. Nurses use both low-tech and high-tech practices to facilitate care and comfort to their patients. Nurses are there when no one else is (ANA Enterprise, n.d.).

Decision-making model

The Ohio Board of Nursing created a decision-making model (Figure 1) for APRNs, RNs, and LPNs to determine if an existing, modified, or new procedure, activity, or task they encounter may be performed as part of and within their scope of practice.

The decision-making model is based on relevant statutes and is a guide for determining whether a specific procedure, task, or activity is within the nurse's scope of practice.

Figure 1: Ohio Board of Nursing's Decision-Making Model



Ohio Board of Nursing. (2019, September). *RN and LPN Decision Making Model.* https://www.nursing.ohio.gov/practice-resources/practice-rn-lpn/

Note: Ohio Board of Nursing. (2019, September). RN and LPN Decision Making Model. https://www.nursing.ohio.gov/practice-resources/practice-rn-lpn/

Case study 6

John and Sarah have passed their initial NCLEX-RN and NCLEX-PN exams. Both are working on the med-surg floor. John is faced with a procedure that he is not familiar with. He is trying to decide what to do. Shannon is rounding on the floor at this time, so he asks her for guidance.

Self-Assessment Quiz Question #8

John is not sure how to proceed with a procedure that he has never carried out. He knows what the procedure is and the reasoning behind it, and he has seen it demonstrated when in nursing school. He talks to Shannon, who advises him to consult the Ohio Board of Nursing's decision-making algorithm. After reading through the algorithm, John determines that he should not carry out the task. What should he do next?

a. Do the procedure anyway; he has seen it done.
b. Ask Shannon to do it and show him how.
c. Ask Shannon to watch him and instruct him as he does it.
d. Discuss the procedure and concerns with his manager.

PATIENT SAFETY

In October 2019, the Ohio Board of Nursing created a document titled *Scopes of Practices: Registered Nurses (RNs) and Licensed Practical Nurses (LPN)* to provide guidance regarding the RN and LPN practice based on the requirements in the Nurse Practice Act and administrative rules. ORC 4723.01A-V denoted the scopes of practice for RNs and LPNs. OAC 4723-4-03A-K5 stipulated RN and LPN standards of practice and addressed patient safety and nursing processes.

RN and patient safety: Orders

It is the RN's responsibility to "maintain current knowledge of the duties, responsibilities, and accountabilities for safe nursing practice" (OAC 4723-4-03B). When an RN is given an order, it is the nurse's responsibility to carry out the order unless a problem has been identified such as the inaccuracy of the order, the order has not been properly authorized, or the order is not valid or has expired (OAC 4723-4-03E1a,b,c). If the nurse deems that the order may cause harm to the patient or is contraindicated, then it is the nurse's responsibility to clarify the order with another licensed practitioner (OAC 4723-4-03Ed,eF1), and if, after the clarification, the nurse decides not to proceed, the nurse must notify the ordering practitioner and then document the notification as well as the reason for not following the order in the patient's chart (OAC 4723-4-03F2,3). If further action is required to keep the patient safe, the nurse must do what is needed to protect the patient (OAC 4723-4- 03F4).

LPN and patient safety: Orders

Before an LPN can undertake any task, an RN must first assess the situation, including the "condition of the patient, the type of nursing care required and the complexity and frequency of the nursing care needed" (OAC 4723-4-03K1,2,3). The RN must then consider the "training, skill, and ability of the Licensed Practical Nurse . . . [as well as] the availability and accessibility of resources necessary to perform the . . . procedure" (OAC 4723-4-03K4,5). Standards of practice for LPNs are the same as for RNs (OAC 4723-4-04A-E).

APRN and patient safety: Orders

To practice as an APRN, the nurse must first be an RN and follow all the rules for RNs. APRNs have a wider scope of practice related to advanced education, clinical experience, and national certification (OAC 4723-8-02A, OAC 4723-8-02B2). Because of the APRN's additional education and experience, a plan must be in place for chart review when the nurse (APRN) has direct patient care, education, or management, serving as another layer of protection for the patient (OAC 4723-8-047d). APRNs must collaborate with a physician or podiatrist that is in the same specialty and develop a standard care arrangement consisting of "a written formal guide for planning and evaluating a patient's health care" (ORC 4723.431H).

The standard care arrangement contains the following:

- Signatures of the nurse and each collaborating physician or designee—another physician who serves as the department or unit director or chair, in the same institution, or practice specialty as the nurse (OAC 4723-8-04C1).
- A listing of services that the APRN will be offering and a description of the scope of prescriptive practice (OAC 4723-8-04C5).
- Criteria for referral from the APRN to the collaborating physician or podiatrist (ORC 4723.431B1).
- A process for the APRN to consult with the collaborating physician or podiatrist (ORC 4723.431B2).
- A plan for coverage in case the APRN or the collaborating physician or podiatrist is not available and another physician or podiatrist can supervise the APRN (ORC 4723.431B3).
- A process for dispute resolution between the APRN and the collaborating physician or podiatrist (ORC 4723.431B4)
- When the APRN has prescriptive authority, a plan must be in place for "timely direct, personal evaluation of the patient with a collaborating physician" (OAC 4723-8-04,11a).
- An APRN may prescribe drugs or therapeutic devices if they are within the APRN's specialty scope of practice, consistent with the terms of the standard care arrangement with a collaborating physician, and do not exceed the prescriptive authority of the collaborating physician (ORC 4723-9-10;13D1,2,3; Ohio Board of Nursing, 2019, May, para.1–2).

As of September 28, 2018, hospitals are permitted to hire clinical nurse specialists, certified nurse-midwives, and certified nurse practitioners as employees and can negotiate their standard care arrangements (between the employee and the employee's collaborating physician) with pending approval of the medical staff and governing body of the hospital (ORC 4723.431E).

Case study 7

Shannon has written an order for Sarah's patient. Sarah reads the order but does not agree with it because it is unclear and could present a patient safety hazard. Shannon has left the floor. Sarah finds John and asks him to interpret the order. He agrees with Sarah that it is ambiguous.

Self-Assessment Quiz Question #9

John and Sarah disagree with Shannon's order for a patient, as it seems to present a safety hazard. They should take all of the following steps EXCEPT:

a. Clarify the order with another licensed practitioner.
b. Talk about it with the rest of the nurses on the floor.
c. Contact the ordering practitioner and request clarification and then document it in the chart.
d. Do whatever needs to be done to protect the patient.

Case study 8

Shannon is now practicing as an APRN. Because of the APRN's additional education and experience, a plan must be in place for chart review, which provides an extra layer of protection for patients. APRNs must collaborate with a physician or podiatrist that is in the same specialty and develop a standard care arrangement.

Self-Assessment Quiz Question #10

The contents of a standard care arrangement consist of all of the following EXCEPT:

a. A process for dispute resolution between a physician and the APRN.
b. Prescriptive authority that requires timely and direct evaluations from the collaborating physician or podiatrist.
c. A list of services and prescriptive authority the APRN will be offering.
d. A stipulation that if the collaborating physician or podiatrist is not available, the APRN can consult with any other physician or podiatrist.

Conclusion

Each nurse is responsible for knowing and abiding by the laws and rules that pertain to the practice of nursing in the state of Ohio. Every nurse must know where to find the Ohio Revised Code and the Ohio Administrative Code, and review both frequently. No one is exempt from the law because of lack of knowledge. Although many nurses perceive that the laws and rules are there to protect them, in reality, the laws and rules were made to protect the patient. The Ohio Board of Nursing governs safe nursing practice within the state.

This course provided information on how the Ohio Revised Code, the Ohio Administrative Code, and the Ohio Board of Nursing work in collaboration to provide safe patient care. The definitions of and requirements for a registered nurse, a licensed practical nurse, and an advanced practice nurse were explored. In addition to the different types of nurses, there are different requirements for the education of each. There are four types of licensure: initial, renewal, endorsement, and compact. The most important item covered in this course is what the nurse should do when facing an order that seems incorrect. Whether it is inaccurate, not properly authorized, or invalid, it is the nurse's responsibility to identify a problem with the order, question it with peers and then the prescriber, and then document the situation and resulting action. Above all, it is the nurse's responsibility to protect the patient at all costs.

References

- American Association of Colleges of Nursing. (2021). The essentials: Core competencies for professional nursing education. https://www.aacnnursing.org/AACN-Essentials
- American Association of Nurse Anesthesiology. (2022). CRNA fact sheet. https://www.aana.com/membership/become-a-crna/crna-fact- sheet
- American Association of Nurse Practitioners (AANP). (2022, April 15). State practice environment. Retrieved from https://www.aanp.org/advocacy/state/state-practice-environment
- American College of Nurse Midwives. (n.d.). About the midwifery profession. https://www.midwife.org/About-the-Midwifery-Profession
- ANA Enterprise. (n.d.a). Advanced practice registered nurse (APRN). https://www.nursingworld.org/practice-policy/workforce/what-is- nursing/aprn/
- ANA Enterprise. (n.d.b). Scope & practice. http://www.nursingworld.org/practice-policy/scope-of-practice/
- LAWriter Ohio Laws and Rules. (n.d.a). Ohio Administrative Code: Chapter 4723. Ohio Board of Nursing. http://codes.ohio.gov/oac/4723
- LAWriter Ohio Laws and Rules. (n.d.b). Ohio Revised Code: Chapter 4723. Nurses. http://codes.ohio.gov/orc/4723
- National Association of Clinical Nurse Specialists. (2022). What is a CNS? https://nacns.org/about-us/what-is-a-cns/
- National Council of State Boards of Nursing (NCSBN). (2022a). Nurse licensure compact. https://www.ncsbn.org/nurse-licensure- compact.htm
- National Council of State Boards of Nursing (NCSBN). (2022b). NLC FAQs. http://www.NCSBN.org
- Ohio Board of Nursing. (n.d.a) The Nurse Practice Act: Ohio Revised Code (ORC). https://nursing.ohio.gov/laws- rules/#:~:text=Based%20on%20the%20Nurse%20Practice%20Act%2C%20the%20Board,nursing%20education.%20Chapter%204723-1%20Board%20Organization%20and%20Records
- Ohio Board of Nursing. (n.d.b). RN and LPN decision-making model. http://www.nursing.ohio.gov/practice-resources/practice-rn-lpn/
- Ohio Board of Nursing. (n.d.c). Scopes of practices: Registered nurses (RNs) and licensed practical nurses (LPNs). https://nursing.ohio.gov/laws-rules/
- Ohio Laws. (2022, October 5). Rule 4723-14-03 | Continuing education requirement for licensed practical and registered nurses. Retrieved from https://codes.ohio.gov/ohio-administrative-code/rule-4723-14-03
- Ohio Laws. (2021, July 30). Section 4723.481: Authority of A.P.R.N. designated as Clinical Nurse Specialist, certified nurse-midwife, or certified nurse practitioner to prescribe drugs and therapeutic devices. Section 4723.481 - Ohio Revised Code. Retrieved from https://codes.ohio.gov/ohio-revised-code/section-4723.481
- Ohio Legislature (2022). Ohio Codes: Ohio Revised Code. Legislature.ohio.gov/laws/ohio-codes

LAWS AND RULES FOR OHIO NURSES, 2ND EDITION

Self-Assessment Answers and Rationales

1. The correct answer is A.
Rationale: The Ohio Board of Nursing enforces the NPA's laws through rules (OAC) that more clearly define the laws for licensure and the nurse's scope of practice.

2. The correct answer is D.
Rationale: The RN is responsible for providing health counseling and health teaching, administering medications and treatments, and identifying patterns of human responses (ORC 4723.01B1,2,3,4,5).

3. The correct answer is A.
Rationale: LPNs are responsible for administration of medications and treatments, teaching nursing tasks to other LPNs, and observing (ORC 4723.01F1-6).

4. The correct answer is C.
Rationale: An APRN can be a certified registered nurse anesthetist, a clinical nurse specialist, a certified nurse-midwife, or a certified nurse practitioner (OAC 4723.3.01B1-4 and ORC 4723.01O1-4).

5. The correct answer is A.
Rationale: There are multiple requirements to qualify to sit for the RN or PN examinations, one of which is the successful completion of an approved nursing program (OAC 4723-7-02C).

6. The correct answer is D.
Rationale: A renewed advanced practice registered nurse license is subject to renewal in odd-numbered years (OAC 4723-8- 08,A1,a,b,c,2,B).

7. The correct answer is C.
Rationale: APRNs cannot participate in the Compact Multistate License program and must hold individual licenses for each jurisdiction or state (NCSBN, 2022b).

8. The correct answer is D.
Rationale: According to the Ohio Board of Nursing's decision-making model, John should not perform the procedure. He should contact his manager and get guidance as to how to proceed.

9. The correct answer is B.
Rationale: If the nurse deems that an order may cause harm to the patient or is contraindicated, then it is the nurse's responsibility to clarify the order with another licensed practitioner (OAC 4723-4-03Ed,eF1).

10. The correct answer is D.
Rationale: A standard care agreement between an APRN and physician must include multiple elements that define the collaboration and oversight; some of these include the process or dispute resolution, prescriptive authority with timely and direct evaluations, and a list of all services the APRN will be providing.

Course Code: ANCCOH01LR

Basic Psychiatric Concepts

6 Contact Hours

Release Date: June 1, 2022 **Expiration Date:** June 1, 2025

Faculty

Robyn B. Caldwell, DNP, FNP-BC, earned a Doctor of Nursing Practice (DNP) from Samford University in nursing administration with an emphasis in nursing education in 2013; a post-master's certificate as a family nurse practitioner from Delta State University in 2003; a master's degree in Nursing Administration (MSN) in 1996; and Bachelor of Science in nursing (BSN) degree in 1990 from the University of Tennessee. Dr. Caldwell has worked in a variety of healthcare settings throughout her 32-year career including adult and pediatric emergency nursing, nursing administration, and nursing education (LPN to DNP) in both the community college and university settings. She has published and presented on topics relevant to nursing education and patient outcomes in local, state, and national venues. Currently, Dr. Caldwell is employed in an urgent care setting and is working on a post masters as a psychiatric mental health nurse practitioner (PMHNP).

Robyn B. Caldwell has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Reviewer: Kimberleigh Cox, DNP, PMHNP-BC, ANP-BC, PHNc., is an Associate Professor at the University of San Francisco's School of Nursing and Health Professions and is nationally board certified as both an adult nurse practitioner (ANP) and psychiatric mental health nurse practitioner (PMHNP). She is also a certified Public Health Nurse (PHNc). Dr. Cox received her bachelor's degree in Psychology from Brown University. She then worked for Harvard, Brown and Stanford Universities' Departments of Psychiatry and Mood Disorders Clinics from 1990-1995 doing clinical research, primarily in depressive and anxiety disorders. Dr. Cox received her master's degree in Nursing (MSN) from University of California San Francisco in 1998, completing a dual adult and psychiatric nurse practitioner program. She has practiced clinically as a Nurse Practitioner since 1998 working with diverse populations of individuals with psychiatric, behavioral health, and addictive problems in a variety of specialty mood disorders, psychiatric and residential care settings in California. She completed her Doctor of Nursing Practice (DNP) from USF in 2010 and was the Dean's Medal recipient for professionalism. Her doctoral work focused on chronic depression and the application of an evidence-based psychotherapeutic treatment. Dr. Cox has been teaching undergraduate and graduate nursing students in community/public health and psychiatric/mental health since 2003. She has presented nationally on managing patients with difficult behaviors, has authored publications, including "Bipolar and Related Disorders: Signs, Symptoms and Treatment Strategies" (2018), and has peer reviewed "Depression: A Major Public Health Concern" (2nd & 3rd editions - 2019, 2022).

Kimberleigh Cox has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Course overview

The goal of this course is to provide an introductory overview of mental health concepts. This course examines the history, epidemiology, legal/ethical aspects, mental health assessment, and other basic therapeutic skills used in mental health nursing. In-text links, case studies, and self-assessment questions and NCLEX-style testing are utilized.

This course is designed for registered nurses, licensed practical/vocational nurses, and newly licensed registered nurses who desire a greater understanding of basic mental health concepts. A fundamental understanding of medical terminology, abbreviations, and nursing care is assumed.

Learning objectives

Upon completion of the course, the learner will be able to:

- Explore historical aspects associated with mental healthcare.
- Identify legal and ethical principles of mental health nursing.
- Explore cultural aspects of mental health.
- Describe components of the psychiatric assessment, including the mental status exam.
- Describe neurobiological components essential to mental health.
- Identify therapeutic modalities used in mental healthcare.

How to receive credit

- Read the entire course online or in print which requires a 6-hour commitment of time.
- Complete the self-assessment quiz questions which are at the end of the course or integrated throughout the course. These questions are NOT GRADED. The correct answer is shown after you answer the question. If the incorrect answer is selected, the rationale for the correct answer is provided. These questions help to affirm what you have learned from the course.
- Depending on your state requirements you will be asked to complete either:
  - An affirmation that you have completed the educational activity.
  - A mandatory test (a passing score of 70 percent is required). Test questions link content to learning objectives as a method to enhance individualized learning and material retention.
- If requested, provide required personal information and payment information.
- Complete the MANDATORY Course Evaluation.
- Print your Certificate of Completion.

CE Broker reporting

Colibri Healthcare, LLC, provider # 50-4007, reports course completion results within 1 business day to CE Broker. If you are licensed in Arkansas, District of Columbia, Florida, Georgia, Kentucky, Michigan, Mississippi, New Mexico, North Dakota, South Carolina, or West Virginia, your successful completion results will be automatically reported for you.

Accreditations and approvals

Colibri Healthcare, LLC is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation.

Individual state nursing approvals

Colibri Healthcare, LLC is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation. In addition to states that accept courses offered by ANCC Accredited Providers, Colibri Healthcare, LLC is an approved Provider of continuing education in nursing by: Alabama Board of Nursing, Provider #ABNP1418 (valid through February 5, 2025); Arkansas State Board of Nursing, Provider #50-4007; California Board of Registered Nursing, Provider #CEP17480 (valid through January 31, 2024); California Board of Vocational Nursing and Psychiatric Technicians (LVN Provider #V15058, PT Provider #V15020; valid through December 31, 2023); District of Columbia Board of Nursing, Provider #50-4007; Florida Board of Nursing, Provider #50-4007; Georgia Board of Nursing, Provider #50-4007; Kentucky Board of Nursing, Provider #7-0076 (valid through December 31, 2023; CE Broker Provider #50-4007); Michigan Board of Nursing, Provider #50-4007; Mississippi Board of Nursing, Provider #50-4007; New Mexico Board of Nursing, Provider #50-4007; North Dakota Board of Nursing, Provider #50-4007; South Carolina Board of Nursing, Provider #50-4007; and West Virginia Board of Registered Nurses, Provider #50-4007. This CE program satisfies the Massachusetts States Board's regulatory requirements as defined in 244 CMR5.00: Continuing Education.

Activity director

Deborah Martin, DNP, MBA, RN, NE-BC, FACHE, Director of Learning Innovation Colibri Healthcare, LLC

Disclosures

Resolution of conflict of interest
In accordance with the ANCC Standards for Commercial Support for continuing education, Colibri Healthcare, LLC implemented mechanisms prior to the planning and implementation of the continuing education activity, to identify and resolve conflicts of interest for all individuals in a position to control content of the course activity.

Sponsorship/commercial support and non-endorsement
It is the policy of Colibri Healthcare, LLC not to accept commercial support. Furthermore, commercial interests are prohibited from distributing or providing access to this activity to learners.

Disclaimer

The information provided in this activity is for continuing education purposes only and is not meant to substitute for the independent medical judgment of a healthcare provider relative to diagnostic and treatment options of a specific patient's medical condition.

Course verification

All individuals involved have disclosed that they have no significant financial or other conflicts of interest pertaining to this course. Likewise, and in compliance with California Assembly Bill No. 241, every reasonable effort has been made to ensure that the content in this course is balanced and unbiased.

INTRODUCTION

In 1973, the American Nurses Association (ANA) developed standards as a framework for psychiatric-mental health nursing practice, which evolved into the "Psychiatric-Mental Health Nursing: Scope and Standards of Practice" (2nd edition, 2014). These practice guidelines provide a foundation for standardization of the professional role, scope, and standards of practice for psychiatric-mental health nurses. During the 1980s and 1990s, respectively, the American Nurses Credentialing Center (ANCC) and American Association of Nurse Practitioners (AANP) implemented specialty certifications relevant to the level of education and experience of the applicants. Increasing numbers of psychiatric mental health nurse practitioners (PMHNPs) have obtained certification to provide advanced care to individuals in both acute and community health settings.

HISTORY OF MENTAL HEALTHCARE

Before the late 1800s, unusual behaviors were commonly thought to be caused by demonic forces. Those who displayed strange behaviors were often banished or confined. People with these odd behaviors were treated poorly and the treatments were aggressive and torturous. In the late 1700s, Philippe Pinel became the superintendent of a mental institution in France (Keltner, 2015). He noted the substandard conditions of the institution and the brutal treatment of the patients. He was the first to begin what became known as *moral therapy*, which consisted of better treatment, including unchaining patients and allowing them time outside. Soon after, William Tuke founded a similar facility in England (Boyd, 2018; Kibria & Metcalfe, 2016). This facility was based on the religious teachings of the Quakers and ensured moral treatment. Tuke saw this institution as a refuge for those with mental illness.

In the United States, Dorothea Dix, a Boston school teacher, was instrumental in opening a state hospital that endorsed a warm and caring environment, providing food and protection for Massachusetts residents (Boyd, 2018; Forrester, 2016). This facilitated a movement toward a more humanistic view of those with mental illness.

In the late 1800s and early 1900s, Sigmund Freud developed his landmark work regarding how childhood experiences and faulty parenting shape the mind (Boyd, 2018; Fromm, 2013). This began the movement toward scientific reasoning and understanding behaviors. Freud influenced researchers such as Carl Jung and Alfred Adler as well as other researchers who contributed to the fields of behaviorism, somatic treatments, and biology (Wedding & Corsini, 2020). With these new

developments, patients with psychiatric disorders began to receive needed psychiatric treatment and rehabilitation.

In 1946, the United States passed the National Mental Health Act, which resulted in the establishment of the National Institute of Mental Health or NIMH. In the second half of the 20th century, equality became a central tenet in mental health treatment. Many mental healthcare consumers became advocates and began to promote the rights of those with mental illness, working to demolish stigma, discrimination, and forced treatments.

In 1979, the National Alliance on Mental Illness, an advocacy group, was formed. Through the work of the alliance and other advocacy efforts, mental health patients were granted autonomy and began participating in their own care.

The 1990s were known as the *decade of the brain*, with focus placed on neuroscience and brain research.

It stimulated a worldwide growth of scientific research and advances, including the following:

- Research on genetic basis for mental illnesses.
- Mapping of the genes involved in Parkinson, Alzheimer's, and epilepsy.
- Discovery of the actions and effects of neurotransmitters and cytokines.
- Advancements in neuroimaging techniques that have increased our understanding of normal brain function and pathologic states (Halter, 2018).

In 1990, the Human Genome Project began to map the human genome. This 13-year project strengthened the theory that there are biological and genetic explanations for psychiatric conditions (https://www.genome.gov/human-genome-project). Although researchers have begun to identify genetic links to mental illness, research has yet to reveal the exact nature and mechanisms of the genes involved. It has been established, however, that psychiatric disorders can result from multiple mutated or defective genes.

EPIDEMIOLOGY

Epidemiology is the scientific study of the distribution (frequency, pattern) and determinants (causes, risk factors) of health-related states and events (not just diseases) in specified populations including neighborhoods, schools, cities, states, countries, and globally (https://www.cdc.gov/). Concepts related to epidemiology include *incidence* and *prevalence*. Applied to mental health, incidence is the number of new cases of a mental disorder in each period. Prevalence is the total number of cases in each population for a specific period. According to 2019 data from the National Institutes of Mental Health (NIMH), an estimated 51.5 million adults aged 18 or older (20.6%) in the United States have been diagnosed with mental illness. Lifetime prevalence estimates 49.5% of adolescents have been diagnosed with a mental disorder and 22.2% have had severe impairment (NIMH).

POLICY AND PARITY

The first Surgeon General's report on mental health was published in 1999. This landmark report, which was based on scientific literature and included a focus on mental health providers and consumers, concluded that mental health is fundamental to holistic health and that effective treatments for mental disorders are available.

In 2003, the President's New Freedom Commission on Mental Health recommended that the healthcare system needed to streamline care for those suffering from mental illness. This commission advocated for early diagnosis, prevention, and treatment and set forth new expectations for recovery and assistance for those experiencing mental illness to find housing and work.

In 2006, the Institute of Medicine (now the Health and Medicine Division of the National Academies) Committee on Crossing the Quality Chasm published Improving the Quality of Health Care for Mental and Substance Use Conditions. The *Quality Chasm* series highlights effective treatments and addresses large gaps in care, focusing on voluntary treatment. Additionally, this promotes a system that treats mental health issues separately from physical problems. A strong recommendation was made for equality in financial reimbursement and quality treatment. *The Mental Health Parity and Addiction Equity Act of 2008* (Office of the Federal Register, 2013) sought to improve the quality of treatments for those with mental illness by advocating mental health coverage at the same annual and lifetime benefit as any medical-surgical coverage (Centers for Medicare & Medicaid Services, n.d.). This Act required any business with more than 50 employees to have mental health coverage at the same level as medical-surgical coverage (Centers for Medicare & Medicaid Services, n.d.). This includes deductibles, copayments, coinsurance, out-of-pocket expenses, and treatment limitations. The requirements under the Act are applied indirectly to small group health plans in tandem with the Affordable Care Act's essential health benefit requirements (Centers for Medicare & Medicaid Services, n.d.).

PSYCHIATRIC AND MENTAL HEALTH NURSING

The psychiatric nurse *promotes mental health through the assessment, diagnosis, and treatment of human responses to mental health problems and psychiatric disorders* (American Nurses Association, 2014, p. 129). Psychiatric nursing integrates the use of self, neurobiological theories, and evidence-based practice in planning treatments. Nurses work in a variety of inpatient and outpatient settings with individuals and families across the lifespan who exhibit mental health needs. Specific activities of the psychiatric nurse are defined by the Psychiatric-Mental Health Nursing: Scope and Standards of Practice, published jointly by the American Nurses Association, the American Psychiatric Nurses Association, and the International Society of Psychiatric Mental Health Nurses (American Nurses Association, 2014).

Nurses encounter patients in crisis in many clinical settings. The crisis may be physical, emotional, mental, or spiritual. Regardless of the origin, these patients express a variety of feelings including hopelessness, helplessness, anxiety or anger, low self-esteem, and confusion. Many individuals act withdrawn, suspicious, depressed, hostile, or suicidal. Additionally, the individual may be intoxicated or withdrawing from alcohol or other substances. Knowledge of basic psychiatric concepts increases nursing competency in any clinical setting.

DSM-5 NOMENCLATURE FOR DIAGNOSES AND CLASSIFICATIONS

Blood tests, though useful for diagnosing many physical disorders, cannot diagnose all psychiatric disorders. Instead, healthcare practitioners base their diagnoses primarily on symptoms. Emil Kraepelin was the first healthcare provider to recognize and categorize patients' symptoms into mental disorders around the turn of the 20th century (Boyd, 2018).

Today, healthcare providers often use other forms of tests, such as genetic testing, computerized tomography, magnetic resonance imaging, and positron emission tomography, to detect changes in the brain and brain activity.

By 1880, researchers had developed seven classifications of mental illness: mania, melancholia, monomania, paresis, dementia, dipsomania, and epilepsy (APA, n.d.). By 1918, the need for uniformity in diagnoses drove the Committee on Statistics of the American Medico-Psychological Association, which later became the American Psychiatric Association (APA, 2013), to develop the first *Statistical Manual for the Use of Institutions for the Insane*. The purpose of this document was to gather statistical information from institutions regarding 22 known disorders. Following World War II, US Army psychiatrists expanded the diagnostic categories to better incorporate the types of problems veterans experienced as a result of combat (APA, n.d.).

In 1952, the APA published the first edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM).* Since then, the APA has published new editions of the DSM every 5 to 10 years. In 2013, the APA released the fifth edition of the DSM, the most recent version (APA, 2013). The DSM-5 is the result of a 12-year revision process involving hundreds of professionals, field trials to demonstrate the reliability of the data, and public and professional review and comment (APA, 2013).

The purpose of the DSM-5 is to facilitate healthcare providers' diagnosis of mental disorders and development of individualized treatment plans (APA, 2013). The DSM-5 bases disorders on a continuum from mental health to mental illness. A mental disorder is defined in the DSM-5 as *a syndrome characterized by clinically significant disturbance in the individual's cognition, emotion regulation, or behavior that reflects a dysfunction in the psychological, biological, or developmental processes underlying mental functioning* (APA, 2013, p. 20). The definition also reflects the high level of disability or distress in occupational or other life activities that results from the mental disorder.

Some healthcare providers feel that the DSM-5's categorical classifications limit its use because individuals may not fit neatly into one specific category. Regardless, the DSM-5 serves as a guideline to assist practitioners in making sound clinical decisions. Diagnosis does not always imply etiology; therefore, using the DSM-5 to predict behavior or response to treatment is inappropriate (APA, 2013).

THEORIES RELATED TO PSYCHIATRIC AND MENTAL HEALTH NURSING

Mental health professionals base their work on assessments, behaviors, and theories. These are often described as explanations or hypotheses and tested for relevance and soundness. In mental health, theories are often borrowed from other disciplines and inspire treatments for the practice of psychiatric nursing.

Freud's psychoanalytic theory

Sigmund Freud, referred to as *the father of psychoanalysis*, revolutionized thinking about mental disorders (Townsend, 2019). His theories of personality structure, level of awareness, anxiety, the role of defense mechanisms, and stages of psychosexual development revolutionized the psychiatric world (Townsend, 2019). Although Freud started as a biological scientist, he changed his approach to conversational therapy. He concluded that talking about difficult issues involving intense emotions had the potential to heal problems that could cause mental illnesses. This led Freud to develop his psychoanalytic theory (https://pmhealthnp.com/pmhnp-topics/sigmund-freud-psychoanalytic-theory/).

Erikson's theory on the stages of human development

Erik Erikson, a developmental psychologist, emphasized the role of the psychosocial environment and expanded on Freud's psychoanalytic theory. The Eight Stages of Man, is organized by age and developmental conflicts:

1. Basic trust versus mistrust.
2. Autonomy versus shame and doubt.
3. Initiative versus guilt.
4. Industry versus inferiority.
5. Identity versus role confusion.
6. Intimacy versus isolation.
7. Generativity versus stagnation.
8. Ego integrity versus despair.

Analysis of behavior using Erikson's framework helps nurses to identify long term successful resolution of psychosocial development across the lifespan.

Harry Stack Sullivan's interpersonal theory

Interpersonal theories are the cornerstone of mental health nursing. Harry Stack Sullivan, an American-born psychiatrist, identified personality as an observable behavior within interpersonal relationships, which led to the development of his interpersonal theory. Sullivan believed that anxiety or painful feelings arise from insecurities or the inability to meet biological needs. All behaviors are designed to help individuals through interpersonal interactions by decreasing anxiety. Individuals are unaware that they act out behaviors to decrease anxiety and therapy can help the patient gain personal insight into these insecurities. He was the first to use the term *participant observer*, which refers to the idea that therapists must be part of the therapeutic session. Sullivan insisted that healthcare professionals should interact with patients as authentic human beings through mutual respect, unconditional acceptance, and empathy. Sullivan developed the concept of psychotherapeutic environments characterized by accepting the patient and the situation, which has become an invaluable treatment tool. Even today, many group psychotherapies, family therapies, and training programs use Sullivan's design of an accepting atmosphere (Halter, 2018).

Hildegard Peplau's theory of interpersonal relations

Hildegard Peplau, sometimes referred to as the *mother of psychiatric nursing*, published the theory of interpersonal relations in 1952, which became a foundation for modern psychiatric and mental health nursing (Townsend, 2019). The goal of interpersonal therapy is to reduce or eliminate psychiatric symptoms by improving interpersonal functioning (Sadock, & Ruiz, 2015). Sullivan's work greatly influenced Peplau. She developed the first systematic framework for psychiatric nursing, focusing on the nurse-patient relationship. Peplau established the foundation of professional practice for psychiatric nurses and continued working on psychiatric nursing theory and advancement of nursing practice throughout her career. She was the first nurse to identify mental health nursing as a specialty area with specific ideologies and principles, and the first to describe the nurse-patient relationship as the foundation for nursing practice (Boyd, 2018).

Peplau created a major shift from a care model focused on medical treatment to one based on the interpersonal relationship between nurses and patients. She further proposed that nurses are both participants and observers in the therapeutic treatment of patients. Her theory recognizes the *ability to feel in oneself the feelings experienced by another*; she identified this as *empathetic linkage* (Boyd, 2018). Another key concept, according to Peplau, is anxiety, which is an energy that arises when present expectations are not met (Boyd, 2018). Throughout her career, Peplau's goal was for nurses to care for the person and the illness.

B.F. Skinner's behavioral theory

Behavioral theories supply techniques that patients can use to modify or replace behaviors. This is an important concept in psychiatric nursing management and is the basis of several approaches that research has shown to be successful in altering specific behaviors. B. F. Skinner, a prominent behaviorist, researched *operant conditioning*, the process through which consequences and reinforcements shape behaviors. Behavioral therapy is grounded in the assumption that maladaptive behaviors can be changed, and positive and negative reinforcements can be used to help modify behavior.

Behavioral therapy is often used in treating people with phobias, alcoholism, and anxiety. Another type of behavioral therapy is modeling, in which the therapist or nurse role-plays specific behaviors so that the patient can learn through imitation. Role-playing allows the patient to practice modeled behaviors in a safe environment. Another form of behavioral therapy is systematic desensitization, which targets a patient's specific fears and proceeds in a step-by-step manner to alleviate those fears with the help of relaxation techniques (Keltner, 2018).

Aaron Beck's cognitive behavioral therapy

Whereas behaviorists focus on the belief that behaviors can be changed, other researchers focus on cognition or thoughts involved in behaviors. Aaron Beck developed cognitive behavioral therapy after working with depressed patients. Cognitive behavioral therapy is based on cognitive psychology and behavioral therapy. Beck believed that depression was the result of distorted thinking processes and negative self-concept (https://www.ncbi.nlm.nih.gov/books/NBK470241/). Using this approach, the nurse can help the patient identify negative thought patterns and then help the patient recondition these cognitive distortions into more appropriate beliefs that are based on facts (https://www.ncbi.nlm.nih.gov/books/NBK470241/).

Humanistic theories

Humanistic theories focus on the potential and the free will of patients. These theories emphasize self-actualization, the highest potential and productivity that an individual can achieve in life. For example, Abraham Maslow believed that motivation is driven by a hierarchy of needs that leads to becoming the best person possible. This model allows the nurse to work with the patient to create an individualized care plan based on the current hierarchical needs of the patient https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4130906/.

THE STRESS-DIATHESIS MODEL

The Stress-Diathesis Model was originally developed to explain schizophrenia during the 1960s, but later adapted to study depression during the 1980s (Colodro-Conde, et.al, 2018). According to this model, stress activates certain vulnerabilities (diathesis), which predisposes the individual to psychopathology. This model has been criticized for its vagueness, yet these principles are used to understand other psychiatric disorders.

BIOLOGICAL MODEL

Mental health nurses also attend to the physical needs of psychiatric patients. The nurse may administer prescribed medication, nutrition, and hydration to ensure optimal physiological functioning of the patient. The biological model of mental illness focuses on the chemical, biological, and genetic makeup of mental illness. This model seeks to understand how the body and brain interact to create experiences and emotions, and how social, environmental, cultural, spiritual, and educational factors influence individuals (Halter, 2018). All the theories discussed in this section play a vital role in how the nurse cares for the patient with a mental health disorder.

Self-Assessment Quiz Question #1

Which best describes Aaron Beck's Contribution to the mental health profession?

a. Hierarchy of needs.
b. Cognitive behavioral therapy.
c. Empathetic linkages.
d. Operant conditioning.

ETHICAL, LEGAL, AND CULTURAL CONSIDERATIONS

The term *ethics* refers to an individual's beliefs about right and wrong and societal standards regarding right and wrong. Bioethics refers to ethical questions related specifically to healthcare (Halter, 2018).

Ethics are linked to cultural values. Societal standards and values can be determined only within a specific group. However, fundamental principles of ethics exist in all cultures and are inherent in all human beings. Understanding how cultures view mental illness and the accompanying patient symptoms can influence how decisions, particularly ethical decisions, are made. Nurses can be an instrumental part of effective decision making when cultural values and societal standards differ.

A thorough understanding of general ethical principles is necessary to make reasonable, fair, and sound judgments in providing care. Nurses who choose to work in the specialty of mental healthcare will encounter ethical questions on almost a daily basis. Issues such as autonomy, confidentiality, patient protection, therapeutic relationships, mental health competency, and mental health admissions are particularly complicated. To better guide the nurse in making ethical choices, an understanding of the American Nurses Association Code of Ethics and the five basic principles of bioethics is useful.

American Nurses Association Code of Ethics

The American Nurses Association (ANA) established an ethical standard for the nursing profession that guides ethical analysis and decision making (ANA, 2015). Ethics is a branch of philosophy where one reflects on morality, which is the person's character, values, and conduct in a particular situation (ANA, 2015).

The Code of Ethics is the foundation for nursing theory and practice where values and obligations shape the nursing profession (ANA, 2015). This living document changes based on nursing's social context, with a revision occurring at minimum every 10 years (ANA, 2015). The ANA Code divides ethical issues into nine provisions, based on general ethical principles:

- Provision 1
  - The nurse practices with compassion and respect for the inherent dignity, worth, and unique attributes of every person, including self-determination (ANA, 2015).
- Provision 2
  - The nurse's primary commitment is to the patient, whether an individual, family, group, community or population (ANA, 2015).

- Provision 3
  - The nurse promotes, advocates for, and protects the rights, health, and safety of the patient (ANA, 2015).
- Provision 4
  - The nurse has authority, accountability, and responsibility for nursing practice, makes decisions, and takes action consistent with the obligation to promote health and to provide optimal care (ANA, 2015).
- Provision 5
  - The nurse owes the same duties to self as to others, including the responsibility to promote health and safety, persevere wholeness of character and integrity, maintain competence and continue personal and professional growth (ANA, 2015).
- Provision 6
  - The nurse, through individual and collective effort, establishes, maintains, and improves the ethical environment of the work setting and conditions and employment are conducive to safe, quality care (ANA, 2015).
- Provision 7
  - The nurse, in all roles and settings, advances the profession through research and scholarly inquiry, professional standards development, and the generation of both nursing and health policy (ANA, 2015).
- Provision 8
  - The nurse collaborates with other health professionals and the public to protect human rights, promote health diplomacy, and reduce health disparities (ANA, 2015).
- Provision 9
  - The profession of nursing, collectively through its professional organizations, must articulate nursing values, maintain the integrity of the profession and integrate principles of social justice into nursing and health policy (ANA, 2015).

The ANA Code may be viewed at no charge on the ANA website (https://www.nursingworld.org/coe-view-only).

Bioethical principles

Bioethics is a branch of ethics that studies the implications of biological and biomedical advances and can be considered a set of guiding principles for the nursing profession that go beyond right and wrong. Bioethical principles fall into five categories (Boyd, 2018; Halter, 2018). These principles are meant to be guidelines to help all clinicians in decision making.

- *Beneficence*: Clinicians have a duty to assist the patient to achieve a higher level of well-being. This concept encompasses kindness and generosity toward the patient in providing care. An example of this is changing healthcare policy or making sure a patient brought to the emergency department in severe pain gets medication as soon as possible.
- *Fidelity*: Healthcare providers have a duty to be honest and trustworthy. This concept includes loyalty, advocacy, and a commitment to the patient. An example of this is staying abreast of best practices in nursing or advocating for the patient to receive high-quality services. Another example is being faithful in your promises to check on a patient within a specific timeframe.
- *Autonomy*: The healthcare provider acknowledges the patient's right to make their own decision, even if the nurse disagrees with the decision. An example of this is a patient with cancer who refuses treatments that may prolong their life.
- *Justice*: Healthcare providers must recognize that all persons are entitled to equal treatment and quality of care. For example, it can be particularly difficult to provide emotional support and counseling equally to both the family harmed by an intoxicated driver and to the driver. Healthcare providers should strive to be nonjudgmental and fair to all patients, regardless of age, gender, race, sexual orientation, diagnosis, or any other differentiating characteristic.
- *Veracity*: The healthcare provider should always be truthful with the patient. This allows the patient to make informed decisions about their treatment. For example, talking to the patient about the side effects of medications is showing respect to the patient by being truthful.

Self-Assessment Quiz Question #2

Patients admitted to inpatient psychiatric units are scheduled for group therapy two times daily. Attendance is strongly encouraged, but not mandatory. Which ethical principle is demonstrated by this unit policy?

a. Autonomy.
b. Justice.
c. Beneficence.
d. Veracity.

IMPORTANT LEGISLATION IN MENTAL HEALTH

Section 1 of the 14th Amendment to the US Constitution adopted on July 9, 1868, states:

> *All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the state wherein they reside. No state shall … deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws* (U.S. Constitution). The issue of liberty has been tested repeatedly in the courts in cases in settings where U.S. citizens have been held against their will, including in psychiatric institutions.

Keltner and Steele (2018) provide an overview of landmark legal decisions related to patients with psychiatric disorders. Historically, these nine rulings have had a major impact on the legal rights of patients with psychiatric disorders. A summary of each of these legal decisions is as follows:

> 1843 – The *M'Naghten rule* first identified a legal defense of not guilty by reason of insanity by stating that persons who do not understand the nature of their actions cannot be held legally responsible for those actions (https://www.law.cornell.edu/wex/m%27naughten_rule).
>
> 1965 – In *Griswold v. Connecticut*, The Supreme Court first recognized that a person has the right of marital privacy under the Constitution of the United States (https://www.law.cornell.edu/wex/griswold_v_connecticut_(1965)).
>
> 1966 – In *Rouse v. Cameron*, the courts found that a patient committed to an institution must be actively receiving treatment and not merely warehoused (https://casetext.com/case/rouse-v-cameron)
>
> 1968 – In *Meier v. Ross General Hospital*, a physician was found liable for the death of a hospitalized patient who committed suicide while under his care. The patient had a previous suicide attempt before the hospital stay. The physician was liable for failing in his *duty to warn* of the threat of suicide in this patient (https://caselaw.findlaw.com/ca-supreme-court/1822578.html)
>
> 1972 – In *Wyatt v. Stickney*, the entire mental healthcare system of Alabama was sued for an inadequate treatment program. The court ruled that each institution within the mental healthcare system must (1) stop using patients for hospital labor needs, (2) ensure a humane environment, (3) maintain minimum staffing levels, (4) establish human rights committees, and (5) provide the least restrictive environment possible for the patients (https://mentalillnesspolicy.org/legal/wyatt-stickney-right-treatment.html).

1976 – In the well-known case of *Tarasoff v. The Regents Of the University of California*, the parents of Tatiana Tarasoff sued the university following the 1969 death of their daughter at the hands of Prosenjit Poddar. Poddar had told his therapist that he planned to kill Tarasoff when she returned from summer break. Although the therapist had contacted the police, law enforcement released Poddar because he appeared rational. The court found that the therapist had a *duty to warn of threats of harm to others* and was negligent in not notifying Tarasoff of the threats that had been made against her (https://law.justia.com/cases/california/supreme-court/3d/17/425.html).

1979 – Patients at Boston State Hospital sought the right to refuse treatment in *Rogers v. Okin*. Based on the 1965 decision regarding the right of personal privacy, the court found that the hospital could not force nonviolent patients to take medication against their will. This ruling also included the directive that patients or their guardians must give informed consent before medications could be given (https://pubmed.ncbi.nlm.nih.gov/6134270/ and https://muse.jhu.edu/article/404046).

1983 – In *Rennie v. Klein*, a patient claimed a hospital violated his rights when he was forced to take psychotropic medications. The ruling again addressed the right to refuse treatment and the right to privacy, and it furthered the necessity of obtaining informed consent (https://pubmed.ncbi.nlm.nih.gov/11648483/).

1992 – *Foucha v. Louisiana* demonstrated that the nature of an ongoing psychiatric commitment must *bear some reasonable relation to the purpose for which the patient is committed* (Foucha v. Louisiana, 1992). When Foucha was first hospitalized, the indication was a patient who was considered mentally ill and dangerous. The ruling recognized that patients who are no longer mentally ill do not require hospitalization and that patients are not required to prove themselves to be no longer dangerous (https://www.law.cornell.edu/supct/html/90-5844.ZO.html).

Mental health laws have been created to protect patients with psychiatric disorders and regulate their care. These laws often vary by state. Check the Nurse Practice Act within the respective state of practice to determine state-level regulation.

MENTAL HEALTH AND DEINSTITUTIONALIZATION

The changes in mental healthcare over the years show a shift in care from institutionalization to community settings, also known as deinstitutionalization (Boyd, 2018). Deinstitutionalization was also significant because this shaped our current community and mental health treatment for many vulnerable individuals including the homeless and those with substance use disorders. During the era of state hospitals, mentally ill individuals were less likely to be chronically homeless. While deinstitutionalization was a noble concept, it was not well implemented. The lack of existing public health infrastructure left communities unprepared to manage those with chronic mental illness. Additionally, the arrival of inexpensive and accessible illicit drugs like crack cocaine, changed the face of communities and left those with mental illness even more vulnerable. The lack of affordable treatment for mental health disorders contributes to both individual and public health risk.

Two of the most important concepts in civil rights law are the writ of habeas corpus and the least restrictive alternative doctrine (Halter, 2018). The writ of habeas corpus pertains to holding people against their will. Psychiatric patients are included in this protection and they have the right not to be detained unless individual welfare is involved. Additionally, the least restrictive alternative doctrine states that a patient's autonomy must be upheld whenever possible (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2733575/pdf/behavan00025-0105.pdf). In practice it means that nurses need to try to manage patients' symptoms and behaviors with psychotherapeutic interventions (milieu management, communication, and behavioral approaches) first. If symptoms are not fully or adequately managed, nurses should document what was attempted and ineffective in order to move to more restrictive measures or levels of care (i.e. move up the treatment hierarchy to more restrictive approaches such as medications/chemical restraints, seclusion, and/or physical restraints). Each time a more restrictive measure is applied, documentation needs to support which lesser restrictive strategies were attempted and describe their lack of efficacy.

An understanding of civil rights and state regulations is important to patient care procedures. Admission of psychiatric patients can be voluntary or involuntary, but neither voluntary nor involuntary admission indicates the ability of the patient to make decisions (Halter, 2018). Admission procedures are in place to protect the patient and the public. Involuntary admission is used when patients are a danger to self or others or cannot take care of themselves. However, all patients are to be treated with respect and have the right to informed consent, the right to refuse medications, and the right to the least restrictive treatments (Boyd, 2018). Furthermore, the patient must be seen by a specified number of providers who confirm that the patient meets the criteria for involuntary admission.

THE CONSUMER BILL OF RIGHTS AND CONFIDENTIALITY

In 1997, President Clinton appointed the Advisory Commission on Consumer Protection and Quality in the HealthCare Industry. The Commission, co-chaired by Donna Shalala, secretary of the Department of Health and Human Services at the time, issued its final report, which included a Consumer Bill of Rights & Responsibilities. Of interest to psychiatric nurses is the section on confidentiality of health information. Patients with psychiatric disorders are expressly protected in the confidentiality of their records; practitioners may not share information with any third party without the express written consent of the patient or their legal guardian. The patient can withdraw consent to release information at any time.

CONSUMER BILL OF RIGHTS AND RESPONSIBILITIES

The Commission's consumer bill of rights consists of the following rights and responsibilities:

1. Access to Accurate, Easily Understood Information about health plans, facilities, and professionals to assist consumers in making informed health care decisions;
2. Choice of Health Care Providers that is sufficient to ensure access to appropriate high quality care. This right includes providing consumers with complex or serious medical conditions access to specialists, giving women access to qualified providers to cover routine women's health services, and ensuring continuity of care for consumers who are undergoing a course of treatment for a chronic or disabling condition;
3. Access to Emergency Services when and where the need arises. This provision requires health plans to cover these services in situations where a prudent layperson could reasonably expect that the absence of care could place their health in serious jeopardy;
4. Participation in Treatment Decisions including requiring providers to disclose any incentives -- financial or otherwise -- that might influence their decisions, and prohibiting gag clauses that restrict health care providers' ability to communicate with and advise patients about medically necessary options;
5. Assurance that Patients are Respected and Not Discriminated Against, including prohibiting discrimination in the delivery of health care services based on race, gender, ethnicity, mental or physical disability, and sexual orientation;
6. Confidentiality provisions that ensure that individually identifiable medical information is not disseminated and that provide consumers the right to review, copy, and request amendments to their medical records;
7. Grievance and Appeals Processes for consumers to resolve their differences with their health plans and health care providers -- including an internal and external appeals process; and
8. Consumer Responsibilities provisions that ask consumers to take responsibility by maximizing healthy habits, becoming involved in health care decisions, carrying out agreed-upon treatment plans, and reporting fraud.

Note. Adapted from the President's Advisory Commission. (1997). Consumer bill of rights and responsibilities. Retrieved from https://govinfo.library.unt.edu/hcquality/press/cborimp.html

In addition to the Consumer Bill of Rights, the Health Insurance Portability and Accountability Act (HIPAA) was enacted in 1996 and went into effect in 2003 (U.S. Department of Health and Human Services, 1996). This act was designed to protect patient health information more securely and has been a major force behind the use of electronic health records.

There are a few circumstances where confidentiality may be waived in mental health (U.S. Department of Health and Human Services, 2000). If the patient has made a direct threat against another person, the healthcare provider has a clear duty to warn the endangered individual (U.S. Department of Health and Human Services, 2000). If the patient has reported actual or suspected abuse (including molestation) or neglect of a minor child, the healthcare provider has an obligation to report this to the appropriate Child Protective Services division of the state's Office of Family and Children. A judge may also order documents (clinical records) to be turned over to the court for examination. A subpoena to appear in court does not constitute a judge's order to release information; it merely mandates the appearance of the subpoenaed individual. Violation of the confidentiality of a patient with a psychiatric illness in situations other than those outlined by law may subject the nurse to legal action and revocation of licensure. Most agencies have an acceptable form that identifies to whom information can be released, the date that the release is valid, and types of information that can be shared.

NURSING LIABILITY IN MENTAL HEALTH

The state nurse practice act (NPA) is the single most important piece of legislation for the nurse because it affects ALL facets of nursing practice. Each state has its own NPA for which the courts have jurisdiction. NPA's generally grant specific provisions on how nurses practice in a state and define 3 levels of nurses: LPNs, RNs, and APRNs with defined scopes of practice. The nurse practice act also established a state board of nursing. Its main purpose is to ensure enforcement of the act and protect the public.

Individuals who present themselves as nurses must be licensed. The National Council of State Boards of Nursing serves as a clearinghouse, further ensuring that nursing licenses are recorded and enforced in all states. Individual state boards of nursing develop and implement rules and regulations regarding the discipline of nursing. Most changes deal with modifications with rules and regulations rather than the act itself. Nurses must be advised of the provisions of the state's nurse practice act. Thus, what is acceptable in one state is not necessarily acceptable in another state.

The nurse has legal liability in the psychiatric setting when caring for patients (Boyd, 2018). *Torts* are wrongful acts that result in injury, loss, or damage and can be intentional or unintentional (Boyd, 2018). *Intentional torts* are voluntary acts that result in harm to the patient and include the following:

- *Assault* involves any action that causes an individual to fear being touched in any way without consent. Examples of this include making threats to restrain a patient or making threats to administer an injection for failure to cooperate.
- *Battery* involves harmful or unwarranted contact with a patient; actual injury may or may not occur. Examples of this include touching a patient without consent or unnecessarily restraining a patient.
- *False imprisonment* involves the unjustifiable detention of a patient. Examples of this include inappropriate use of a restraint or inappropriate use of seclusion

Unintentional torts are involuntary acts that result in harm to the patient and include the following:

- *Negligence* involves causing harm by failing to do what a reasonable and prudent person would do in a similar circumstance (anyone can be negligent). Examples of this include failing to erect a fence around a pool and a small child drowns or leaving a shovel on the icy ground and someone falls down on it and cuts their head.
- *Malpractice* is a type of negligence that refers specifically to healthcare professionals. An example of this includes a nurse who does not check the treatment orders and subsequently gives a medication that kills the patient.

CULTURAL CONSIDERATIONS IN MENTAL HEALTHCARE

Culture influences various aspects of mental health, including the recognition and expression of psychiatric symptoms, coping styles, community support, and the willingness to seek treatment. Cultural concepts of distress are recurrent, locality-specific patterns of aberrant behavior that are not linked to a specific diagnostic category in the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (American Psychiatric Association, 2013). More impoverished communities have environmental risks such as a lack of access to healthy nutritious foods, clean soil, and clean air in urban areas. This may impact mental health via physiological/neurological impact and deficits, especially in vulnerable populations.

As of 2021, the percentage of the US population that self-identified as African American had grown to 13.4% (U.S. Census Bureau QuickFacts: United States). Although anyone can develop a mental health problem, African Americans may experience barriers to appropriate mental healthcare(National Alliance on Mental Illness, n.d.a). For example, the poverty rate among African Americans in 2020 was 19.4%, with 11.4 million people of all races living in poverty (Income and Poverty in the United States: 2020 [census.gov]). Poverty directly relates to mental healthcare access. The poverty rates in the African American community combined with provider bias and patient distrust of the health system can result in subpar mental health care for African Americans (NAMI: National Alliance on Mental Illness. In addition, the African American community has experienced increasing diversity because of immigration from Africa, the Caribbean, and Latin America. Mental healthcare providers need to understand this diversity and develop cultural competence (Boyd, 2018). Contributing to this cultural consideration is the estimation that over half of the prison population has a mental illness and that African Americans are five times more likely to be incarcerated than Whites (Mental Health America, n.d.; Sakala, 2014).

The Latin/Hispanic American population is rapidly growing, currently comprising 18.6% of the nation's total population (U.S. Census Bureau QuickFacts: United States). In 2020, 17.0% of Latin/Hispanic Americans were living in poverty. Rates of mental health disorders in this population are similar to those of non-Hispanic Caucasians, with some exceptions:

- Older Hispanic adults and Hispanic youths are more vulnerable to the stress associated with immigration and acculturation' and experience more anxiety, depression, and drug use than non-Hispanic youths.
- Depression in older Hispanic adults is closely correlated with physical illness; and suicide rates were about 50% that of non-Hispanic Whites, although suicide ideation and unsuccessful attempts were higher (State of Mental Health in America - 2020_0.pdf (mhanational.org).
- There is a higher incidence of post-traumatic stress disorder (PTSD) in Hispanic men, some of which may be attributable to social disorder experienced before immigration. As of 2020, there were 1.2 million Hispanic or Latinos who are US military veterans (U.S. Census Bureau QuickFacts: United States).
- The rates of substance use disorders are slightly lower in Hispanic women and slightly higher in Hispanic men. Hispanics are approximately twice as likely as Whites to die from liver disease, which could be associated with substance use (Hispanic Health | VitalSigns | CDC).

There are few Hispanic children in the child welfare system, but Hispanics are twice as likely as Whites to be incarcerated at some point in their lifetime (Sakala, 2014). The lack of Spanish-speaking mental healthcare providers has been a problem, likely causing fewer than 1 in 11 Hispanic individuals with a psychiatric disorder to seek treatment (Mental and Behavioral Health - Hispanics - The Office of Minority Health (hhs.gov)). Misdiagnosis is common and is often related to language barriers. Among Hispanics living in the United States, one in three do not speak English well (Hispanic Health | VitalSigns | CDC). Hispanic Americans are more likely to use folk remedies solely or as a complement to traditional care, and some may consult church leaders or healers for more traditional care (Hispanic/Latinx | NAMI: National Alliance on Mental Illness).

Asian Americans and Pacific Islanders comprise just over 20 million of the US population and are considered one of the fastest growing racial/ethnic groups within the United States (U.S. Census Bureau, 2020; Wyatt, Ung, Park, Kwon, & Trinh-Shevrin, 2015). By 2060, it is projected that 1 in 10 children in the United States will be Asian (Wyatt et al., 2015). There are numerous ethnic subgroups included in the Asian American/Pacific Islander demographic, with over 100 languages and dialects (Asian American/Pacific Islander Communities and Mental Health | Mental Health America (mhanational.org)). Thirty-two percent of Asian Americans have difficulty accessing mental healthcare services because they do not speak fluent English (Asian American/Pacific Islander Communities and Mental Health | Mental Health America (mhanational.org)). For example, older Asian Americans may not understand questions or the intent of a medical interview, and they may give affirmative answers to avoid confrontation. Asian Americans and Pacific Islanders are the least likely of any group to seek help with mental health issues (Hernandez, Nesman, Mowery, Acevedo-Polakovich, & Callejas, 2015). Although fewer mental health concerns are reported in this group, few epidemiological studies have included this population (Asian American/Pacific Islander Communities and Mental Health | Mental Health America (mhanational.org)). Asian Americans tend to exhibit somatic (physical) symptoms of depression more frequently than emotional symptoms (Boyd, 2018; Kalibatseva & Leong, 2011). The focus on physical symptoms and misdiagnosis serves as a barrier to mental healthcare for this population. Suicide rates within this population should be monitored closely by examining risk factors such as acculturation, family discrimination, social acculturalization, and discrimination (Boyd, 2018; Wyatt et al., 2015).

NURSING CARE IN MENTAL HEALTH

Standards of practice

The American Nurses Association's scope and standards of practice of psychiatric-mental health nursing *(Psychiatric-Mental Health Nursing Scope and Standards of Practice)* provides the foundation for the application of the nursing process to patients with psychiatric disorders (American Nurses Association, 2014). The *PMHNP Scope and Standards of Practice* also serves as a reference document for the National Council Nursing Licensure Examination (NCLEX) and many state nurse practice acts. The *PMHNP Scope and Standards of Practice* includes each step of the nursing process: assessment, diagnosis, planning, implementation, and evaluation.

When using the *PMHNP Scope and Standards of Practice*, the nurse should consider the individual's age, language, and culture. The nurse should also address each patient's developmental level. Note that the age and the developmental level may be incongruent in certain mental illnesses. Use age-appropriate communication techniques to establish a therapeutic alliance with both the patient and the family. Additionally, observations of behaviors and reactions are just as important as the conversation. Parents are often present during a child assessment. However, if abuse or neglect is suspected, it may be prudent to talk to the child or adolescent alone. In cases involving child sexual abuse or other uncomfortable issues, the nurse may need the assistance of a healthcare provider with advanced training to interview the child.

When working with adolescents, the therapeutic alliance may be hindered by concerns of confidentiality. Reassure the adolescent that conversations are confidential, and information is only

shared with team members, except in certain circumstances. In cases of suicidal or homicidal thoughts, sexual abuse, or other high-risk behaviors, the nurse must share the assessment information with other healthcare professionals and the parents. In fact, identifying risk factors in this age group is an important aspect of the assessment.

THE NURSING PROCESS IN MENTAL HEALTH

The physiological health exam and work-up is an initial step for thoroughly and accurately diagnosing and managing mental health conditions, including common screening labs and physical exams to rule out common medical issues that could be causing, mimicking, or contributing to mental health symptoms. Some physiological conditions present with psychiatric symptoms. Ensuring that the patient has a baseline physical assessment assist in the accurate diagnosis and appropriate treatment of all conditions, thus demonstrating the mind-body connection. Because of this link, the history and presenting symptoms of the patient are of utmost importance.

The nursing process is a systematic way of developing an individualized plan of care for those experiencing a disruption in mental health status. The traditional nursing process consists of performing a comprehensive assessment, formulating nursing diagnoses, developing a care plan, implementing selected nursing interventions, and evaluating the outcome or effectiveness of those interventions (Boyd, 2018). Most facilities have their own documentation that follows accepted guidelines for mental health assessment.

Assessment

Creating a therapeutic alliance is an important step in the holistic care of the patient. This connection provides an optimal setting for obtaining the psychosocial and psychiatric history. The first step is to obtain a thorough history of the patient, incorporating elements of current and past health problems, social issues affecting health, and cultural or spiritual beliefs that may support or interfere with prescribed healthcare treatments (Halter, 2018). The nurse should obtain the history in an environment conducive to effective communication between the nurse and the patient. Family members and significant others may or may not be present, or they may be present for a portion of the time and then be asked to step out to maintain the patient's confidentiality. Interviews should be conducted in a private conference room or patient's room (if inpatient or residential) rather than in a public area where others may overhear. If personal safety is a concern, the nurse may request another staff member to be present. The nurse should remove distracting elements such as a television or radio. If the nurse determines that the patient is too ill to be able to provide accurate information or that the interview process itself will be detrimental to the patient's health, then the nurse should obtain information from other reliable sources, such as family members, social workers, therapists, and primary healthcare providers (Boyd, 2018). Documentation of the source of information is important, particularly when the patient is unable to provide an accurate history. Although the psychiatric nurse may gather information from other sources, it is important that the nurse not disclose any information regarding the patient's status without the patient's written consent to avoid a breach in confidentiality.

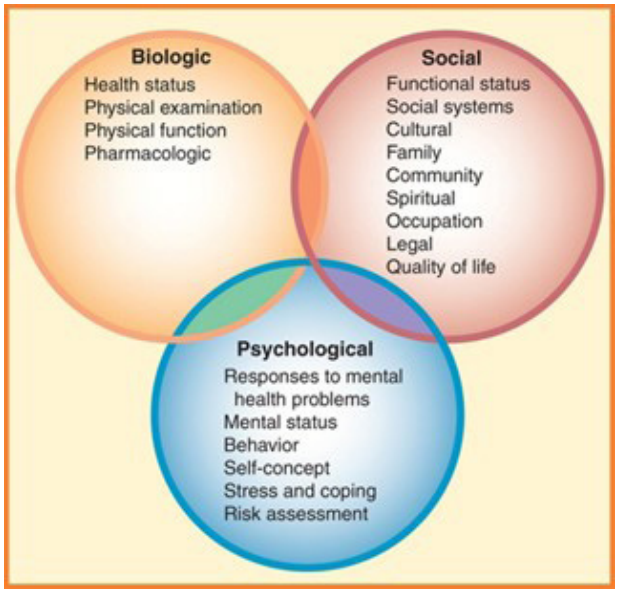
Nursing diagnosis and planning

Most healthcare facilities have an existing form to guide the nurse in data collection. The data collection process assists the nurse in developing a nursing diagnosis list. After identifying real and potential problems, the nurse develops written nursing diagnoses to address each problem. Nursing diagnoses are important in structuring appropriate, efficient nursing care while serving as a common language nursing team members. Prioritization is also based on Maslow's Hierarchy of needs so that physiological and safety needs that are outlined in nursing diagnoses will be addressed first. The nursing diagnosis drives the planning process in the care of patients with psychiatric-mental health disorders. Implementation of interventions is driven by goals established during the planning process. Short- and long-term goals must be observable, measurable (i.e., goals or outcomes that can be evaluated) and realistically attainable in the given time frame and setting. Identifying contributing factors and behavioral symptoms can directly lead to the development of short- and long-term goals that help evaluate progress. Interventions for this population will always include therapeutic communication and the mental status examination (Boyd, 2018).

The biopsychosocial framework

The biopsychosocial framework is a well-accepted, holistic model for organizing healthcare issues (Boyd, 2018). Three interdependent domains have separate treatment focus but interact to provide a framework for implementing nursing care through a systematic process.

The *biologic domain* is related to functional health patterns in mental health such as sleep, exercise, and nutrition. Pharmacologic principles in medication administration are related to neurobiological theories. The *psychological domain* contains the interpersonal dynamics that influence emotions, cognition, and behavior. This generates theories and research critical in understanding symptoms and responses in mental disorders. Therapeutic communication techniques exist in this domain, as there are many cognitive and behavioral approaches in patient care. The *social domain* accounts for the family and community influences in mental disorders. While these influences do not cause mental illness, manifestations and disorders are significantly affected by these factors.



Boyd, 2018

A comprehensive nursing assessment enables the nurse to make sound clinical judgments and plan appropriate interventions. Assessment skills in psychiatric nursing are essential in-patient care. Although data collection and assessment vary among clinical agencies, the psychiatric examination consists of two parts: the psychiatric history and the mental status exam. Patients are often reluctant to discuss mental illness because of the associated stigma. Clinical reasoning in nursing practice depends on critical thinking skills such as problem solving and decision making, where nurses must analyze, interpret, and evaluate biopsychosocial data in the context of the nursing process.

THE MENTAL STATUS EXAMINATION

The mental status examination is a structured means of evaluating the psychological, physical, and emotional state of a patient with a psychiatric disorder to facilitate appropriate healthcare treatments. The nurse may also identify significant problem areas to be addressed in the treatment plan. Mental status exams are an essential tool for evaluating the safety of the patient and caregivers. Although each healthcare facility may vary slightly in its approach, all mental status exams include the same basic elements. These include an assessment of the patient's appearance, behaviors, thoughts, and moods. These are called the ABC's of MSE: (1) A-appearance, (2) B- Behavior and (3) C- Cognition which includes mood, affect and speech. Speech is a reflection of cognition (https://psychscenehub.com/psychinsights/ten-point-guide-to-mental-state-examination-mse-in-psychiatry; Boyd, 2018).

Appearance

Appearance includes primarily objective data based on observations of the patient's general appearance. The nurse assesses the patient's overall hygiene and grooming, considering gender, apparent age, height/weight, dress, odors, and tattoos/piercings. Height and weight should be documented along with nutritional status. The nurse evaluates if the patient looks the stated age since chronological age may not be a reflection of the client's physical/mental status. For example, a patient appears in their 50s, but the actual age is 35, suggesting poor self-care or illnesses (Boyd, 2018).

Behavior

The patient's behavior should be noted during the interview. Consider any mannerisms, notable movements such as agitation, physical slowing (retarded movements), tics, or other abnormal movements. It is important for the nurse to be developmentally and culturally aware during the mental status examination. For example, American culture considers eye contact to be a sign of respect and attention, but other cultures deem eye contact as offensive, challenging, or arrogant (Boyd, 2018).

Mood and affect

Mood is subjective (whatever the patient states) so this must be asked directly (e.g., How is your mood?) and is typically documented in quotations (Mood is "happy"). Affect is objective data (the nurse's observations) based on clinical descriptors that take into account the tone, range, and quality, together with facial expressions and body language that reveal the emotional state or feelings of the person. Mood and affect do not necessarily have to be consistent or similar. For example, a patient may state that their mood is "fine" but through their presentation they are expressing significant difficulty in their emotions with anger, sadness, or depression. Affect is the facial expression, body language, voice, or tone that reveals the emotional state or feelings of a person (Boyd, 2018).

A *dysphoric mood* indicates that the patient is persistently depressed, lethargic, apathetic, or "down" and is usually accompanied by a depressed affect. However, the affect may also be described as anxious or flat, meaning that there is no facial expression of feelings. A *euphoric mood* is an elevated emotional state that may be associated with an affect that is giddy, cheerful, or excessively bright. A *labile affect* is one that is rapidly changing and unpredictable – the patient may be cheerful, then suddenly become enraged with little provocation or may burst into tears unexpectedly. A labile affect can accompany various psychiatric disease states such as depression or psychosis. Substance use can also affect the patient's mood in many ways, depending on the degree of intoxication, the substance used, and any withdrawal symptoms. Some medications can interfere with the physical expression of an emotion, resulting in a flat or blunted affect (Boyd, 2018).

Thought processes

Thought processes refer to the way thoughts are organized and structured. One can think of thought process as HOW one is thinking and thought content as WHAT they are thinking. Speech assessment reveals both. Normally, thoughts are logical, sequential, and easily understood by others (in the absence of a known speech or communication disorder). Patients with disorganized thoughts may respond to questions with nonsensical speech because speech often reflects the thought process. There may be difficulty in performing simple activities such as bathing or eating without assistance, even in the absence of a physical impairment. Patients may mix up or confuse medications when a structured system (such as a weekly pill dispenser) is not available. Thoughts can be rapid, racing, or slowed. Poverty of speech can occur where questions are answered with one or two words and patients may be unable to expand on responses or use their imagination. Thoughts can be either abstract or concrete (Boyd, 2018).

A patient's thought processes may also show flight of ideas, as in the following example: "I came here in an ambulance. I wish I had more money! Did you see that TV show about Pekingese dogs the other night?" When a patient is experiencing a flight of ideas, speech is often accelerated and thoughts are random, abruptly changing with little association between thoughts (Boyd, 2018). When assessing a patient's thought processes, the nurse might also note the phenomenon of word salad. In a word salad, the patient's statements have no logical connections, and the thoughts are jumbled – for example: "I don't. Here, he said. My house. Mouse. Spouse." The previous statement also serves as an example of clang association, which is a pattern of using words because they have similar sounds and not because of the actual meanings of the words. A patient may use neologisms or words that don't exist in the English language. Words such as "frugelzip" or "rappeliciosity" will have a meaning that is clear only to the patient.

Thought content

Thought content refers to what the patient is thinking about. Initially, it is helpful to assess preoccupations or obsessions about real-life events, such as finances, employment, or relationships (Boyd, 2018). Sometimes a patient can experience intrusive or ruminating thoughts. An intrusive thought is an unwelcome idea that occurs without conscious effort, and ruminative thoughts

are thoughts that seem *stuck* in the patient's mind. An obsessive patient may have ruminative thoughts that may be unusual, such as a desire to check the door repeatedly to ensure it is locked or the belief that germs may be everywhere. Obsessive thoughts will often lead to compulsive behaviors – such as ritualized handwashing – in part as an attempt to relieve intrusive thoughts and their accompanying anxiety. The nurse's role is to help the patient understand that these thought processes are irrational.

Thought content problems are of essential importance. *Hallucinations* are false sensory perceptions (Boyd, 2018). Auditory, visual, olfactory, gustatory, or tactile symptoms may be present. Auditory hallucinations, such as hearing voices, are the most common in psychiatric disorders (Boyd, 2018). Visual hallucinations are false visual perceptions, such as seeing people who are not present. Patients can also experience a tactile hallucination, known as a false perception of touch (Boyd, 2018). Tactile hallucinations can present as "hands touching me" or "bugs crawling on me" and can exist with psychological or medical conditions such as withdrawal. When caring for a patient experiencing hallucinations, it is important to remember that the brain perceives the reported sensation, meaning that to the patient, it is very real. It is important for the nurse to address hallucinations with the patient; however, nursing judgment on how to therapeutically address them is critical. Initially, pointing out that the hallucination does not exist may jeopardize the development of a secure nurse-patient relationship; however, rationalizing with and helping the patient reason are important elements in the progression of treatment.

Delusions are fixed false beliefs (Boyd, 2018). The patient experiencing a delusion is certain that something is true, even when there is no substantiating evidence to prove the belief. Paranoid patients may be frightened as they often believe they are being watched, monitored, or spied upon by others. These individuals may report cars following them or mysterious phone calls late at night. Occasionally, a patient with paranoia may fear being poisoned and refuse medications or food. Religious delusions can also occur where the patient may feel persecuted by demons or may be very excited about a special relationship with God or with angels. Careful assessment by the healthcare provider is important to determine a patient's baseline religious beliefs so as not to label a thought as delusional when it is a well-accepted belief for the patient. Somatic delusions are uncomfortable beliefs that there is something wrong with one's body (Boyd, 2018). For example, some patients may believe that their bowels are necrotic or dead or may believe that their brain is missing.

Other delusions may exist such as a belief that aliens are broadcasting signals, or a belief that loved ones have been replaced by clones. It is always essential to determine what feelings are elicited in the patient because of the delusional thoughts. Paranoid thoughts will drive fear and fight-or-flight responses. The patient may set up protective traps around the home to prevent others from entering. Religious delusions may be pleasant and make the patient feel special, or they may be so persecutory that the patient becomes depressed and suicidal. Somatic delusions can lead to excess visits to healthcare providers and may result in the label of "hypochondriac" for the patient.

Ideas of reference can also occur in which the patient may believe that all events in the environment are related to or about them (Boyd, 2018). Patients experiencing ideas of reference may believe that, when in a group setting, others are talking about or ridiculing them (Boyd, 2018). Sometimes, ideas of reference are associated with grandiosity, or the belief that one is especially important or powerful (Boyd, 2018). An elderly homemaker who suddenly believes herself to be the next Marilyn Monroe may be experiencing grandiosity. Grandiose patients attempt to convince others of their importance and may present with perceived rude or arrogant behavior patterns.

Cognition and memory

Cognitive abilities are the elements of thinking that determine attention, concentration, perception, reasoning, intellect, and memory (Boyd, 2018). Attention span is particularly important in evaluating the mental status because a decreased attention span often limits comprehension. Decreased concentration levels and distractibility may occur in patients with disorders that affect attention, as well as for those with depression and other mental health concerns.

The nurse can assess the patient's perception by asking open-ended questions that encourage description, such as "What makes you feel anxious?" (Boyd, 2018). Intellect is assessed through clinical assessment as well as intelligence testing (American Psychiatric Association, 2020). Intelligence quotients (IQs), as well as cognitive, social, and psychomotor capabilities, are assessed to determine intellectual function. Intellectual disabilities are categorized as mild, moderate, severe, or profound. Although IQ scores can serve as a parameter for these categories, the level of severity is determined by adaptive functioning (American Psychiatric Association, 2020).

An assessment of memory consists of three basic parts: immediate recall, recent memory, and remote memory (Boyd, 2018). A simple test of recall is to give the patient three items to remember and then 5 minutes later ask the patient to state those items. *Immediate recall* can be quickly determined by asking what a patient consumed for breakfast. *Recent memory* is recall of one to several days. Questions regarding family members' names or place of residence help assess recent memory. *Remote memory* is recalled from several days to a lifetime. Asking patients where they grew up, what their parents' names were, or where they went to school readily provides this information.

Memory assessments help in differentiating a thought disorder from a dementia disorder. Patients with a primary psychiatric disturbance may be delusional in their beliefs but extremely accurate in memory and recital of facts and dates. A patient with early dementia may lose some short-term memory first, progressing to the loss of immediate recall, then finally to long-term memory loss (Boyd, 2018). *Orientation* means that patients are aware of who they are (person), where they are now (place), the approximate time and date (time), and awareness of the circumstances (situation). A disoriented person may be suffering from a cognitive disorder, drug or alcohol use or withdrawal, or several physical or psychological health problems.

Insight and motivation

Insight refers to patients that demonstrate understanding of their illness and the steps necessary to treat or manage the illness. The determination of a patient's level of insight is often associated with treatment adherence. The goal is that understanding leads to adherence. Occasionally, nurses encounter patients who demonstrate good insight and knowledge, but continue to display nonadherence to recommended treatments. Nurses should ask these patients about barriers to treatment, such as financial constraints or concerns regarding health insurance. The stigma of having a psychiatric diagnosis may lead the patient to feel ashamed or angry. Anger may be causing the patient to intentionally deny and refuse adequate treatment. Hidden motivations, such as the defense mechanisms may also have a significant impact on the patient.

Judgment

Healthcare choices can reflect *judgment*. This can be a positive or negative reflection on an ability to reach a logical decision about a situation (Boyd, 2018). For example, the patient with diabetes who continues to consume a diet high in sugar is demonstrating poor judgment. Actions and behaviors are often signs of judgment capabilities. A manic patient may spend their life savings on a trip or a lottery ticket. However, once in the normal or melancholic state, the patient may have no memory of the incident. Proper evaluation of the mood state when the actions were carried out is an important part of the assessment. Conversely, the patient who recognizes that an increase in paranoia is a sign of decompensation and seeks out emergency treatment is demonstrating good judgment. A patient's insight, or awareness of their own feelings, relates to the ability to display logical judgment (Boyd, 2018). Assessing and understanding a patient's ability to make positive or negative choices is an important piece of planning effective mental healthcare.

Safety

Finally, an evaluation of safety is important in any mental status assessment. The essential areas to examine include safety of self and safety of others. The nurse should determine if the patient has thoughts or urges of intentional harm. When suicidal thoughts are noted, inpatient treatment must be considered. Assessing suicide risk consists of asking the patient about a suicide plan, suicidal intent, and the available means to harm oneself. A well-developed suicide plan with means at hand may necessitate forcing an involuntary hospital stay, whereas an impulsive episode of self-mutilating may be best treated by an intensive outpatient program with family supervision. For example, a hunter who thinks about shooting himself is at much higher risk than the office worker who doesn't own or have access to a gun. Determining the lethality of the means available is also essential.

Patients experiencing extreme emotional pain may also self-mutilate by cutting or burning their arms, legs, or other areas. Although this is not considered suicidal behavior, it is high-risk behavior that indicates significant emotional distress.

The nurse should also determine the degree of risk of harm to others. There are two distinct areas in which patients with a psychiatric disorder may lose their rights to confidentiality: a threat to harm or kill another person and the report of child or elder abuse (Halter, 2018; U.S Department of Health and Human Services, 2019). *Duty to warn is an obligation to warn third parties when they may be in danger from a patient* (Halter, 2018, p. 99; Duty to Warn). The nurse must use all means necessary to reasonably contact the individual at risk, including notifying the police. In most healthcare settings, there are policies to ensure the report is made accurately and documented appropriately. Across the United States, nurses are considered mandatory reporting agents when a patient offers knowledge of abuse, molestation, or neglect of vulnerable patients. The nurse is obligated to report this to the local Child Protective Services agency (Duty to Warn). However, there is a conflict between state and federal law when child abuse is revealed during drug and/or alcohol treatment, and a court order is required for disclosure (Halter, 2018). State laws vary and healthcare providers should be very clear on their respective state laws and facility policy in terms of confidentiality.

THE THERAPEUTIC RELATIONSHIP

Hildegard Peplau applied Sullivan's teaching to her own theory, which nurses still use today in practice. Peplau viewed the nurse-patient relationship as representative of the patient's relationship with other important people in their life (husband, wife, mother, father, etc.). By analyzing the dynamic between the self and the patient, the nurse draws inferences about how the patient interacts with others and helps the patient to develop insight into these behaviors to promote change. Furthermore, Peplau applied Sullivan's views on anxiety as a driving force behind behaviors and related these views to nursing practice and a patient's ability to perceive and learn. For example, mild anxiety promotes learning, whereas severe or panic levels of anxiety prevent learning and distort perceptions (Keltner, 2014, p. 87).

From her own research, Peplau developed the therapeutic model of the nurse-patient relationship and introduced this in 1952 in her book entitled *Interpersonal Relations in Nursing: A Conceptual Frame of Reference for Psychodynamic Nursing*. Today, this framework is relevant as a basis of nurse-patient relationships. The nurse performs several roles while engaged in the relationship, including advocate, teacher, role model, and healer. Peplau saw these roles as significant in each phase of the nurse-patient relationship, all of which overlap and work together to facilitate interventions. There are traditionally three phases in the therapeutic relationship: the initiation (orientation) phase, the working phase, and the termination phase (Edberg, Nordmark, & Hallberg, 1995). Peplau (1952) identified five phases: orientation, identification, exploitation, resolution, and termination.

In the orientation phase, the nurse establishes rapport and begins to discuss the parameters of the relationship. The nurse also collaborates with the patient to identify the problem and extent of intervention needed, and how the patient and the nurse will work together to find solutions (Jones & Bartlett Learning, n.d.). Here the nurse can discuss confidentiality while developing the plan of care. The nurse will also address termination of the relationship. This involves informing the patient that the interactions will take place over a specific period. This helps the patient plan for the termination phase so that complications are less likely to arise when the nurse-patient relationship ends. An example of an orientation-phase introduction is:

> *Good morning, Mr. Jamison. I am Chris and I will be your nurse while you are a patient. I would like to arrange a time to meet this morning to discuss how we will work together to develop the plan of care for the next week. Together we will develop strategies to manage your depression and we will continue to meet daily to evaluate what you have accomplished before you are discharged.*

In the working phase, identification, exploitation, and resolution take place. During identification, the patient begins to identify with the nurse independently, dependently, or interdependently (Jones & Bartlett Learning, n.d.). It is during identification that the nurse reinforces the understanding of the meaning of the patient's situation (Jones & Bartlett Learning, n.d.). During exploitation, the patient utilizes the nurse's services based on personal needs, and once needs are resolved during resolution, mature goals emerge (Jones & Bartlett Learning, n.d.). During this working phase, the patient can practice new techniques or behaviors to manage thoughts, feelings, and behaviors that have contributed to their symptoms and created problems in relationships, occupational functioning, or interpersonal well-being. These skills and strategies can be practiced within the safety of the inpatient, partial hospital, or outpatient environment. The nurse helps to promote problem-solving skills, self-esteem, and behavioral changes. Unconscious thoughts and behaviors may arise in the working phase. It is important to address lingering or past issues to aid in the resolution of present symptoms. The patient learns about *self*, develops coping mechanisms, and tests new behaviors. During this phase, transference and countertransference often occur. Transference takes place when the patient unconsciously displaces feelings for another onto the nurse (Boyd, 2018). Likewise,

countertransference can occur when the nurse's emotions may also be displaced onto the patient (Boyd, 2018). The nurse's self-awareness and ability to maintain healthy boundaries and remain patient focused are important elements of the nurse-patient relationship.

The termination phase is the final phase of the relationship. In this phase, the nurse and the patient discuss the goals and outcomes achieved, review coping skills, and determine how to incorporate new behaviors into life outside of the facility. Closure of the relationship occurs so that the patient and the nurse can move forward. However, this phase can elicit strong emotions of loss or abandonment. For the nurse, feelings of guilt can arise if the patient has not met all goals. It is not appropriate for the nurse to meet with the patient once discharged. The nurse can plan for discharge by recalling successes achieved with the patient and taking pride in helping the patient gain positive outcomes to date. The patient may experience feelings of abandonment which may be revealed in behavior or emotions. For example, the patient may avoid signing necessary papers or have sudden outbursts. The nurse may need to discuss the importance of the termination phase with the patient, help redirect the patient to reflect on successes achieved while working together, and refer the patient to the next level of care, if appropriate (https://psychscenehub.com/psychinsights/ten-point-guide-to-mental-state-examination-mse-in-psychiatry/).

THERAPEUTIC COMMUNICATION

Therapeutic communication and the therapeutic relationship are a significant part of mental health nursing. Hildegard Peplau reiterated this sentiment in her work many times, stating that understanding was central to the nurse-patient relationship (Ramesh, 2013). Therapeutic communication differs from social communication in that patient goals are the central focus of the interaction. The goal may be to solve a problem, examine self-defeating behaviors, or promote self-care. Additionally, therapeutic communication involves active listening and responding in a way that creates rapport and moves the patient toward the end goal.

Therapeutic communication involves trust, boundaries, empathy, genuineness, and respect for the patient, regardless of the patient's condition (Halter, 2018; Morgan & Townsend, 2019). Sometimes, recognizing an individual's behaviors and making statements can add to the assessment data and provide insight into the patient's current state. An example is "I notice you are pacing more today." Allow the patient to respond. Remember that no response from an individual provides further insight into the individual's state of mind.

One important aspect of therapeutic communication is the therapeutic use of self. This is when the nurse uses self-disclosure in a goal-oriented manner to promote trust and teach the patient how to view the feelings or actions of others (Riley, 2015). Use of self, however, should not reveal personal details. Effective use of self involves self-reflection, self-awareness, and self-knowledge. As in any nurse-patient interaction, it is important to remain objective and nonjudgmental while considering the patient's needs. Nonverbal communication can tell the nurse a lot about the patient. Awareness of how the patient gestures or moves while conversing is vital in determining verbal/nonverbal congruence. Sitting across from the patient with an open stance demonstrates openness and a willingness to listen. An angled position or sitting side by side can promote comfort. Additionally, the doorway should never be blocked; this promotes safety as well as prevents the patient from feeling trapped or confined (Boyd, 2018).

A general opening, such as asking how the patient slept, can help facilitate the conversation. Gradually start asking open-ended questions to encourage the patient to engage, such as "Tell me a little about what has been going on." If anxiety or nervousness is observed, the nurse may need to step back and alter the questions or provide encouraging statements such as *go on* or *tell me more about that*. Those types of statements confirm that the nurse is listening and is open to knowing more about the topic. *Why* questions can be perceived as challenging and judgmental (e.g., "Why would you do that?"). Reword the question so that the patient can answer without feeling belittled or betrayed. It is important to get as much of the patient's history as possible. However, this may be difficult if the patient has severe symptoms that may limit their ability to carry on a conversation. In that case, observation will take precedence in the interview.

Samples of therapeutic and nontherapeutic communication techniques are provided in Table 1. *Therapeutic and nontherapeutic communication techniques.* Each of these techniques will elicit responses that give the nurse insight into the patient's thoughts and emotions (Boyd, 2018). Use open-ended questions so that the patient can respond with more than a yes or no answer. Give the patient enough time to answer the question as well. Avoid using jargon or medical terminology (https://publichealth.tulane.edu/blog/communication-in-healthcare/).

Table 1. Therapeutic And Nontherapeutic Communication Techniques

Therapeutic	**Example**
Open-ended question	"How are you feeling?"
Offering self	"I'll sit here with you for a while."
Giving general leads	"Go on … you were saying."
Silence	Sitting quietly.
Active listening	Leaning forward, making eye contact, and being attentive.
Restating	"So, what you're saying is …"
Clarification	"I don't quite understand. Could you explain …"
Making observations	"I notice that you shake when you say that."
Reflecting feelings	"You seem sad."
Encouraging comparisons	"How did you handle this situation before?"
Interpreting	"It sounds like what you mean is …"
Nontherapeutic	**Example**
Closed-ended question	"Did you do this?"
Challenging	"Just what do you mean by that, huh?"
Arguing	"No. That's not true."
Not listening	Body turned away, poor eye contact.
Changing the subject	(Patient states he is sad.) "Where do you work?"
Being superficial	"I'm sure things will turn out just fine!"
Being sarcastic	"Well, that's not important or anything. Not!"
Using clichés	"All's well that ends well."
Being flippant	"I wouldn't worry about it."
Showing disapproval	"That was a bad thing to do."
Ignoring the patient	"Did anyone see the news today?"
Making false promises	"I'll make the doctor listen to you!"

(Boyd, 2018)

During the evaluative process, the nurse will assess the use of defense mechanisms that may indicate the need for ongoing revision of the plan of care. Consistent evaluation of goals and progress is integral for successful nursing care of the patient with a psychiatric-mental health disorder. Sigmund Freud, the grandfather of psychotherapy, believed that most psychiatric disturbances arise out of childhood experiences and the way human beings respond to their environment, and are based on unconscious drives or motivations (Halter, 2018). Freudian therapy, developed in 1936 and referred to as psychoanalysis, attempts to bring the unconscious into consciousness to allow individuals to work through past issues and develop insight into present behaviors. Although classic psychoanalysis as developed by Freud is rarely used today, Freud's understanding of anxiety as well as the unconscious mind are significant drivers in understanding the human response with defense mechanisms (Halter, 2018).

Any behavior or psychological strategies employed (often unconsciously) to protect a person (the real self or 'ego') from discomfort, uncomfortable emotions, anxiety, or tension that may result from unacceptable thoughts or feelings is considered a defense mechanism. Most individuals use defense mechanisms from time to time, but problems may occur when they are used exclusively or in place of healthier coping mechanisms. Therefore, recognition and nursing interventions focused on adaptive coping strategies should be implemented before working to replace the person's usual defense mechanisms. Defense mechanisms are behaviors that an individual uses to deal with stressors. Defense mechanisms can be beneficial and protective for the patient, or they can be counterproductive and maladaptive. Table 2. Defense mechanisms provides an overview of commonly utilized defense mechanisms; a brief discussion of some of these defense mechanisms follows (https://www.ncbi.nlm.nih.gov/books/NBK559106/)

Table 2. Defense Mechanisms

Defense Mechanism	Definition	Example
Repression	Involuntarily forgetting painful events.	A woman who was sexually abused as a child cannot remember that it occurred.
Suppression	Voluntarily refusing to remember events.	An emergency room nurse refuses to think about the child who is dying from injuries sustained in an auto accident.
Denial	Refusing to admit certain things to oneself.	An alcoholic man refuses to believe that he has a problem, in spite of evidence otherwise.
Rationalization	Trying to prove one's actions are justifiable.	A student insists that poor academic advice is the reason he cannot graduate on time.
Intellectualization	Using logic without feelings.	A father analyzes why his son is depressed without expressing any emotions of concern.
Identification	Attempting to model one's self after an admired other.	An adolescent tries to look and dress like his favorite musician to feel stronger and more in control.
Displacement	Discharging pent-up feelings (usually anger) on another.	A child who is yelled at by her parents goes outside and kicks the dog.
Projection	Blaming someone else for one's thoughts or feelings.	A jealous man states that his wife is at fault for his abuse of her.
Dissociation	Unconsciously separating painful feelings and thoughts from awareness.	A rape victim "goes numb" and feels like she is floating outside of her body.
Regression	Returning to an earlier developmental level.	A 7-year-old child starts talking like a baby after the birth of a sibling.
Compensation	Covering up for a weakness by overemphasizing another trait.	A skinny, nonathletic child becomes a chess champion.
Reaction formation	Acting exactly opposite to an unconscious desire or drive.	A man acts homophobic when he secretly believes he is gay.
Introjection	Taking on values, qualities, and traits of others.	A 12-year-old girl acts like her teacher when the teacher is out of the room.
Sublimation	Channeling unacceptable drives into acceptable outlets.	An angry woman joins a martial arts club and takes lessons.
Conversion	Converting psychiatric conflict into physical symptoms.	A lonely, elderly woman develops vague aches and pains all over.
Undoing	Trying to counteract or make up for something.	A man who yells at his boss sends her flowers the next day to "make up."

(Boyd, 2018)

Denial

Denial indicates an inability to believe or act on some type of news or information. This may be attributed to unconscious forces that override a person's rational thoughts or the premise that changing a behavior is more difficult and anxiety provoking than continuing the behavior. For example, a man with lung cancer may continue to smoke because quitting smoking may mean acknowledging a life-threatening illness, or a woman with alcoholism may continue to drink to avoid facing a dysfunctional marriage. Denial provides protection by allowing the psyche to slowly grasp traumatic events (e.g., death of a loved one), but it becomes maladaptive when the person can't move on. Understanding denial as a psychological process is important, especially when it may seem that a patient is not adhering to a plan of care (https://www.ncbi.nlm.nih.gov/books/NBK559106/).

Repression and suppression

Repression and suppression are defense mechanisms that are commonly confused with each other. In repression, a person cannot voluntarily recall a traumatic event such as a rape or terrorist attack (Halter, 2018). Only through therapy and sometimes hypnosis can the memories start to painfully resurface; when they do, the event will be as acutely distressful as if it had just happened. In suppression, a person chooses to ignore or forget painful events; however, when queried, they can instantly recall them (Halter, 2018). This can be very productive for the nurse in an emergency, when they are able to temporarily push aside personal feelings and reactions to deal with the crisis at hand (https://www.ncbi.nlm.nih.gov/books/NBK559106/).

Displacement

Displacement occurs in our everyday lives. For example, when a person has a bad day at work and goes home and takes it out on their spouse or children, displacement has occurred as the person has shifted their feelings away from the intended object (job, boss, etc.) and onto an innocent and unsuspecting other. Displacement can be the defense mechanism behind anger outbursts such as road rage (https://www.ncbi.nlm.nih.gov/books/NBK559106/).

Rationalizing

Rationalizing is the attempt to explain away situations while not taking responsibility for one's own actions. A senator who is arrested for taking gifts or money from lobbyists may try to rationalize this behavior by saying, *everyone does it, or that's the way you get business done* (https://www.ncbi.nlm.nih.gov/books/NBK559106/).

Identification

An adolescent who tries to emulate a respected authority figure is using identification. Identifying with others and trying to be like them is adaptive and useful when the role model is a positive influence (e.g., father, mother, minister), but it can be very maladaptive when the role model is a negative influence (e.g., gang leader, rock star with drug problems). The psychiatric nurse who understands the various defense mechanisms patients in emotional distress use will be able to develop a treatment plan that addresses the use of defense mechanisms and presents alternatives that are more conducive to mental health and improved quality of life (https://www.ncbi.nlm.nih.gov/books/NBK559106/).

Self-Assessment Quiz Question #3

Which best describes the meaning of defense mechanisms?

a. Behaviors used to deal with stressors.
b. False sensory perceptions.
c. Beliefs that lack substantiation.
d. Overall emotional state.

THERAPEUTIC APPROACHES IN MENTAL HEALTH

Milieu therapy

The word milieu means surroundings or environment; milieu therapy is also referred to as therapeutic community. Milieu therapy is a structuring of the environment in order to affect behavioral changes and improve the psychological health and functioning of the individual. The goal of milieu therapy is to manipulate the environment so that all aspects of a patient's hospital environment are considered therapeutic (Townsend, 2019). Within this setting, the patient is expected to learn adaptive coping, interaction, and relationship skills that can be generalized to other aspects of the patient's life. Although milieu therapy was originally developed for patients in the inpatient setting, these principles have been adapted for a variety of outpatient settings (https://easpublisher.com/media/articles/EASJNM_22_129-135.pdf)

Care of patients in the therapeutic milieu is directed by an interdisciplinary treatment team, but overall management is the responsibility of the nurse. The initial assessment is made by the nurse or psychiatrist and the comprehensive treatment is developed by the treatment team. Basic assumptions of milieu therapy include the opportunity for therapeutic intervention, the powerful use of peer pressure within the environment, and inappropriate behavior can be addressed as it occurs (Boyd, 2018).

There are certain conditions that promote a therapeutic community.

1. The patient is protected from injury from self or others.
2. The patient's physical needs are met.
3. Programming is structured, and routines are encouraged.
4. Staff members remain relatively consistent.
5. Emphasis is placed on social interaction among patients and staff.
6. Decision-making authority is clearly defined.
7. The patient is respected as an individual and is encouraged to express emotion
8. The patient is afforded opportunities for freedom of choice.
9. The environment provides opportunities for testing new behaviors.

(Townsend, 2019;
https://currentnursing.com/pn/milieu_therapy.html)

It is understood that basic physiologic needs are fulfilled, and safety is paramount. Within this environment, a democratic self-government exists through community group participation. This promotes member interaction and communication. The therapeutic milieu provides structure and consistent limit setting at a time when individuals need it the most. These elements provide an assessment of the patient's progress toward treatment goals. The nurse assumes responsibility for the overall management of the therapeutic milieu including assessment, safety and limit setting, medication administration, and education.

Effects of the environment can easily be understood by thinking about common events in one's own life. Going to a party may evoke a sense of festivity, joy, and excitement; going to a funeral can cause somber feelings of sadness; when walking into a quiet library, a person may feel the need to whisper and walk softly; and a starkly painted, tiled hospital room may lead us to feel fearful, anonymous, or disengaged. Even schools reflect environmental or milieu manipulation and effects (consider a Montessori-style school compared with a stricter military school). Inpatient psychiatric settings and residential settings are the most common places in which milieu therapy occurs. A patient who is disorganized, paranoid, or agitated responds better to an environment that is calm, well structured, and predictable, with staff persons who are pleasant in nature but consistent, directive, and firm.

Self-Assessment Quiz Question #4

The nurse is explaining milieu therapy to a group of students. What is the primary role of the nurse in milieu therapy?

a. Conducts individual, group and family therapy
b. Directs drama that portrays real life situations
c. Assumes responsibility for management of milieu
d. Focuses on rehabilitation and vocational training

Group therapy

Irvin Yalom, MD, has been highly influential in the development of group therapy. Dr. Yalom's first book, *The Theory and Practice of Group Psychotherapy* (1970), became a foundational text for many psychotherapists and advanced practice nurses interested in group therapy. Dr. Yalom postulated that when individuals are grouped together, certain characteristics of the individuals will emerge that are reflective of family-of-origin and childhood issues (1970). In therapy sessions with groups of people, these negative or destructive childhood events can be reworked and reframed, leading to healthier adult coping responses while the group members develop identities and go through phases.

In a counseling group setting, members can discuss stressors in a safe environment. The group often provides a sense of community and the feeling that the individual is not alone in dealing with their problems (Corey, Corey, & Corey, 2013). Dr. Yalom termed this concept universality (Yalom & Leszcz, 2014). Thus, universality, or the camaraderie sense of *we are all in this together*, serves to encourage trust and move the group into productivity. Individual group members grow and develop self-awareness through the relationships developed and feedback gathered from those around them (Corey et al., 2013).

Yalom's stages include orientation, conflict development, cohesion, and working (Yalom & Leszcz, 2014). There are many other theories regarding groups; although they may differ in certain ways, they all show how the group forms interpersonal relationships cohesively. The group leader recognizes what phase the group is in and helps facilitate progression toward the group's goals.

The best size for a therapy group is usually 6 to 12 members (Boyd, 2018). In larger groups, some members may be ignored or can more easily avoid participation. In smaller groups, the gatherings can turn into a series of individual therapy sessions with the group leader while everyone else watches. Training in facilitation of therapy groups is standard in graduate programs for advanced practice nurses, psychiatric and psychological master's programs, and clinical doctoral programs.

Psychoeducational groups

Psychiatric nurses are often responsible for facilitating psychoeducational groups in mental health settings, where there is a defined group leader and specific content or topics to be discussed. Topics are frequently based on developing skills important to daily living and maximizing the quality of life. Some topic examples include strategic management of symptoms, medication education, coping with stress, and relapse prevention. Psychoeducational groups emphasize group member interaction and participation, but they also emphasize learning new behaviors. The facilitator may organize hands-on activities and sometimes give homework assignments. Other non-nursing personnel may conduct psychoeducational groups; however, psychiatric nurses are in a unique position based on their education, training, and holistic approaches, to help bridge the gap between patients' physical and mental health. Psychoeducational groups may be larger than strictly therapeutic groups, although larger groups can be difficult to manage depending upon the personality mix of those attending (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7001357/).

Cognitive-behavioral therapy (Individual therapy)

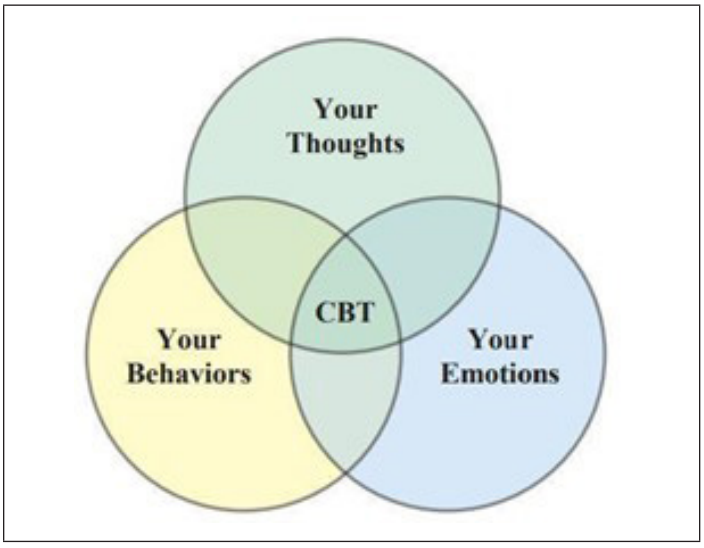
Cognitive-behavioral therapy (CBT), pioneered by Aaron Beck (1967) and Albert Ellis (1973), focused on the relationship between a patient's perceptions about events and the resultant feelings and behaviors. This cycle of thoughts that influence feelings and behaviors is demonstrated in this example:

> *Imagine you are driving down the interstate at 75 miles per hour. You check your rear-view mirror and see the flashing lights of a state trooper. Knowing that you are driving over the speed limit, you are certain you will be pulled over and given a traffic ticket. You think of the two glasses of wine you just consumed with dinner. "What if my blood alcohol level is too high? I can't be arrested! I would lose my job! They'll take away my nursing license!" Your palms get sweaty and your heart starts to race. Barely able to contain your panic, you swerve quickly into the right-hand lane without signaling and cut off a car coming up behind you. The car honks, you pull onto the shoulder, and finally stop. In dread, you look out the window for the trooper, who drives past you down the highway.*

In this example, the driver's thoughts of breaking the law by speeding and getting arrested for drunk driving cause the driver to feel anxious and panic, which results in erratic behavior and nearly causes an accident. Now consider this example:

> *Imagine yourself driving down the interstate. You check your mirror and see the flashing lights of a state trooper. You know you're driving over the speed limit, but so are many drivers around you. You think of the two glasses of wine you had with dinner, but you did eat a large portion and you don't feel drowsy – besides, that was several hours ago. You determine that the state trooper must be on the way to the scene of a crime or accident, so you signal a right turn, check your mirrors, and carefully pull over onto the shoulder of the road. The state trooper drives past you and you continue your journey.*

CBT is based on the supposition that behaviors are a result of distorted thinking about situations (Yalom & Leszcz, 2014). These distortions can take the shape of catastrophizing, which involves thinking that the worst that can possibly happen will happen or has happened; perceiving threats where none exist; thinking only of negative outcomes; or making over-generalizations. In anxiety disorders, fear is the driving force for distorted thoughts. These distorted thoughts impact feelings and lead to behaviors such as situational avoidance where objects or places may become a self-reinforcing behavior as the person has no additional life experience to combat the distorted thinking. Cognitive restructuring is used to help the patient examine their beliefs in more detail and to break down the resultant feelings and behaviors into A (antecedent), B (behavior), and C (consequence).



Exposure is a CBT technique that provokes the patient's anxiety over a feared idea or object in a controlled, supportive environment (Boyd, 2018). A person afraid of heights might be asked to work toward standing on a footstool for a minute or two in the clinician's office. Gradual exposure to the situation allows the patient to systematically desensitize to the stressor with tools to manage thoughts and feelings that arise when confronted with the feared stimulus. Flooding exposes the patient to the stressful object or idea all at once; although this technique can be used, trained clinicians should judiciously use it as it may produce panic symptoms. Skills training may also be employed in CBT. This specifically trains the individual based on their needs. Cognitive-behavioral techniques are useful with most psychiatric conditions and mental health states to improve mental flexibility and resilience, moving the person towards health on the health-illness continuum. Helping the patient to identify beliefs (true or false) about situations enables the patient to challenge the beliefs that are detrimental to recovery (McKay et al., 2015). Psychiatric nurses of all levels can utilize the basic skills of CBT in teaching their patients how to reframe distorted thoughts that lead to emotional turmoil and erratic behaviors.

Family therapy (Social theory)

Individuals with psychiatric, mental health, or behavioral problems often live in a family environment. Children and adolescents are still part of the family unit although the nature of "family" may differ in situations concerning foster care or residential treatment centers. Adults may live alone or with others, be married or single, and live with or without children of their own. Even adults who live alone often have significant family relationships with parents, children, or others. The concept of "family" is identified by the patient but usually involves other persons with whom the patient interacts on a frequent basis and in whom the patient has significant emotional investment.

Family therapy is based within the understanding that, although there is an identified patient, problems may arise out of dysfunctions within the system because the family is a unit and problems are relational to each other (Friedman, Bowden, & Jones, 2003; Sexton & Alexander, 2015). Family therapies focus on strengths of the individual patient and the family as a basis for treatment. Understanding how the family functions and relates to one another helps contribute information that is helpful in the development of a plan of care. Family therapy is complex, and master's or doctorate-level clinicians should be utilized for this type of intense treatment. The Commission on Accreditation for Marriage and Family Therapy Education (COAMFTE) offers specialized accreditation to marriage and family therapy programs; this encourages programs to continue monitoring and maintaining their rigor and development and demonstrates that programs are meeting industry standards and their own objectives (COAMFTE, n.d.)

Treating the family via emotional or cognitive methods allows problems to be addressed within the family dynamic; treating the patient apart from his or her family alone will not correct these systemic problems, and relapse is likely (Sexton & Alexander, 2015). Cognitive awareness (as in CBT) helps individuals and families recognize the cyclic nature of thoughts creating feelings, which create behaviors, which reinforce thoughts, and which continue circularly. Addressing this from a systems nature allows all members of the family unit to explore their role within this continuum and work toward healthier interactions simultaneously.

Community support groups (Social theory)

Many community support groups exist to help individuals who are experiencing specific mental health problems. Groups exist for gambling addiction, rape and sexual abuse support, bipolar disorder, depression, grief and bereavement, suicide, attention deficit disorder, PTSD, substance abuse, and many more. Support groups differ from therapy groups in several important ways. Support groups are a network of members with similar traits or characteristics; support groups are leaderless – they may have a nominated leader, but that person is also a victim or patient and a group member; support groups are not managed by a healthcare professional; support groups are free or have minimal cost; support groups may meet less frequently than therapy groups but for a longer period of time (years to indefinitely); and support groups are usually self-sustaining. If members lose interest, the group can't find a place to meet, or membership wanes, then the group may end (https://www.frontiersin.org/articles/10.3389/fpsyt.2021.714181/full).

The National Alliance on Mental Illness (NAMI) is the nation's largest grassroots support organization for families and persons affected by mental illness. Established in 1979, NAMI is a powerful lobbying force in Washington, DC, with affiliates in every state and more than 1,100 communities across the country. NAMI focuses on fighting against the stigma associated with mental illness and provides support for families and patients with psychiatric illnesses.

Self-Assessment Quiz Question #5

Which of the following is considered a support group?

a. Cognitive behavioral therapy.
b. Alcoholics Anonymous.
c. Family therapy.
d. Medication education.

BRAIN ANATOMY AND PHYSIOLOGY

Within the brain, several areas influence behaviors and are related to psychiatric-mental health disorders, such as the areas involved in mood, anger, and thoughts. Therefore, it is important for nurses to understand how the brain regulates mood and behaviors. The cortex, the outer surface of the brain, is associated with rational thinking (Halter, 2018). The orbitofrontal cortex, which is in the forehead, regulates sympathetic and parasympathetic signals and houses the executive functions (Norris, 2019). Examples of executive functions include decision making, organizing, and determining right from wrong. Additionally, the cortex is adjacent to other areas of the brain, connecting rational thought to mood.

Several other areas of the brain also have a role in psychiatric-mental health disorders. The frontal lobe, for example, is heavily involved in decision making. The parietal lobe integrates sensory and motor information. The occipital cortex is the vision center. The cerebellum works to create muscle tone, posture, and coordination. The temporal lobe is involved with memory, smells, sounds, and language. The hypothalamus regulates body temperature and metabolism, and research suggests that it plays a role in emotions. The pituitary gland regulates hormones, and the brainstem controls basic vital functions such as respiratory rate, heart rate, reflexes, and movement (Norris, 2019).

The limbic system, which is involved in emotions, has a central role in psychiatric-mental health disorders. The limbic system contains the amygdala, which regulates mood and emotions such as anger; the hippocampus, which regulates memory; and the anterior cingulate, which regulates sensations (Norris, 2019; Stahl, 2020). These areas all work together to compose emotions and the body's responses to emotions. There are millions of connections among these areas. These connections, or pathways of electrical impulses, allow parts of the brain to communicate with one another and respond to stimuli.

NEUROTRANSMITTERS

The presynaptic area located at one end of each neuron holds neurotransmitters. A neurotransmitter is a chemical that carries a message to another neuron. An electrical charge, usually powered by a sodium-potassium channel, causes a reaction from one end of the neuron to the other, releasing the neurotransmitter into the synapse like a gun firing (Norris, 2019; Stahl, 2020). The neurotransmitter then crosses the space or synapse between the neurons and attaches to a specific receptor on the postsynaptic cell. Once the neurotransmitter has delivered the message to the postsynaptic cell, it is released back into the synapse (Stahl, 2020). Once released, the neurotransmitter can be destroyed by specific enzymes or be taken back into the presynaptic area by a process called *reuptake* (Stahl, 2020).

Psychiatric-mental health treatment is based on enabling neurotransmitters with messages to attach to the postsynaptic neurons (Stahl, 2020). Each neurotransmitter attaches to a receptor like a key fitting into a lock. This causes a reaction in the neuron referred to as a *second messenger system*. These exchanges must happen several times before the goal of change in the neurons and brain occurs. Sometimes a message gets lost or is incorrectly transmitted. This can lead to emotional dysregulation and psychiatric symptoms (Stahl, 2020).

Dopamine, serotonin, and norepinephrine are the most important neurotransmitters in mental health. In addition, two amino acids, gamma-aminobutyric acid and glutamate, have a role in psychiatric-mental health, with each having its own effect on mood and behavior.

Dopamine

Dopamine is a neurotransmitter associated with psychosis and influences several areas of the brain. Dopamine regulates movement and coordination, emotions, and decision making. Decreased levels of dopamine can cause Parkinson's disease. Conversely, increased levels can lead to schizophrenia or mania (Stahl, 2020). Dopamine also stimulates the hypothalamus to release sex, thyroid, and adrenal hormones (Stahl, 2020). Antipsychotic medications aim to decrease symptoms of psychosis by enhancing the impact of dopamine on the postsynaptic cells.

Serotonin

Serotonin is a neurotransmitter found in the limbic system, the brain cortex, and the stomach. Research suggests that low levels of serotonin are implicated in depression, whereas excess levels have a role in anxiety, mania, aggression, and possibly schizophrenia. Serotonin is also associated with appetite, mood, aggression, libido, sleep, and arousal, as well as perception of pain (Stahl, 2020). Medications that support serotonin are the first line of action against depression and are components of some antipsychotic medications.

Norepinephrine

Norepinephrine is a neurotransmitter found in various parts of the brain and the brainstem. Norepinephrine regulates mood, cognition, perception, sleep, arousal, and cardiovascular status (Stahl, 2020). Excess levels can trigger a fight-or-flight response and long-term elevations are associated with mania and anxiety. When norepinephrine is depleted, depression can occur. Research suggests that norepinephrine plays a role in the chronic pain that can accompany depression. Medications that increase the messages or actions of receptors that involve norepinephrine are usually antidepressants.

Gamma-Aminobutyric Acid

Gamma-aminobutyric acid (GABA), an amino acid, is an inhibitory protein. It is concentrated in the frontal and temporal lobes of the brain, where it slows down activity. GABA works like a light switch, turning on and off other excitatory molecules (Stahl, 2020). When there is not enough GABA in the brain, anxiety can occur. Medications such as benzodiazepines aim to increase levels of GABA to slow down the brain activity involved in, for example, panic attacks and anxiety.

Glutamate

Glutamate is an excitatory amino acid that functions to open the calcium channel so that neurons fire faster (Stahl, 2020). This causes excitement in the brain. Researchers are currently investigating the role of glutamate in ADHD, anxiety disorders, depression, mania, and mood disorders (Stahl, 2020).

Self-Assessment Quiz Question #6

Dopamine is responsible for which of these symptoms?

a. Sleep.
b. Psychosis.
c. Arousal.
d. Catatonia.

PSYCHOPHARMACOLOGY AND THE BRAIN

Typically, medications that treat psychiatric-mental health disorders work by either increasing or decreasing the activity of neurotransmitter receptor systems in several ways (Stahl, 2020). For example, benzodiazepines aim to slow down brain activity, thus reducing anxiety, by increasing levels of GABA. It is important to remember that the change in the neurotransmitter system either facilitates or inhibits different functions in the brain. Medications can have a single specific target, such as serotonin reuptake inhibitors, or they can target multiple transporters, such as serotonin and norepinephrine reuptake inhibitors.

Simply stated, psychiatric medications block receptors or increase the number of neurotransmitters available for use, thus changing the message at the postsynaptic site. For example, consider a patient with depression who takes a selective serotonin reuptake inhibitor (SSRI). The medication increases the serotonin in the synapse, making more serotonin available for the receptors (Stahl, 2020). The message is sent via the postsynaptic cell and a second messenger to change the cell. The result is a decrease in depressed mood. Note that it might take several weeks of changes to this system for the desired health outcome to occur (Stahl, 2020).

Because neurons and the messages they carry are interrelated, even medications that target only one neurotransmitter can affect other neurotransmitters and messages. These alterations can cause changes in basic drives, sleep patterns, body movements, and autonomic functions (Stahl, 2020). These are side effects of medications affecting neurotransmission. For example, several psychotropic medications have the side effect of drowsiness. This occurs because the medication affects more than one neurotransmitter and message. Side effects are often the result of unintended changes in the neurotransmitter systems.

Classifications in psychopharmacology

Medications play a role in the treatment of nearly every psychiatric condition. For the purposes of this course, psychotropic medications are classified into seven broad categories: antidepressants, anti-anxiety agents (also called anxiolytics), antipsychotics and their "partners" anticholinergics (used to reverse some side effects), mood stabilizers, sedative-hypnotics, psychostimulants, and miscellaneous medications designed to reduce or prevent alcohol or drug dependence, including nicotine dependence (Stahl, 2021)

Complementary and alternative therapies in mental health

Herbals and dietary supplements have gained interest in Western cultures as people search for natural remedies. Many people feel that natural herbal remedies are healthier and safer overall than pharmaceutical drugs. The Food and Drug Administration (FDA) considers herbal supplements, vitamins, and other dietary supplements to be food sources and, as such, only monitors information on the product's label and does not regulate their manufacturing or usage. This can result in wide variances in the amount of active ingredient that may be available in a certain product; some products have even been found to contain no active ingredients after undergoing laboratory evaluation. Some herbal supplements have been used in the treatment of mental health conditions, as these products are available over the counter in many stores. Patients may seek information available on the Internet and then choose supplements based upon their understanding. The nurse should always assess the use of herbal and other supplements and educate patients about known mechanisms of action, side effects, and possible interactions with pharmaceutical drugs. It is important to review available research regarding supplements and use this evidence when providing patient education. The role of certain natural herbs in the treatment of psychiatric disorders is discussed below.

St. John's wort (*Hypericum perforatum*) is derived from the St. John's wort plant. It is primarily used to address depression. St. John's wort is thought to affect serotonin and monoamine oxidase inhibitors in the brain, similar to antidepressants. There are numerous studies that demonstrate reports of drug-to-drug interactions in patients who used St. John's wort while taking other medications (including prescribed antidepressants), so it is important that the nurse teaches patients not to combine this supplement with other medication, as it may increase the risk for serotonin syndrome.

Valerian root (*Valeriana officinalis*) is powdered and taken in a capsule form. It is believed to work on the gamma-aminobutyric acid (GABA) system to alleviate anxiety and treat insomnia. Valerian should not be taken with other central nervous system depressants (especially anesthetics, barbiturates, and benzodiazepines) because it can potentiate their effects. Side effects include headaches, uneasiness, dizziness, and, sometimes, excitability.

Kava kava (*Piper methysticum*) is a South Pacific oceanic herb with sedative, analgesic, and mild euphoria-inducing properties. Kava kava may act on GABA in a manner similar to benzodiazepines, and it does have drug-to-drug interaction effects with those products. Side effects of kava kava can include stomach disturbances, dizziness, and a temporary yellowing of the skin. A person with liver impairment or one who is a heavy alcohol user should never use kava kava because it has been linked with hepatotoxicity (Rivers, Xing, & Narayanapillai, 2016). Banned in some European countries, kava kava is still widely available for over the counter or Internet purchase in the United States, Australia, and New Zealand (Rivers et al., 2016).

Ginseng (*Panax ginseng*) is a stimulating herb that can produce energy similar to caffeine, meant to result in improved endurance and reduced fatigue. Jitteriness and nervousness can be side effects of this supplement, as can insomnia, hypertension, restlessness, and, possibly, mania.

Ginkgo biloba (*Ginkgo biloba*) has gained popularity for its theoretical ability to improve blood flow to the brain to promote alertness, mental sharpness, and memory; to treat fatigue and stress; and to improve endurance. Ginkgo biloba has antioxidant properties, reducing free radicals in the body that cause cellular death (Tulsulkar & Shah, 2013). Ginkgo biloba can interfere with blood clotting and reduce platelet action, leading to increases in bleeding times. It may interfere with anticoagulant therapy and should not be taken by patients with circulatory problems who are taking such medications such as Coumadin, Plavix, or aspirin. Side effects of ginkgo biloba include headaches, nausea, vomiting, stomach upset, and, occasionally, skin allergies (Izzo, Hoon-Kim, Radhakrishnan, & Williamson, 2016).

Chamomile preparations are often used in Europe to facilitate digestion, ease gas, and decrease cramping (Mahady, Wicks, & Bauer, 2017). It has been shown to be safe for children and is a first line of therapy in Germany for treating sensitive skin infants and young children (Mahady et al., 2017).

To address vitamin and mineral needs, a one-a-day multivitamin supplement for adults and a chewable daily supplement for children can be helpful. Iron deficiency is associated with fatigue and oral conditions such as stomatitis. Omega-3 fatty acids (fish oil, flaxseed oil) have shown positive benefits in treating behavioral problems (Bondi et al, 2014; Raine, Portnoy, Liu, Mahoomed, & Hibbeln, 2015). The fat-soluble vitamins A, D, and K can be dangerous in high doses. B-complex vitamins are associated with energy. Given with calcium, vitamin B6 has been shown to reduce premenstrual symptoms (Masoumi, Ataollahi, & Oshvandi, 2016). L-methylfolate (Deplin), a prescription medical food, is a derivative of folic acid (a B vitamin). It is a dietary supplement that has demonstrated effectiveness in enhancing the treatment of depression and is monitored by the FDA (Shelton, Manning, Barrentine, & Tipa, 2013).

Massage is the manipulation of the body's soft tissues to promote circulation and relaxation. There are numerous types of massage techniques, varying from light touch to deep muscle work and from specific to generalized body parts. Swedish massage is meant to provide relaxation and increase circulation; Shiatsu massage, influenced by Chinese medicine, is used by a specialized practitioner who applies pressure to acupoints on the body with the intention of increasing the life flow (or Japanese ki; Halter, 2018).

Reflexology, also called *zone therapy*, is the application of massage or pressure to the hands and feet to alleviate distress in different parts of the body. The theory of reflexology is that all of the body is represented in areas in the hands and feet, and thus stimulating these trigger points can eliminate distress in the related body system(s) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4624523/).

According to traditional Chinese medical theory, acupuncture points are situated along meridians (channels) in the body that align with a vital energy flow, the *Qi* (Halter, 2018). Illness or distress interrupts the Qi. Acupuncturists insert tiny filiform needles along the meridians to stimulate and readjust the energy flow. Practitioners diagnose which systems in the body are affected based on inspection, auscultation, olfactory senses, palpation, and taking a limited history of symptoms. Side effects to the treatment are generally mild and may include slight headaches, nausea, or pain in certain areas. In the Western hemisphere, a common use of acupuncture is for the treatment of pain (Halter, 2018 (https://www.sciencedirect.com/science/article/pii/S2213422021000883?via%3Dihub).

Hypnosis is a technique that induces a deep relaxation and calm, trance-like state of mind. The patient's focus of awareness becomes so restricted that external noise and distractions are no

longer present in the conscious mind. Hypnotherapy is practiced by highly trained clinicians, often psychologists, to achieve certain therapeutic goals with the patient, such as recovering memories lost through the defense mechanism of repression, learning to be less anxious when faced with anxiety-provoking situations, or reducing or eliminating undesirable behavior such as smoking. The patient undergoing hypnotherapy must be relaxed and receptive to the procedure (https://positivepsychology.com/hypnotherapy/).

Psychiatric nurses should familiarize themselves with the various modalities of psychotherapy, the medications used in the treatment of psychiatric illness, as well as the complementary and alternative therapies and the various somatic therapies used in the treatment of psychiatric disorders. Psychiatric nurses provide psychoeducational services to patients and their families and should have a thorough understanding of the treatment modalities commonly used in psychiatric practice.

Self-Assessment Quiz Question #7

Which complementary alternative medicine interferes with anticoagulants?

a. Chamomile.
b. Ginseng.
c. Ginkgo biloba.
d. St. John's wort.

Self-Assessment Quiz Question #8

Which complementary alternative medicine should be avoided in patients who report heavy alcohol use?

a. St. John's Wort.
b. Ginseng.
c. Valerian root.
d. Kava kava.

OTHER THERAPIES IN MENTAL HEALTH

Electroconvulsive therapy

Mental health professionals once used ECT, introduced in the 1930s, to treat a broad range of psychiatric disturbances (George et al., 2020). With strong advances and refinements in the field, professionals may still use ECT to treat certain conditions such as severe depression (major depression), mania, or psychosis (George, et. al, 2020). To perform ECT, the patient is given a short-acting sedative, followed by a muscle relaxant. The muscle relaxant prevents tonic-clonic jerking of the body caused by seizure activity that, historically, was the cause of physical injuries to the patient. After the patient is anesthetized, electrodes are placed on the sides of their head and an electrical stimulus that is sufficient to trigger a seizure is given. Ideally, the seizure activity lasts about 15 seconds (Townsend, 2014). Breathing is supported during the procedure by nurse anesthetists or anesthesiologists. The ECT session is repeated two to three times a week for 3 to 4 weeks and is often done on an outpatient basis (Townsend, 2019).

Providers usually use medications and therapy before deciding to use ECT. ECT has an effectiveness rate of approximately 60% to 70% in the treatment of depression (George, et. al, 2020). There are few contraindications to ECT; however, caution should be used in pregnancy, patients with cardiac conditions, or patients with intracranial pressure because of disease (Townsend, 2019). Side effects of ECT include memory loss and some confusion in recalling events right before and after the procedure. Some people complain of long-term memory and cognitive problems. Also, complications related to the use of anesthetics (allergic reaction, respiratory suppression) can occur.

Transcranial magnetic stimulation

Transcranial magnetic stimulation (TMS) is a noninvasive treatment for depression. The patient is exposed to electrical energy that is passed through a coil of wires to produce a powerful magnetic field (George, et. al, 2020). Magnetic waves pass through the brain and skull painlessly, while the patient remains awake for the procedure. It is most effective when administered for 40 minutes daily for 4 to 6 weeks. It is thought to work by stimulating nerve cells to produce the neurotransmitters that relieve depression. Side effects of TMS are few, with patients reporting only mild headaches. TMS cannot be used if the patient has implanted or permanent metal in the skull or brain (George, et. al, 2020).

Vagus nerve stimulation

Vagus nerve stimulation (VNS) is an adjunctive, long-term, invasive therapy for adult patients with serious and persistent depression (George, et. al, 2020). Most of these individuals have shown no improvement in condition after trials of four or more antidepressants before attempting VNS therapy. A VNS implant is a small, battery-powered device, similar to a cardiac pacemaker, that is surgically implanted subcutaneously under the skin of the upper left or right chest. Internally, a wire runs from the device to the vagus nerve, which then carries electrical impulses to the brain. These impulses are emitted every few minutes. The device is thought to work by electrically stimulating the production of neurotransmitters that are associated with depression treatment. The side effects of VNS include a tickle in the throat (may trigger a cough reflex), mild hoarseness or other voice changes, and, rarely, difficulty swallowing, shortness of breath, neck pain, and a prickling sensation in the skin.

Case study 1

Mrs. Jones was admitted as an involuntary patient to the psychiatric unit. She was brought to the emergency department by her daughter, who reported her mother was showing "new and bizarre" behaviors. She has a history of schizophrenia, which has been well controlled until this episode.

The psychiatric nurse begins the mental status exam of Mrs. Jones. The nurse notes that she is wearing a short dress that is on backwards. She appears disheveled and unkempt; she has not eaten any of her breakfast. Further, the nurse observes that Mrs. Jones has taken the blankets off the bed and laid them out on the floor. She has also taken the toilet paper and unrolled it into a pile on the floor.

When the nurse introduces herself, Mrs. Jones is at the window talking in nonsensical words. She is wringing her hands and appears to be fixated on something outside. She does not acknowledge the nurse.

Later, she turns around and exclaims, "Sally, I am so glad you are here. Tea is almost ready. Flubrubaroo?" She moves to the pile of blankets and stands in the middle of them, smiling at the nurse.

The nurse smiles and begins to talk to Mrs. Jones. The nurse explains again that she is a psychiatric nurse and is there to care for her. She states, "Oh no, dear, have you tokenitnd?"

The nurse notes that Mrs. Jones' affect is flat as she stares out at the window but animated when speaking in nonsensical words. The nurse asks her name. Suddenly, the patient turns to the nurse and starts talking very quickly, saying, "I know it is late. What was the dog's name again? I must go to the store. More milk."

Questions
1. Which components of the mental status examination can the nurse document from this interaction with Mrs. Jones?
2. How might you describe Mrs. Jones' affect?
3. How would you summarize the nurse's observation and evaluation of Mrs. Jones' thought processes?
4. What other health status information is helpful for the nurse to assess?

Responses
1. The psychiatric nurse can document Mrs. J's appearance, her behavior, and her affect, but not her mood. Documentation can also include thought processes and thought content. The psychiatric nurse is unable to assess Mrs. J's memory, cognition, insight, motivation, and judgment as well as her safety.
2. In addition to being flat and animated, Mrs. J's affect may also be described as anxious. Because her affect seems to be fluctuating, there may be an incongruence between her affect and behavior.
3. Word salad is a common finding and learners should be familiar with the term. Mrs. J's nonsensical and disorganized speech gives some indication of her thought processes. Her thought process appears to be confused. She exhibits word salad and her thought processes are disjointed and incoherent. Mrs. J's thought content is not clear as she does not respond coherently to the questions being asked.
4. It would be helpful for the psychiatric nurse to obtain information from the patient's daughter. What has Mrs. J been exhibiting at home? What is Mrs. J's baseline level of functioning? Were there any past episodes of self-harm or dangerous behavior? Over what period has this change in behavior occurred? Were there any triggers?

Case study 2

Donald is a 45-year-old male patient employed as a financial manager by a large bank. Because of economic downturns, there have not been as many opportunities to gain new business, which has led to fierce competition between financial managers.

Donald presents to his primary care provider's office reporting recent episodes of shortness of breath, sweating, anxiety, and the strong feeling that he is about to die. These symptoms started 3 months ago, occurring once or twice a week. Within the past few weeks, Donald reports he has experienced symptoms daily and he has begun to fear leaving his home because he is afraid that he will have another attack. His attendance at work has suffered and he reports that his supervisor told him that he might lose his job as a result. This has caused problems between him and his wife and she has started talking about leaving him to move back in with her parents.

An electrocardiogram, stress test, and laboratory testing are performed, all of which show normal results. Donald is prescribed alprazolam (Xanax) by his primary care provider and referred to the local mental health center for treatment. Once there, he meets with a therapist for a comprehensive assessment. Donald is diagnosed with panic disorder and agoraphobia. He is referred to the psychiatric nurse practitioner for a medication evaluation and treatment. The nurse practitioner recommends that Donald start taking sertraline (Zoloft), 50 mg daily, and that he uses the Xanax only as needed to avoid tolerance and dependency.

Questions
1. What are other therapies that are most likely to be beneficial for Donald?
2. Are there any ancillary services that could also be helpful to Donald?
3. Which recommendations regarding his relationship status with his wife could the nurse practitioner discuss with Donald?

Responses
1. Panic attacks and panic disorder are treatable and respond well to medications and therapy. Cognitive-behavioral therapy is indicated to help this patient learn to identify anxiety-provoking triggers and reframe how he thinks about these events. Relaxation training, such as guided imagery and mindfulness, could be helpful in teaching Donald a means of reducing the anxiety once it occurs.
2. Another recommendation for Donald would be to include regular daily exercise in his routine (aerobic or weightlifting) because exercise can have a significantly positive effect on panic disorder treatment.
3. Donald may wish to consider the need for marital therapy sessions to work on improving communication with his wife. If she is willing to participate in Donald's treatment plan, they may also want to join a National Alliance on Mental Illness (NAMI) support group to learn more about psychiatric disorders and the rights of individuals who have such disorders. Finally, mental and behavioral health problems are considered medical problems and are protected under the federal Family and Medical Leave Act of 1993. If Donald's symptoms increase and become more debilitating, the psychiatric nurse practitioner treating Donald can provide him with a work statement and absence excuse that should help to protect his employment status and prevent him from losing his job while he is receiving treatment.

Case study 3

Mr. Fisher is a young adult male patient who has been newly diagnosed with panic attacks. The psychiatric mental-health nurse working in the outpatient clinic meets with Mr. Fisher, who was recently prescribed benzodiazepine by the psychiatrist for his panic attacks. Mr. Fisher asks the nurse what it means to have "a chemical imbalance" in the brain. He also asks how the new medication will "fix" his panic attacks.

Questions
1. How should the nurse explain "a chemical imbalance" in the brain to Mr. Fisher?
2. How should the nurse describe how benzodiazepine medications work?

Responses
1. The psychiatric-mental health nurse should explain to Mr. Fisher that neurotransmitters are chemicals in the brain that form messenger systems between neurons to help the brain and body regulate functions (e.g., thinking, feeling) and react or behave. The nurse also explains that there are excitatory and inhibitory amino acids that assist in regulating these brain functions. The nurse describes that a person's emotions and behaviors are the result of the functioning of these chemicals carrying messages between the neurons and amino acids. When there is an imbalance among neurotransmitters, the messenger system receives too many or too few messages, impairing regulation.
2. The nurse should explain that, in a person with panic disorder, the function of GABA may be altered. Normally, GABA slows down other chemicals that are more excitatory. If GABA is not working correctly or at the correct level, there is no way to slow down the other chemicals. The result may be panic attacks. There are anti-anxiety medications, such as benzodiazepines, that aim to increase levels of GABA to help slow down brain activity; they decrease anxiety by changing how the chemicals in the brain communicate and work.

Healthcare Considerations

1. Therapeutic use of self is one of the foundations of mental health nursing.
2. An understanding of the mental health exam is fundamental to the diagnosis and treatment of mental illness.

Conclusion

The brain is an amazing organ that not only monitors changes in the external world but also regulates internal body functions. The brain initiates basic drives and controls contractions of muscles, internal organs, sleep cycles, moods, and emotions. Knowledge of how the brain works with regard to neurotransmission is an important aspect of understanding psychiatric-mental health disorders and the medications used to alleviate patient symptoms. Neurotransmitters carry specific messages from neuron to neuron to produce emotions and behaviors. Psychiatric-mental health medications work by altering these messenger systems. The neurotransmitters involved in mood and behavior include serotonin, norepinephrine, and dopamine. Through epidemiological research, healthcare providers can learn more about the prevalence of psychiatric and mental health disorders, as well as ways to identify persons who are at risk. This information becomes an important part of the nurse's assessment and identification of patients with psychiatric disorders. Recognizing an individual's behaviors and making statements can add to the assessment data and provide insight into the patient's current mental health state.

Assessing the patient, performing mental status assessments, identifying priority problems, developing goals and objectives, and developing evidence-based plans of care comprise the core steps of the systematic approach to caring for patients with psychiatric disorders. After these processes have taken place, the provision of relevant and appropriate nursing interventions follows. The therapeutic relationship is established during initial patient encounters, during the assessment and implementation of interventions during the nursing care planning process.

Psychiatric nurses who use therapeutic communication will be able to conduct effective, comprehensive mental status examinations that provide the information necessary to develop a comprehensive mental healthcare plan, regardless of practice setting.

References

- American Nurses Association. (2014). Psychiatric mental health nursing: Scope and standards of practice (2nd ed.). Silver Spring, MD: Author.
- American Nurses Association. (2016). Code of ethics for nurses with interpretative statements. Retrieved from http://www.nursingworld.org/MainMenuCategories/Ethics Standards/CodeofEthicsforNurses/Code-of-Ethics-For-Nurses.html
- American Psychiatric Association. (n.d.). DSM history. Retrieved from https://www.psychiatry.org/psychiatrists/practice/dsm/history-of-the-dsm
- American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). Arlington, VA: Author.
- American Psychoanalytic Association. Psychoanalytic Theory & Approaches (n.d.) Retrieved April 07, 2022 from https://apsa.org/content/psychoanalytic-theory-approaches
- Beck, A. T. (1967). Depression: Clinical, experimental, and theoretical aspects. Philadelphia, PA: University of Pennsylvania Press.
- Black, D. W. & Grant, J. E. (2014). DSM-5 guidebook: The essential companion to the Diagnostic and Statistical Manual of Mental Disorders. Arlington, VA: American Psychiatric Publishing.
- Bondi, C. O., Taha, A. Y., Tock, J. L., Totah, N. K., Cheon, Y., Torres, G. E., ... Moghaddam, B. (2014). Adolescent behavior and dopamine availability are uniquely sensitive to dietary omega-3 fatty acid deficiency. Biological Psychiatry, 75(1), 38-46.
- Boyd, M. (2018). Psychiatric nursing: Contemporary practice (5th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.
- Centers for Disease Control. (n.d.). *Health Insurance Portability and Accountability Act*
- *of 1996 (HIPAA)*. Retrieved January 16, 2022, from https://www.cdc.gov/phlp/publications/topic/hipaa.html
- Centers for Disease Control and Prevention. (2015). Hispanic health. Retrieved from https://www.cdc.gov/vitalsigns/hispanic-health/index.html
- Centers for Medicare & Medicaid Services. (n.d.). The center for consumer information & insurance oversight: The Mental Health Parity and Addiction Equity Act
- (MHPAEA). Retrieved from https://www.cms.gov/cciio/programs-and-initiatives/other-insurance-protections/mhpaea_factsheet.html
- Chen C, Zhan J, Wen H, Wei X, Ding L, Tao C, Li C, Zhang P, Tang Y, Zeng J, Lu L. Current state of research about acupuncture for the treatment of COVID-19: A scoping review. Integr Med Res. 2021;10(Suppl):100801. doi: 10.1016/j.imr.2021.100801. Epub 2021 Oct 14. PMID: 34664024; PMCID: PMC8516141. Retrieved April 6, 2022.
- Children's Bureau, Child Welfare Information Gateway. (2016). Mandatory reporters of child abuse and neglect. Washington, DC: U.S. Department of Health and Human Services, Children's Bureau. Retrieved from https://www.childwelfare.gov/pubPDFs/manda.pdf
- Commission on Accreditation for Marriage and Family Therapy Education (COAMFTE). (n.d.). Retrieved from http://www.coamfte.org/iMIS15/COAMFTE/Accreditation/Value%20of%20Accreditation.aspx
- Corey, M. S., Corey, G., & Corey, C. (2013). Groups: Process and practice (9th ed.). Boston, MA: Cengage Learning.
- Corsini, R. J. & Wedding, D. (Eds.). (2018). *Current Psychotherapies* (11th ed.). Cengage Learning.
- Diathesis Stress Theory Explained. (n.d.). HealthResearchFunding.org. Retrieved January 16, 2022, from https://healthresearchfunding.org/diathesis-stress-theory-explained/
- Duke, M. R., Moore, R. S., & Ames, G. M. (2011). PTSD treatment-seeking among rural Latino combat veterans: A review of the literature. Journal of Rural Social Sciences, 26(3), 157-180.
- Ebert, A. (n.d.). *Emil Kraepelin: A pioneer of scientific understanding of psychiatry and psychopharmacology*. NCBI. Retrieved January 16, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2927892/
- Embong, N. H., Soh, Y. C., Ming, L. C., & Wong, T. W. (2015). Revisiting reflexology: Concept, evidence, current practice, and practitioner training. *Journal of traditional and complementary medicine*, *5*(4), 197–206. Retrieved from April 6, 2022, from https://doi.org/10.1016/j.jtcme.2015.08.008
- Emergency Hospitalization, 51 Ohio Rev. Code ch. 5122.10. (2014). Retrieved from http://codes.ohio.gov/orc/5122.10
- Forrester, D. A. (2016). Nursing's greatest leaders: A history of activism. New York, NY: Springer.
- Foucha v. Louisiana (90-5844), 504 U.S. 71. (1992). Supreme Court. Retrieved from https://www.law.cornell.edu/supct/html/90-5844.ZO.html
- Friedman, M. M., Bowden, V. R., & Jones, E. (2003). *Family Nursing: Research, Theory & Practice* (5th ed.). Prentice Hall.
- Fromm, E. (2013). Sigmund Freud's mission: An analysis of his personality and influence. New York, NY: Open Road Media.
- George, M., Taylor, J, Short, E., Snipes, J., Pelic, C., & Fryml, L. In Gabbard, G. O. (Ed.). (2014). *Gabbard's Treatments of Psychiatric Disorders* (5th ed.). American Psychiatric Publishing, a division of American Psychiatric Association.
- Griswold v. Connecticut. (1965). Legal Information Institute. Cornell Law School. (https://www.law.cornell.edu/wex/griswold_v_connecticut_(1965)).
- Halter, M. J. (2018). Varcarolis' foundations of psychiatric mental health nursing: A clinical approach (8th ed.). St. Louis, MO: Elsevier.
- Headlee, R. & Corey, B. W. (1948). Psychiatry in Nursing. New York, NY: Rinehart; original from the University of Michigan.
- Henwood, B. F., Derejko, K. S., Couture, J., & Padgett, D. K. (2015). Maslow and mental health recovery: a comparative study of homeless programs for adults with serious mental illness. Administration and policy in mental health, 42(2), 220–228. https://doi.org/10.1007/s10488-014-0542-8
- Herne, M. A., Bartholomew, M. L., & Weahkee, R. (2014). Suicide mortality among American
- Indians and Alaska Natives, 1999-2009. American Journal of Public Health, 104 (Suppl. 3), S336-S342. doi:10.2105/AJPH.2014.301929
- Institute of Medicine (now the Health and Medicine Division of the National Academies) Committee on Crossing the Quality Chasm. (2006). Improving the quality of health care for mental and substance-use conditions. In Quality Chasm. Retrieved from http://www.ncbi.nlm.nih.gov/books/NBK19830/
- Izzo, A. A., Hoon-Kim, S., Radhakrishnan, R., & Williamson, E. M. (2016). A critical approach to evaluating clinical efficacy, adverse events and drug interactions of herbal remedies. Phytotherapy Research, 30(5), 691–700.
- Jahnke, R., Larkey, L., Rogers, C., Etnier, J., & Lin, F. (2010). A comprehensive review of health benefits of qigong and tai chi. *American journal of health promotion: AJHP*, *24*(6), e1–e25. Retrieved April 6, 2022, from https://doi.org/10.4278/ajhp.081013-LIT-248
- Jones & Bartlett Learning. (n.d.). The Nurse-Patient Relationship. Retrieved from http://samples.jbpub.com/9781449691776/9781449691776_CH05_Pass2.pdf
- Keltner, N. L. (2018). Historical issues. In N. L. Keltner & D. Steele (Eds.), Psychiatric nursing (7th ed., pp. 9-18). St. Louis, MO: Mosby Elsevier. (2015). Anxiety-related, obsessive-compulsive, trauma and stressor-related, somatic, and dissociative disorders. In N. L. Keltner & D. Steele (Eds.), Psychiatric nursing (7th ed., pp. 308-330). St. Louis, MO: Mosby Elsevier.
- Keltner, N. L. & Steele, D. (2014). Psychiatric nursing (7th ed.). St. Louis, MO: Mosby Elsevier.
- Kibria, A. A. & Metcalfe, N. H. (2016). A biography of William Tuke (1732–1822): Founder of the modern mental asylum. Journal of Medical Biography, 24(3), 384-388. doi:10.1177/0967772014533059
- Lasagna, L. (1982). The Boston State Hospital Case (*Rogers* v. *Okin*): A Legal, Ethical, and Medical Morass. Perspectives in Biology and Medicine Volume 25, Number 3, Spring 1982, pp. 382-403, Johns Hopkins University Press, 10.1353/pbm.1982.0031. Retrieved April 8, 2022 from https://muse.jhu.edu/article/404046
- Mahady, G. B., Wicks, S. M., & Bauer, R. (2017). Use of botanicals in children and adults. In S. W. Ekvall & V. K. Ekvall (Eds.), Pediatric and adult nutrition in chronic diseases, developmental disabilities, and hereditary metabolic disorders: Prevention, assessment, and treatment, p. 191.
- Masoumi, S. Z., Ataollahi, M., & Oshvandi, K. (2016). Effect of combined use of calcium and vitamin B6 on premenstrual syndrome symptoms: A randomized clinical trial. Journal of Caring Sciences, 5(1), 67.
- McKay, D., Sookman, D., Neziroglu, F., Wilhelm, S., Stein, D. J., Kyrios, M., ... Veale, D. (2015). Efficacy of cognitive-behavioral therapy for obsessive–compulsive disorder. Psychiatry Research, 225(3), 236–246.
- Meier, E., et al., Plaintiffs and Appellants, v. ROSS GENERAL HOSPITAL et al., Defendants and Respondents. S.F. 22607. Decided: October 04, 1968. Retrieved April 8, 2022, from https://caselaw.findlaw.com/ca-supreme-court/1822578.html
- Rennie v. Klein. Fed Report (1983). 1983 Oct 13; 720:266-77.U.S. Court of Appeals, Third Circuit PMID: 11648483. Retrieved April 8, 2022, from https://pubmed.ncbi.nlm.nih.gov/11648483/
- Riley, J. B. (2015). Communication in nursing. St. Louis, MO: Elsevier Health Sciences.
- Rivers, Z., Xing, C., & Narayanapillai, S. (2016). Kava as a pharmacotherapy of anxiety disorders: Promises and concerns. Medicinal Chemistry, 6(2), 81-87.
- Rouse v. Cameron. (1966) 125 U.S.App. D.C. 366, 373 F.2d 451 (https://casetext.com/case/rouse-v-cameron)
- Rüsch, N., Zlati, A., Black, G., & Thornicroft, G. (2014). Does the stigma of mental illness contribute to suicidality? The British Journal of Psychiatry, 205(4), 257-259.
- Sadock, B. J., Sadock, V. A., & Ruiz, P. (2015). Kaplan and Sadock's synopsis of psychiatry: Behavioral sciences/clinical psychiatry (11th ed.). Philadelphia, PA: Wolters Kluwer.
- Sarkhel, S., Singh, O. P., & Arora, M. (2020). Clinical Practice Guidelines for Psychoeducation in Psychiatric Disorders: General Principles of Psychoeducation. *Indian journal of psychiatry*, *62*(Suppl 2), S319–S323. Retrieved April 06, 2022, from https://doi.org/10.4103/psychiatry.IndianJPsychiatry_780_19
- S.F. No. 23042. Supreme Court of California. July 1, 1976. VITALY TARASOFF et al., Plaintiffs and Appellants, v. THE REGENTS OF THE UNIVERSITY OF CALIFORNIA et al., Defendants and Respondents
- Sharma, N. & Gupta, V. (2022). Therapeutic communication. Stat Pearls. Retrieved from NCBI, April 8, 2022, from https://www.ncbi.nlm.nih.gov/books/NBK567775/
- Shelton, R. C., Manning, J. S., Barrentine, L. W., & Tipa, E. V. (2013). Assessing effects of l-methylfolate in depression management: results of a real-world patient experience trial. The Primary Care Companion for CNS Disorders, 15(4).
- Stahl, S. M. (2020). Stahl's essential psychopharmacology: Neuroscientific basis and practical applications (4th ed.). Cambridge, United Kingdom: Cambridge University Press.
- Suma, P., Kuckel, D., & Huecker, M. (2021). Cognitive Behavior Therapy. *Stat Pearls* 8. Retrieved 4/8/22 from https://www.ncbi.nlm.nih.gov/books/NBK470241/
- Townsend, M. C. (2019). Psychiatric mental health nursing: Concepts of care in evidence-based practice (8th ed.). Philadelphia, PA: F. A. Davis.
- Treatment Advocacy Center. (2014). Mental health commitment laws: A survey of the states. Retrieved from http://www.treatmentadvocacycenter.org/storage/documents/2014-state-survey-abridged.pdf
- Tuckman, B. W. & Jensen, M. A. C. (1977). Stages of small-group development revisited. Group & Organization Management, 2(4), 419-427.

- U.S. Census Bureau. (2016a, November). Facts for features: American Indian and Alaska Native heritage month: November 2016. Retrieved from https://www.census.gov/newsroom/facts-for-features/2016/cb16-ff22.html
- U.S. Census Bureau. (2016b, October). FFF: Hispanic heritage month 2016. Retrieved from https://www.census.gov/newsroom/facts-for-features/2016/cb16-ff16.html
- U.S. Census Bureau. (2016c). Table: Black or African American alone, percent, July 1, 2016 (V2016). Retrieved from https://www.census.gov/quickfacts/fact/table/US/RHI225216
- US Census Bureau. (2021). *US Census Bureau QuickFacts: United States*. Census Bureau. Retrieved January 16, 2022, from https://www.census.gov/quickfacts/fact/table/US/RHI225219
- US Constitution. (1868). 14th Amendment. https://constitution.congress.gov/constitution/amendment-14/
- U.S. Department of Health and Human Services. (1996). The Health Insurance Portability and Accountability Act. Retrieved from https://aspe.hhs.gov/report/health-insurance-portability-and-accountability-act-1996
- U.S. Department of Health and Human Services. (2017a). Health information privacy. Retrieved from https://www.hhs.gov/hipaa/for-professionals/faq/2098/if-doctor-believes-patient-might-hurt-himself-or-herself-or-someone-else-it-duty-provider.html
- U.S. Department of Health and Human Services. (2017b). Information related to mental and behavioral health. Retrieved from https://www.hhs.gov/hipaa/for-professionals/special-topics/mental-health/index.html
- U.S. Department of Labor (1993). Family medical leave act of 1993. Retrieved January 2, 2022, from https://www.dol.gov/agencies/whd/laws-and-regulations/laws/fmla#
- Volpi-Abadie, J., Kaye, A. M., & Kaye, A. D. (2013). Serotonin syndrome. *The Ochsner journal*, *13*(4), 533–540. retrieved Apr 8, 2022 from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3865832/
- Wyatt v. Stickney 325 F. Supp 781(M.D.Ala.1971), 334 F. Supp. 1341 (M.D.Ala 1971), 344 F. Supp. 373 (M.D. Ala. 1972), sub nom Wyatt v. Aderholt, 503 F. 2d 1305 (5th Cir. 1974). Retrieved April 8, 2022, from https://mentalillnesspolicy.org/legal/wyatt-stickney-right-treatment.html
- Yalom, I. D. & Leszcz, M. (2014). The theory and practice of group psychotherapy (5th ed.). New York, NY: Basic Books.

BASIC PSYCHIATRIC CONCEPTS

Self-Assessment Answers and Rationales

1. The correct answer is B.
Rationale: Aaron Beck developed cognitive behavioral therapy after working with depressed patients. Cognitive behavioral therapy is based on cognitive psychology and behavioral therapy.

2. The correct answer is A.
Rationale: The unit policy regarding voluntary patient participation in group therapy preserves the ethical principle of autonomy. The principle of autonomy presumes that individuals are capable of making independent decisions for themselves and that healthcare workers must respect these decisions. Beneficence refers to one's duty to benefit or promote the good of others. Justice reflects the nurse's duty to treat all patients equally. Veracity refers to the duty to be truthful (Boyd, 2018).

3. The correct answer is A.
Rationale: Defense mechanisms are behaviors that an individual uses to deal with stressors. Defense mechanisms can be beneficial and protective for the patient or they can be counterproductive and maladaptive.

4. The correct answer is C.
Rationale: The nurse assumes responsibility for the milieu. The nurse is responsible for the overall environment as well as assessment and medication administration. The therapist is primarily responsible for group and individual therapy in a traditional care model. Psychodrama uses role-play to express feelings. The occupational therapy assists the patient to develop independence in life skills (Boyd, 2018).

5. The correct answer is B.
Rationale: Many community support groups exist to help individuals who are experiencing specific mental health problems. Groups exist for gambling addiction, rape and sexual abuse support, bipolar disorder, depression, grief and bereavement, suicide, attention deficit disorder, Tourette's disorder, substance use disorders, and many more.

6. The correct answer is B.
Rationale: Dopamine is a neurotransmitter associated with psychosis and influences several areas of the brain.

7. The correct answer is C.
Rationale: Ginkgo biloba can interfere with blood clotting and reduce platelet action, leading to increases in bleeding times. It may interfere with anticoagulant therapy and should not be taken by patients with circulatory problems who are taking such medications such as Coumadin, Plavix, or aspirin.

8. The correct answer is D.
Rationale: A person with liver impairment or one who is a heavy alcohol user should never use kava kava because it has been linked with hepatotoxicity (Rivers, Xing, & Narayanapillai, 2016).

Diabetes Prevention and Management for Healthcare Professionals

5 Contact Hours

Release Date: November 16, 2021

Expiration Date: November 16, 2024

Faculty

Adrianne Avillion, D.Ed, RN, is an accomplished nursing professional development specialist and healthcare author. She earned a doctoral degree in adult education, an MS in nursing from Penn State University, and a BSN from Bloomsburg University. Dr. Avillion has held a variety of nursing positions as a staff nurse in critical care and physical medicine and rehabilitation settings, as well as numerous leadership roles in professional development. She has published extensively and is a frequent presenter at conferences and conventions devoted to the specialty of continuing education and nursing professional development. Dr. Avillion owns and is the CEO of Strategic Nursing Professional Development, a business that specializes in continuing education for healthcare professionals and consulting services in nursing professional development.

Adrianne Avillion has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Reviewer: Mary C. Ross, Ph.D., RN, is an experienced nursing clinician and educator. She has clinical expertise in nursing and various medical-surgical areas. Dr. Ross has had numerous research grants, and multiple publications and presentations. In addition to a BSN and an MSN, she has a doctorate in nursing.

Mary C. Ross has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Course overview

Diabetes is a significant health problem in the United States and throughout the world. It is imperative that the healthcare community take aggressive steps to reduce the number of Americans who have the disease and to promote more effective treatment so that persons with diabetes can enjoy their maximum quality of life. This education program presents information on both the impact of the disease and how to provide effective healthcare professional interventions to those affected.

Learning objectives

Upon completion of the course, the learner should be able to:

- Discuss the incidence and prevalence of diabetes mellitus.
- Explain the financial and societal impact of diabetes mellitus.
- Describe the normal anatomy and physiology of the pancreas.
- Differentiate among the different types of diabetes mellitus.
- Discuss the pathologies of the different types of diabetes mellitus.
- Explain the screening guidelines for diabetes mellitus.
- Identify risk factors for the development of diabetes mellitus.
- Describe the presenting clinical manifestations of each type of diabetes mellitus.
- Explain the process of diagnosing diabetes mellitus.
- Describe strategies for the management of diabetes mellitus.
- Identify the potential complications of diabetes mellitus.
- Describe healthcare professional interventions when caring for persons with diabetes mellitus.
- Discuss the educational needs of diabetic patients and their families.

How to receive credit

- Read the entire course online or in print which requires a 5-hour commitment of time.
- Complete the self-assessment quiz questions which are at the end of the course or integrated throughout the course. These questions are NOT GRADED. The correct answer is shown after you answer the question. If the incorrect answer is selected, the rationale for the correct answer is provided. These questions help to affirm what you have learned from the course.
- Depending on your state requirements you will be asked to complete either:
  - An affirmation that you have completed the educational activity.
  - A mandatory test (a passing score of 70 percent is required). Test questions link content to learning objectives as a method to enhance individualized learning and material retention.
- If requested, provide required personal information and payment information.
- Complete the MANDATORY Course Evaluation.
- Print your Certificate of Completion.

CE Broker reporting

Colibri Healthcare, LLC, provider # 50-4007, reports course completion results within 1 business day to CE Broker. If you are licensed in Arkansas, District of Columbia, Florida, Georgia, Kentucky, Michigan, Mississippi, New Mexico, North Dakota, South Carolina, or West Virginia, your successful completion results will be automatically reported for you.

Accreditations and approvals

Colibri Healthcare, LLC is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation.

Individual state nursing approvals

Colibri Healthcare, LLC is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation. In addition to states that accept courses offered by ANCC Accredited Providers, Colibri Healthcare, LLC is an approved Provider of continuing education in nursing by: Alabama Board of Nursing, Provider #ABNP1418 (valid through February 5, 2025); Arkansas State Board of Nursing, Provider #50-4007; California Board of Registered Nursing, Provider #CEP17480 (valid through January 31, 2024); California Board of Vocational Nursing and Psychiatric Technicians (LVN Provider #V15058, PT Provider #V15020; valid through December 31, 2023); District of Columbia Board of Nursing, Provider #50-4007; Florida Board of Nursing, Provider #50-4007; Georgia Board of Nursing, Provider #50-4007; Kentucky Board of Nursing, Provider #7-0076 (valid through December 31, 2023; CE Broker Provider #50-4007); Michigan Board of Nursing, Provider #50-4007; Mississippi Board of Nursing, Provider #50-4007; New Mexico Board of Nursing, Provider #50-4007; North Dakota Board of Nursing, Provider #50-4007; South Carolina Board of Nursing, Provider #50-4007; and West Virginia Board of Registered Nurses, Provider #50-4007. This CE program satisfies the Massachusetts States Board's regulatory requirements as defined in 244 CMR5.00: Continuing Education.

Activity director

Shirley Aycock, DNP, RN, Executive Director of Quality and Accreditation

Disclosures

Resolution of conflict of interest
In accordance with the ANCC Standards for Commercial Support for continuing education, Colibri Healthcare, LLC implemented mechanisms prior to the planning and implementation of the continuing education activity, to identify and resolve conflicts of interest for all individuals in a position to control content of the course activity.

Sponsorship/commercial support and non-endorsement
It is the policy of Colibri Healthcare, LLC not to accept commercial support. Furthermore, commercial interests are prohibited from distributing or providing access to this activity to learners.

Disclaimer

The information provided in this activity is for continuing education purposes only and is not meant to substitute for the independent medical judgment of a healthcare provider relative to diagnostic and treatment options of a specific patient's medical condition.

Course verification

All individuals involved have disclosed that they have no significant financial or other conflicts of interest pertaining to this course. Likewise, and in compliance with California Assembly Bill No. 241, every reasonable effort has been made to ensure that the content in this course is balanced and unbiased.

INTRODUCTION

According to the National Diabetes Statics Report, 2020, 34.2 million Americans, just over 1 in 10, have diabetes. Of these 34.2 million people, 7.3 million, or 21.4%, are undiagnosed (Centers for Disease Control and Prevention (CDC), 2020c; 2020d). The World Health Organization (WHO) reports that in 2019 an estimated 1.5 million deaths were directly caused by diabetes (WHO, 2021). The numbers of people who have diabetes continue to increase at alarming rates. It is critical that healthcare professionals aggressively pursue identification of persons who have, and who are at risk for, developing diabetes, and intervene to facilitate not only treatment, but prevention efforts (CDC, 2020c; 2020d).

INCIDENCE AND PREVALENCE OF DIABETES MELLITUS

Diabetes mellitus (DM) is a chronic endocrine disease characterized by impaired glucose regulation that occurs when the pancreas fails to produce adequate amounts of insulin or when the patient's body is unable to effectively utilize the insulin that is produced (Ignatavicius et al., 2018; WHO, 2021).

Approximately 304.2 million Americans have diabetes. Data indicate that (CDC, 2020c; 2020d):

- An estimated 10.5% of the United States (US) population are dealing with diabetes.
- About 26.9 million people have been diagnosed. This figure includes 26.8 million adults.
- A significant number of these people, 7.3 million or 21.4%, are undiagnosed.
- A total of 88 million people 18 years of age and older have prediabetes. This figure represents 34.5% of the adult US population.
- For persons 65 years of age and older, 24.2 million people have prediabetes.

Healthcare Professionals Consideration: An estimated 1.5 million world-wide deaths were directly caused by diabetes in 2019 (WHO, 2021). Healthcare professionals must increase their efforts in the recognition, treatment, and prevention of diabetes mellitus.

Diabetes is also a leading cause of death in the United States. According to the most recent data available on the CDC website (2021d), the following are the leading causes of death in the United States.

1. Heart disease: 659,041
2. Cancer: 599,601
3. Accidents (unintentional injuries): 173,040
4. Chronic lower respiratory diseases: 156,979
5. Stroke (cerebrovascular diseases): 150,005
6. Alzheimer's disease: 121,499
7. Diabetes: 87,647
8. Nephritis, nephrotic syndrome, and nephrosis: 51,565
9. Influenza and pneumonia: 49,783
10. Intentional self-harm (suicide): 47,511

Key findings of the National Diabetes Statistics Report 2020 regarding incidence and prevalence include (CDC, 2020d ;2020e; 200f):

- 34.2 million Americans—just over 1 in 10—have diabetes.
- 88 million American adults—approximately 1 in 3—have prediabetes.
- New diabetes cases were higher among non-Hispanic blacks and people of Hispanic origin than non-Hispanic Asians and non-Hispanic whites.
- For adults diagnosed with diabetes:
  - New cases significantly decreased from 2008 through 2018.
  - The percentage of existing cases was highest among American Indians/Alaska Natives.
  - 15% were smokers, 89% were overweight, and 38% were physically inactive.
  - 37% had chronic kidney disease (stages 1 through 4); and fewer than 25% with moderate to severe chronic kidney disease (stage 3 or 4) were aware of their condition.
- New diagnosed cases of type 1 and type 2 diabetes have significantly increased among US youth.
- For ages 10 to 19 years, incidence of type 2 diabetes remained stable among non-Hispanic whites and increased for all others, especially non-Hispanic blacks.
- The percentage of adults with prediabetes who were aware they had the condition doubled between 2005 and 2016, but most continue to be unaware.

More people are developing type 1 and type 2 diabetes during youth, and racial and ethnic minorities continue to develop type 2 diabetes at higher rates. Likewise, the proportion of older people in our nation is increasing, and older people are more likely to have a chronic disease like diabetes. By addressing diabetes, many other related health problems can be prevented or delayed.

Prevalence and incidence according to age, race, and ethnicity

Age

According to the National Diabetes Statistics Report 2020, (CDC, 2020c; 2020d;2020e):

- About 34.2 million people of all ages had diabetes mellitus.
- The percentage of adults (18 years of age or older) with diabetes increased with age.
- About 34.1 million adults 18 years of age or older) had diabetes.
- The highest percentage was 26.8% among persons 65 years of age or older.
- An estimated 4.9 million adults between the ages of 18 and 44 had diabetes.
- An estimated 14.8 million people between the ages of 45 and 64 had diabetes.
- An estimated 14.3 million people over the age of 65 had diabetes.

Incidence and Trends among Children and Adolescents.

According to the National Diabetes Statistics Report 2020 (CDC, 2020c; 2020d; 2020e):

- 18,291 children and adolescents younger than age 20 years with type 1 diabetes.
- 5,758 children and adolescents age 10 to 19 years with type 2 diabetes.
- During 2011–2015, non-Hispanic Asian and Pacific Islander children and youth had the largest significant increases in incidence of type 1 diabetes.
- During 2011–2015, non-Hispanic Asian and Pacific Islander children and youth had the largest significant increases in incidence of type 1 diabetes.
- Among US children and adolescents aged 10 to 19 years (CDC, 2020c; 2020d; 2020e):
- For the entire period 2002–2015, overall incidence of type 2 diabetes significantly increased.
- During the 2002–2010 and 2011–2015 periods, changes in incidence of type 2 diabetes were consistent across race/ethnic groups. Specifically, incidence of type 2 diabetes remained stable among non-Hispanic whites and significantly increased for all others, especially non-Hispanic blacks.

Evidence-based practice! Research data shows that the number of younger people with diabetes is significant and continues to increase (CDC, 2020c; 2020d; 2020e). It is therefore essential that nurses identify those at risk and provide patient/family education regarding risk factors for the disease and how to modify these risk factors as appropriate.

Racial and ethnic differences (Prevalence of diagnosed diabetes)

Among the US population overall, crude estimates for 2018 were (CDC, 2020c; 2020d; 2020e):

- 26.9 million people of all ages—or 8.2% of the US population—had diagnosed diabetes.
- 210,000 children and adolescents younger than age 20 years—or 25 per 10,000 US youths— had diagnosed diabetes. This includes 187,000 with type 1 diabetes.
- 1.4 million adults aged 20 years or older—or 5.2% of all US adults with diagnosed diabetes—reported both having type 1 diabetes and using insulin.
- 2.9 million adults aged 20 years or older—or 10.9% of all US adults with diagnosed diabetes—started using insulin within a year of their diagnosis.

Among US adults aged 18 years or older, age-adjusted data for 2017–2018 indicated the following (CDC, 2020c; 2020d; 2020f):

- Prevalence of diagnosed diabetes was highest among American Indians/Alaska Natives (14.7%), people of Hispanic origin (12.5%), and non-Hispanic blacks (11.7%), followed by non-Hispanic Asians (9.2%) and non-Hispanic whites (7.5%).
- American Indians/Alaska Natives had the highest prevalence of diagnosed diabetes for women (14.8%).
- American Indian/Alaska Native men had a significantly higher prevalence of diagnosed diabetes (14.5%) than non-Hispanic black (11.4%), non-Hispanic Asian (10.0%), and non-Hispanic white (8.6%) men.
- Among adults of Hispanic origin, Mexicans (14.4%) and Puerto Ricans (12.4%) had the highest prevalence, followed by Central/South Americans (8.3%) and Cubans (6.5%).
- Among non-Hispanic Asians, Asian Indians (12.6%) and Filipinos (10.4%) had the highest prevalence, followed by Chinese (5.6%). Other Asian groups had a prevalence of 9.9%.
- Among adults, prevalence varied significantly by education level, which is an indicator of socioeconomic status. Specifically, 13.3% of adults with less than a high school education had diagnosed diabetes versus 9.7% of those with a high school education and 7.5% of those with more than a high school education.

Prevalence of Prediabetes in Adults

Data regarding prediabetes in adults show that (CDC, 2020c; 2020d; 2020e):

- An estimated 88 million adults aged 18 years or older had prediabetes in 2018.
- Among US adults aged 18 years or older, crude estimates for 2013–2016 were: 34.5% of all US adults had prediabetes, based on their fasting glucose or A1C level (Table 3).
- 10.5% of adults had prediabetes based on both elevated fasting plasma glucose and A1C levels.
- 15.3% of adults with prediabetes reported being told by a health professional that they had this condition.
- Among US adults aged 18 years or older, age-adjusted data for 2013–2016 indicated:

- A higher percentage of men (37.4%) than women (29.2%) had prediabetes.
- Prevalence of prediabetes was similar among all racial/ethnic groups and education levels.

Incidence of Newly Diagnosed Diabetes in Adults

Among US adults aged 18 years or older, crude estimates for 2018 were (CDC, 2020c; 2020d; 2020e):

- 1.5 million new cases of diabetes—or 6.9 per 1,000 persons—were diagnosed.
- Compared to adults aged 18 to 44 years, incidence rates of diagnosed diabetes were higher among adults aged 45 to 64 years and those aged 65 years and older.
- Among US adults aged 18 years or older, age-adjusted data for 2017–2018 indicated that non-Hispanic blacks (8.2 per 1,000 persons) and people of Hispanic origin (9.7 per 1,000 persons) had a higher incidence compared to non-Hispanic whites (5.0 per 1,000 persons).

Evidence-based practice! The rate of new cases of diabetes in youths younger than 20 years of age increased in the US between 2002 and 2015, with a 4.8% increase per year for type 2 diabetes and a 1.9% increase per year for type 1 diabetes (CDC, 2020g). These findings indicate that education regarding prevention and recognition of diabetes in youth must be provided with increased effectiveness, as well as aggressive efforts to prevent development whenever possible.

Self-Assessment Quiz Question #1

Among U. S. adults 18 years of age and older indicated that prevalence of diagnosed diabetes was highest among:

a. American Indians/Alaska Natives.
b. People of Hispanic origin.
c. Non-Hispanic blacks.
d. Non-Hispanic Asians.

FINANCIAL AND SOCIETAL IMPACT OF DIABETES MELLITUS

The momentous financial and societal impact of diabetes continues to increase at an alarming rate. Federal, state, and local governments (and ultimately the US taxpayer) bear the brunt of costs related to diabetes. The American Diabetes Association (ADA) gives as an example that Medicare's diabetes-related burden increased as the prevalence of diabetes increased (O'Connell & Manson, 2019).

According to the CDC, diabetes is the most expensive chronic condition in the US. A summary of these expenses includes (CDC, 2021c):

- The total annual cost of diabetes is $327 billion. An additional $90 billion is spent on reduced productivity.
- One dollar out of every four dollars in US healthcare costs is spent on caring for people with diabetes.
- The total economic cost of diabetes rose 60% from 2007 to 2017.
- Sixty-one percent of diabetes costs are for people 65 years of age or older. These costs are mainly paid by Medicare.
- An estimated 48% to 64% of lifetime medical costs for a person with diabetes are for complications related to diabetes, such as heart disease and stroke.

Medical costs are not the only costs related to diabetes. The stress of chronic illness can impact interpersonal relationships. It can impact the person's ability to work, which may have significant economic impact on the family income. Financial burdens are inter-related with psychological issues that impact persons dealing with diabetes. Medical bills, loss of work time, and inability to actively participate in work and social activities can all have s significant adverse impact on patients, their families, and their employers. Dealing with a chronic illness can lead to significant stress, which can adversely impact ability to function effectively at work, home, and school and interfere with interpersonal relationships. Therefore, the costs of diabetes include monetary, societal, and interpersonal factors. The impact on society includes overextended health services, increased public assistance programs for financially stressed families, and the societal burden of mental health care and rehabilitation for those with complications resulting from diabetes (CDC, 2021c; O'Connell, 2019).

The cost of medications used in the treatment of diabetes continues to increase at alarming rates. The price of insulin, for example, has increased 1,200% since 1996 (Kumok, 2021).

The estimated economic cost of glucose-lowering drugs is $57.6 billion per year in the U.S. in 2015–2017 (15–20% of the estimated annual cost for all prescription drugs in the U.S.). The cost of such drugs can cause a financial burden and have a devastating impact on people without health insurance and people whose insurance imposes high deductibles—the people least able to afford the high cost of diabetes drugs. This means that the high cost of diabetes drugs has important implications for both public policy and social justice (Taylor, 2020a).

Members of an Insulin Access and Affordability Working Group (Cefalu, (2018) made the following recommendations to help lower the cost of insulin. These recommendations may also be applied to other drugs used in the treatment of diabetes. Examples include (Cefalu, (2018):

- Providers, pharmacies, and insurers should discuss the cost of insulin preparations (and other drugs) with patients to help them understand the advantages, disadvantages, and financial impact of potential insulin preparations and those of other diabetes medications.
- Providers should prescribe the lowest-priced medications that effectively and safely achieve treatment goals.
- Researchers should study the comparative effectiveness and cost-effectiveness of the various insulins.
- Organizations such as the (ADA) should:
  - Advocate for access to affordable medications for all people who have diabetes.
  - Develop and regularly update clinical guidelines or standards of care based on scientific evidence for prescribing medications.
  - Make information about the advantages, disadvantages, and financial implications of medications easily available to people with diabetes.

NORMAL ANATOMY AND PHYSIOLOGY OF THE PANCREAS

It is not possible to comprehend the pathophysiology of diabetes without an understanding of normal pancreatic functioning. The pancreas is a triangular shaped organ, about six to 10 inches long, located in the curve of the duodenum (the first portion of the small intestine from the stomach to the jejunum). The pancreas plays critical roles in both the digestive process and the process that regulates blood sugar (The Pancreas Center, n.d.; Willis, 2018).

The pancreas is surrounded by various other organs: the small intestine, liver, and spleen. It has three sections. The wide part, referred to as the head of the pancreas, is positioned toward the center of the abdomen. The middle section is called the neck and the body of the pancreas. The thin end of the organ is referred to as the tail and extends to the left side (Johns Hopkins Medicine, n.d.; The Pancreas Center, n.d.; Willis, 2018).

The pancreas is surrounded by several major blood vessels: the superior mesenteric artery, the superior mesenteric vein, the portal vein, and the celiac axis, which supply blood to the pancreas and many other abdominal organs (The Pancreas Center, n.d.).

Exocrine function of the pancreas

The pancreas contains exocrine glands, which produce enzymes that are essential to the process of digestion (The Pancreas Center, n.d.). Acinar cells make up most of the pancreas and are responsible for the regulation of the exocrine functions of the gland (Willis, 2018).

Below is a summary of the exocrine function of the pancreas (The Pancreas Center, n.d.):

- Food enters the stomach.
- Pancreatic juices flow into a system of ducts that terminate in the primary pancreatic duct.
- The pancreatic duct joins with the common bile duct to form the ampulla of Vater located in the duodenum.
- The common bile duct produces bile. Pancreatic juices and bile flow into the duodenum and facilitate the digestion of fats, carbohydrates, and proteins.

Endocrine function of the pancreas

The endocrine function of the pancreas focuses on hormone secretion. The endocrine cells of the pancreas are islet cells, or islets of Langerhans. These islet cells exist as clusters of cells that are scattered among the acinar cells. They consist of alpha, beta, and delta cells, which produce the following essential hormones (Johns Hopkins Medicine, n.d.a.; The Pancreas Center, n.d.; Willis, 2018):

- Glucagon: Glucagon is produced by the alpha cells. It raises blood glucose levels by causing the breakdown of glycogen to glucose.
- Insulin: Insulin is produced by beta cells. Insulin's primary function is to reduce blood glucose levels by triggering the conversion of glucose to glycogen.
- Somatostatin: Delta cells are responsible for the production of somatostatin. Somatostatin inhibits the release of growth hormone (GH), corticotrophin, and some other hormones.

Under normal conditions, a small amount of insulin is constantly secreted by the pancreas. Insulin secretion increases in response to increases in blood glucose levels. Insulin triggers the conversion of glucose to glycogen. Glycogen is stored primarily in the liver and in skeletal muscle (Johns Hopkins Medicine, n.d.; The Pancreas Center, n.d.; Willis, 2018).

When blood glucose levels are low such as between meals or during or immediately following exercise, alpha cells are stimulated to release glucagon. Glucagon causes the liver to release glycogen, which is then converted to glucose. Glucose travels through the blood stream to the cells of the body where it is converted to energy to maintain body functioning (Johns Hopkins Medicine, n.d.a.; The Pancreas Center, n.d.; Willis, 2018).

Maintaining normal blood glucose levels is essential to the ability of key organs—including the brain, liver, and kidneys—to function properly (Johns Hopkins Medicine, n.d; The Pancreas Center, n.d.; Willis, 2018). However, the normal blood glucose range is rather narrow. Blood glucose levels are regulated by an internal feedback mechanism that involves the pancreas and the liver (Willis, 2018).

The following blood glucose test results indicate normal findings (Pagana et al., 2019).

From the ages of two to adulthood:

- Fasting (no caloric intake for at least eight hours): 70 to 110 mg/dL or <6.1 mmol/L.
- Casual (any time of day regardless of food intake): <200 mg/dL (11.1 mmol/L).

Children <2 years of age:

- 60 to 100 mg/dL or 3.3 to 5.5 mmol/L.

When normal blood glucose levels are not maintained, the impact can be devastating on an individual's health and wellness. To effectively provide healthcare services for persons who have diabetes, healthcare professionals must understand both normal pancreatic functioning and the pathophysiology associated with the disease. To do this, it is essential to differentiate among the different types of diabetes, all of which have different pathologies.

Self-Assessment Quiz Question #2

The endocrine function of the pancreas focuses on:

a. The production of enzymes essential to the process of digestion.
b. The production of bile.
c. Hormone secretion.
d. Alpha cell production of insulin.

THE DIFFERENT TYPES OF DIABETES MELLITUS

Health care professionals and health care consumers are arguably most familiar with type 1 and type 2 diabetes. But there are other types of diabetes with which nurses must be familiar (Rebar et al., 2019).

- Type 1: The body is unable to produce adequate amounts of insulin.
- Type 2: There is resistance to insulin or abnormal insulin secretion.
- Secondary diabetes: This form of diabetes develops because of, or secondary to, another disease or condition.
- Gestational diabetes: This occurs in pregnant women who have never had diabetes.

The primary focus of this educational program is on type 1 and type 2 diabetes, but the issue of other types of diabetes is also quite important. Therefore, it will be discussed before delving into type 1 and type 2 diabetes.

The term secondary diabetes refers to specific types of diabetes because of other causes (ADA, 2021b). Some of the most common causes of secondary diabetes include (Khardori, 2021c; Rebar et al., 2019):

- Physical or emotional stress, which may cause prolonged increases in levels of the stress hormone cortisol, epinephrine, glucagon, and growth hormone (GH). These increases, in turn, raise the blood glucose level and place more demands on the pancreas.
- Use of adrenal corticosteroids, hormonal contraceptives, and other types of drugs that antagonize the effects of insulin.
- Diseases of the pancreas that destroy pancreatic beta cells, such as pancreatic cancer, pancreatitis, and cystic fibrosis.
- Hormonal syndromes that interfere with the secretion of insulin, such as pheochromocytoma.
- Hormonal syndromes that cause peripheral insulin resistance, such as Cushing syndrome.
- Some medications, such as estrogens, phenytoin, and glucocorticoids.

Gestational diabetes

Gestational diabetes occurs in women who have never had diabetes mellitus but have high blood glucose levels during pregnancy (Mayo Clinic, 2020c). This condition develops in a fairly high number of women. In the US, an estimated 10% of women who are pregnant develop gestational diabetes (Dansinger, 2019a). Healthcare professionals are becoming increasingly concerned about the occurrence of gestational diabetes. Thus, the following more detailed information is provided.

Etiology of Gestational Diabetes
As a result of hormonal changes associated with pregnancy, nearly all women experience some amount of impaired glucose intolerance. Although blood sugar may be higher than normal, it is not high enough to be diagnosed as diabetes mellitus. During the third trimester of pregnancy, these hormonal changes put women at higher risk for gestational diabetes. Hormonal changes can interfere with the appropriate action of insulin, which leads to insulin resistance (American Diabetes Association, 2021d; Dansinger, 2019a).

During pregnancy, certain placental hormones help to shift nutrients from the mother to the fetus. Other placental hormones help prevent hypoglycemia in the pregnant woman. As pregnancy advances, such hormones can lead to progressive impaired glucose intolerance (elevated blood glucose levels). Usually, the woman's pancreas is able to compensate for these elevated levels by producing about three times the normal amount of insulin. If the pancreas is not able to produce adequate amounts of insulin, blood glucose levels rise, and gestational diabetes occurs (Dansinger, 2019a).

Risk Factors for Development of Gestational Diabetes
Several factors increase the risk for the development of gestational diabetes (Dansinger, 2019a; Mayo Clinic, 2020c):

- Being overweight or obese
- Being a member of a high-risk ethnic group such as Hispanic, Black, Native American, African American, Pacific Islander, Alaska native, Native American, or Asian
- Being older than 25 years of age
- Having impaired glucose tolerance or impaired fasting blood glucose levels. This means that blood glucose levels are high but not high enough to be diagnosed as diabetes mellitus.
- Having gestational diabetes during a previous pregnancy
- Having a family history of gestational diabetes
- Having polycystic ovary syndrome or other condition that is associated with insulin abnormalities
- Previously giving birth to a baby that weighed over 9 pounds
- Previously giving birth to a stillborn baby or one that had birth defects
- Having had a miscarriage
- Having hypertension, elevated cholesterol, or heart disease

Complications
Gestational diabetes may increase the risk of (Mayo Clinic, 2020c):

- Hypertension
- Preeclampsia
- Development of diabetes in the future
- Need for a surgical delivery (C-section)

Diagnosis of Gestational Diabetes
The ADA (2021b) has published the following recommendations for gestational diabetes mellitus screening.

- Test for undiagnosed prediabetes and diabetes at the first prenatal visit in those with risk factors using standard diagnostic criteria.
- Test for gestational diabetes mellitus at 24-28 weeks of gestation in pregnant women not previously found to have diabetes.
- Test women with gestational diabetes mellitus for prediabetes or diabetes at 4-12 weeks postpartum, using the 75-g oral glucose tolerance test and clinically appropriate nonpregnancy diagnostic criteria.
- Women with a history of gestational diabetes mellitus should have lifelong screening for the development of diabetes or prediabetes at least every three years.
- Women with a history of gestational diabetes mellitus found to have prediabetes should receive intensive lifestyle interventions and/or metformin to prevent diabetes.

The steps of an oral glucose tolerance include (Pagana et al., 2018):

1. Obtain fasting blood and urine specimens. The patient should fast for 12 hours before the test.
2. Administer a prescribed oral glucose solution of 75-100 g for pregnant women. Note that the ADA recommends using 75 g solution.
3. Instruct patient to drink the entire glucose solution.
4. Instruct patient not to eat or drink anything except water during the testing period.
5. Obtain a venous blood sample at 30 and 60 minutes and then hourly.
6. Collect urine specimens hourly.
7. Monitor the patient for dizziness, sweating, and weakness.

Screening tests may vary slightly depending on the patient's healthcare provider. General results include (Mayo Clinic, 2020c; Pagana et al., 2019):

- Initial glucose challenge test: This challenge test is done first. It is a one-hour test that involves drinking a glucose solution and having blood glucose levels assessed. A blood sugar level of 10 mg per deciliter (mg/dL) or 10.6 millimoles per liter indicates gestational diabetes. A blood glucose level below 140 mg/dL is usually considered normal. A higher-than-normal blood glucose level means that the glucose tolerance test should be performed.
- Follow-up glucose tolerance testing: If at least two of the blood glucose readings are higher than normal, a diagnosis of gestational diabetes is made.

Management of Gestational Diabetes
The goal of treatment for gestational diabetes is to keep blood glucose levels equal to those of pregnant women who do not have gestational diabetes (ADA, 2021d).

Management of gestational diabetes includes the following initiatives (ADA,2021d; Dansinger, 2019a; Mayo Clinic, 2020c; WebMD, 2017a):

- Teach patients and family members (as appropriate) how to monitor blood glucose levels. Monitoring should be done four times per day, before breakfast and two hours after meals. Some patients require checking glucose levels before meals as well.
- Teach patients and family members (as appropriate) how to monitor urine for ketones.
- Initiate a dietary consultation for the development of an appropriate diet. Explain to patients and family members the importance of following prescribed dietary plans. A healthy diet focuses on fruits, vegetables, whole grains, and lean proteins.
- Help patients to develop medically approved exercise regimens.
- Teach patients to monitor their weight.
- If needed, teach patients about any hypoglycemic medications, including insulin, that are prescribed.
- Monitor blood pressure and initiate prescribed actions such as exercise and reduction of salt intake. As appropriate, teach patient and family members how to monitor blood pressure.
- Teach patients to keep a careful written record of their blood glucose levels and results of urine monitoring—including the time readings were obtained and how readings relate to dietary intake, exercise, and stress—and blood pressure readings if monitoring blood pressure at home. Instruct patients to bring a copy of these written records with them to all health care appointments.
- Teach patients stress reduction techniques such as meditation and deep breathing exercise as appropriate.

Most pregnant women are concerned about the possible effects of gestational diabetes on their unborn children. Fortunately, gestational diabetes affects the mother relatively late in her pregnancy, when the majority of the baby's organs have been formed, but while the baby is still growing. Gestational diabetes is not associated with the types of birth defects in infants whose mothers had diabetes mellitus before pregnancy (Dansinger, 2019a; Mayo Clinic, 2020c).

Unfortunately, untreated, or inadequately controlled gestational diabetes can harm the fetus. The pancreas works "overtime" to

produce insulin in the presence of gestational diabetes, but the insulin does not reduce blood glucose levels. Insulin does not cross the placenta, but glucose does. Thus, the unborn child is exposed to high blood glucose levels. In response to these elevated levels, the unborn baby produces additional insulin, receives more energy, and stores the "extra" energy as fat. Additional stores of fat can lead to macrosomia, a condition in which the baby is abnormally large before birth. Adverse effects of macrosomia include damage to the baby's shoulders during birth, low blood glucose levels because of the extra insulin production, respiratory distress, and jaundice. These infants are also at higher risk for obesity as children and at risk for type 2 diabetes as adults. Thus, it is essential that all pregnant women be screened for gestational diabetes and, if a diagnosis of diabetes is found, treated appropriately and promptly (Dansinger, 2019a; Mayo Clinic, 2020c).

About six weeks after delivery, the mother's blood glucose levels usually return to normal because the placenta, which was responsible for producing the hormones that led to insulin resistance, is no longer in the body. Blood glucose levels will be monitored to ensure that they have returned to normal. Some health care providers recommend an oral glucose tolerance test 6 to 12 weeks after delivery to screen for diabetes mellitus (Dansinger, 2019a; Mayo Clinic, 2020c).

Evidence-based practice! Women who have had gestational diabetes have a 50% chance of developing type 2 diabetes within 10 to 20 years of delivery (Dansinger, 2019a). Therefore, they should work to reduce this risk by maintaining an ideal body weight, following a healthy diet, and exercising regularly.

Self-Assessment Quiz Question #3

ADA recommendations for gestational diabetes screening include all of the following EXCEPT:

a. Pregnant women not previously found to have diabetes should be screened for gestational diabetes at the first prenatal visit.
b. Women with a history of gestational diabetes mellitus should have lifelong screening for the development of diabetes at least every three years.
c. A blood glucose level of 140 mg/dL is considered normal.
d. The initial glucose challenge test is done before the glucose tolerance test.

TYPE 1 DIABETES: ETIOLOGY AND PATHOPHYSIOLOGY

Type 1 diabetes occurs when the beta cells of the pancreas are destroyed or suppressed. This results in failure of the pancreas to release insulin and inadequate transport of glucose (Rebar et al., 2019). The prevalence of diagnosed type 1 diabetes in 2016 was 0.55%, or 1.3 million adults. This is significantly less than the prevalence of diagnosed type 2 diabetes, which was 8.6%, or 21.0 million adults (Morr, 2018).

Immune mediated types of type 1 diabetes, an autoimmune attack on beta cells occurs. This results in an inflammatory response in the pancreas (insulitis). Antibodies may be present for considerable time before the development of symptoms. In fact, by the time the disease is symptomatic, 80% of the beta cells are deactivated. Some experts believe that the beta cells are not destroyed, but instead they are disabled and may be able to be reactivated (Rebar et al., 2019).

Healthcare Professional Consideration: Type 1 diabetes is divided into idiopathic and immune-mediated types. In idiopathic diabetes (referred to as type 1b diabetes) there is nearly complete insulin deficiency. There is no evidence of autoimmunity (Kalyani, 2017; Rebar et al., 2019). Healthcare professionals must be aware of the various types of diabetes to recognize them and to provide safe and appropriate care. Screening and patient education are critical elements of care. Clinical Practice Guidelines are constantly being updated and should be followed for effective care. The Centers for Medicare & Medicaid Services (CMS) sets reimbursement rates for Medicare providers and generally pays them according to approved guidelines.

Latent autoimmune diabetes (LADA)

Latent autoimmune diabetes in adults (LADA) is characterized by a slow progression of autoimmune reaction against the pancreas. Some experts recognize LADA as a form of type 1 diabetes, while others do not. LADA occurs because of an inadequate production of insulin. However, LADA does not require insulin administration for several months up to years after diagnosis is made (Castro, 2021).

Following are characteristics of LADA (Castro, 2021):

- People are usually over the age of 30 when the disease is diagnosed.
- The pancreas produces some insulin initially
- LADA is often misdiagnosed with type 2 diabetes because the patients are older at diagnosis and some insulin production is still evident.
- Initially, LADA is managed with diet, weight reduction as needed, exercise, and oral medications as needed. But insulin is eventually needed because the pancreas gradually loses its ability to produce insulin.

Research is underway regarding LADA and the best way to manage treatment. Health care providers with expertise in all forms of diabetes should direct treatment initiatives (Castro, 2021).

TYPE 2 DIABETES: PATHOPHYSIOLOGY AND ETIOLOGY

Type 2 diabetes is an impairment of the way the glucose is regulated and used by the body. A chronic condition, type 2 diabetes can lead to disorders of the circulatory, nervous, and immune system (Mayo Clinic, 2021g). The following are general characteristics of type 2 diabetes (Mayo Clinic, 2021g Santos-Longhurst, 2020):

- The disease is caused by a combination of insulin resistance and insulin deficiency. Some people develop the disease predominantly because of insulin resistance, whereas others are affected predominantly by deficient insulin secretion but have little insulin resistance.
- About 90% to 95% of people with diabetes have type 2 diabetes.
- Type 2 diabetes has a strong hereditary component.
- Its onset is typically slow and insidious
- Type 2 diabetes is significantly less common in children and young adults than in older adults. But the number of children with type 2 diabetes is increasing because of the prevalence of overweight children.
- Although some people with this type of diabetes may need insulin, they are still categorized as having type 2 diabetes.

Pathophysiology

Under normal conditions, insulin molecules bind to body cell preceptors. Insulin activates cell portals to open allowing glucose to enter the cells where it is then converted to energy. Insulin decreases the amount of glucose in the blood. As the blood glucose level decreases, so does the amount of insulin secreted by the pancreas (Mayo Clinic, 2021g).

In type 2 diabetes, the cells develop a resistance to insulin. This inhibits the ability of glucose to enter the cells. If glucose cannot enter the cells, the cells fail to receive enough energy. Blood glucose levels increase, and organs are damaged throughout the body (Mayo Clinic, 2021g).

Etiology

Type 2 diabetes is mainly the result of two interrelated issues (Mayo Clinic, 2021g):

- Muscle, fat, and hepatic cells become insulin-resistant and are unable to function efficiently.
- The pancreas is not able to manufacture adequate amounts of insulin to appropriately manage blood glucose levels.

Several environmental and lifestyle factors play a role in the development of type 2 diabetes. The aging process, alcohol consumption, smoking, lack of exercise, and obesity have all been found to be related to the development of diabetes (Mayo Clinic, 2021g). Obesity seems to have an impact on disease development. Obesity, especially visceral fat obesity, leads to a decrease in muscle mass and an increase in insulin resistance (Mayo Clinic, 2021g; Taylor, 2020b).

Research has shown that a number of factors contribute to an increase in the amount of visceral fat in the body (Mayo Clinic, 2021g; Taylor, 2020b):

- Disorders of the nervous or endocrine systems that lead to an increase in cortisol and abnormalities in the secretion of sex hormones.
- Smoking
- Increased intake of alcohol
- Overeating, particularly an excessive intake of simple sugars
- Decreased energy consumption because of insufficient exercise
- Genetic influences
- The aging process

PREDIABETES

Prediabetes is sometimes referred to as a "wake-up call" that the development of diabetes may be imminent. About 84 million Americans over the age of 20 have prediabetes, but 90% of these people do not know that they have it. (Dansinger, 2019b; Mayo Clinic, 2020d). Lifestyle modifications—including weight loss, implementing an exercise regimen, and following a healthy diet—are strongly recommended to prevent prediabetes from progressing to type 2 diabetes (Dansinger, 2019b; Mayo Clinic, 2020d).

With a diagnosis of prediabetes, patients must be counseled regarding diet, exercise, and weight loss. Patients may also need antidiabetic agents (Mayo Clinic, 2020d).

Healthcare Professional Consideration: Prediabetes is a significant risk factor for developing type 2 diabetes and cardiovascular disease (Dansinger, 2019b; Mayo Clinic, 2020d). Risk factors for the risk of developing prediabetes are the same as for type 2 diabetes, which will be discussed later in this education program.

SCREENING GUIDELINES

Type 1 diabetes

At this time, there is a deficit of accepted and clinically validated screening programs outside of research settings. The ADA recommends considering referring relatives of those with type 1 diabetes for islet autoantibody testing for risk assessment in the setting of a clinical research study. (ADA, 2021b).

Current ADA (2021b) recommendations include:

- Screening for type 1 diabetes risk with a panel of islet autoantibodies is currently recommended in the setting of a research trial or can be offered as an option for firs-degree family members of a proband with type 1 diabetes. The proband is the first individual to be studied in a family.
- Persistence of autoantibodies is a risk factor for clinical diabetes and may serve as an indication for intervention in the setting of a clinical trial.

Prediabetes and type 2 diabetes

The 2021 ADA screening guidelines list the same recommendations for both prediabetes and type 2 diabetes. These include (ADA, 2021b):

- Screening for prediabetes and type 2 diabetes with an informal assessment of risk factors or validated tools should be considered in asymptomatic adults.
- Testing for prediabetes and/or type 2 diabetes in asymptomatic people should be considered in adults of any age with overweight or obesity (BMI ≥25 kg/m2 or ≥23 kg/m2 in Asian Americans) and who have one or more additional risk factors for diabetes
- Testing for prediabetes and/or type 2 diabetes should be considered in women with overweight or obesity planning pregnancy and/or who have one or more additional risk factor for diabetes.
- For all people, testing should begin at age 45 years.
- If tests are normal, repeat testing carried out at a minimum of 3-year intervals is reasonable, sooner with symptoms.
- To test for prediabetes and type 2 diabetes, fasting plasma glucose, 2-h plasma glucose during 75-g oral glucose tolerance test, and A1C are equally appropriate.
- In patients with prediabetes and type 2 diabetes, identify and treat other cardiovascular disease risk factors.
- Risk-based screening for prediabetes and/or type 2 diabetes should be considered after the onset of puberty or after 10 years of age, whichever occurs earlier, in children and adolescents with overweight (BMI ≥85th percentile) or obesity (BMI ≥95th percentile) and who have one or more risk factor for diabetes.
- Patients with HIV should be screened for diabetes and prediabetes with a fasting glucose test before starting antiretroviral therapy, at the time of switching antiretroviral therapy, and three to six months after starting or switching antiretroviral therapy. If initial screening results are normal, fasting glucose should be checked annually.

Risk factors for the development of type 1 diabetes

A number of risk factors are associated with the development of type 1 diabetes (American Heart Association, 2021; Mayo Clinic, 2020a):

- Family history
- Exposure to a viral illness
- Presence of autoantibodies
- Geography (Some countries, including Finland and Sweden, have higher rates of type 1 diabetes)

Risk factors for the development of type 2 diabetes

There are several risk factors related to the development of type 2 diabetes mellitus. These risk factors are classified as nonmodifiable and modifiable.

Nonmodifiable risk factors

The following risk factors are nonmodifiable; in other words, they cannot be changed (American Heart Association, 2021; CDC, 2021b; Mayo Clinic, 2020a):

- Age: Risk increases with age. This increase seems to begin at the age of 40
- Race and ethnicity: Some racial and ethnic groups have a higher incidence of type 2 diabetes than others. These include:
  - African Americans
  - Asian-Americans
  - Latino/Hispanic-Americans
  - Native Americans
  - Pacific Islander descent
- Family history: A person's chances of developing type 2 diabetes increases if immediate or even extended family members have the disease.
- History of gestational diabetes: Women who have gestational diabetes have a greater risk of developing prediabetes and type 2 diabetes. Having given birth to a baby that weighs more than 9 pounds also increases risk.

Healthcare Professional Consideration: Although research has shown that certain risk factors cannot be modified, healthcare professionals must still include them in patient/family education and be aware of such factors that increase the risk for development of diabetes.

Modifiable risk factors

The following risk factors are those that can be modified or changed to decrease risk of developing type 2 diabetes.

Overweight/Obesity

Being obese or overweight is one of the greatest risk factors for type 2 diabetes. Because obesity is increasing among children and adolescents, type 2 diabetes is affecting more and more young people (American Heart Association, 2021; Taylor, 2020b).

The body mass index, or BMI, is the standard to determine overweight and obesity. BMI is a person's weight in kilograms divided by the square of height in meters. According to CDC, the following BMI measures indicate underweight, normal, overweight, and obesity (CDC, 2021a):

- Underweight: BMI is < 18.5
- Normal: BMI is 18.5 to <25
- Overweight: BMI is 25.0 to <30
- Obese: BMI is 30.0 or higher

Fortunately, even a small loss of weight can have a significant impact on health and longevity. Lifestyle modifications to achieve weight loss include the following:

- Reduction in caloric intake: Patients should work with their health care providers, including a clinical dietician as necessary, to implement a well-balanced diet that will facilitate weight loss (Ignatavicius et al., 2018).
- Increase in physical activity: The American Heart Association (2021) and CDC, 2020a) publishes the following physical activity guidelines for adult Americans:
  - Two hours and 30 minutes (150 minutes) of moderate-intensity aerobic activity every week and muscle strengthening activities that work all major muscle groups two or more days a week OR
  - Seventy-five minutes of vigorous-intensity aerobic activity every week and muscle strengthening activities that work all major muscle groups two or more days a week.

Moderate-intensity aerobic activity is defined as exercising hard enough to increase heart rate and break a sweat. Examples include walking fast, water aerobics, riding a bicycle on level ground, and pushing a lawn mower. Vigorous-intensity aerobic activity is defined as exercising hard enough to breathe hard and fast and increase heart rate significantly. Examples include jogging, running, swimming laps, riding a bicycle rapidly or on hills, and playing basketball. Physical activity can be spread out so that it is not done all at once. However, physical activity should be sustained for at least 10 minutes at a time (American Heart Association, 2021; CDC, 2021b).

Elevated Blood Glucose

An elevated blood glucose level significantly increases the risk of diabetes as well as for cardiovascular disease and stroke. The American Diabetes Association recommends using one of three testing methods (American Diabetes Association, 2021b; National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), 2018e):

1. A1C test
2. Fasting plasma glucose (FPG)
3. Oral glucose tolerance test (OGTT)

Hypertension

Hypertension is a modifiable risk factor for diabetes as well as for cardiovascular disease and stroke. Hypertension is defined as a consistent systolic pressure of 130 mmHg or higher or diastolic pressure of 80 mmHg or higher. For persons who do not have diabetes, blood pressure should be evaluated at each regular health care provider visit or at least once every two years if it is less than 120/80 mmHg. For patients who have diabetes, blood pressure should be measured at each regular health care provider visit or as often as needed (CDC, 2020b; Ignatavicius et al., 2018).

Abnormal Lipid Metabolism

Abnormalities in cholesterol levels can contribute not only to cardiovascular disease but also to the development of diabetes mellitus. The desired goals of cholesterol levels for adults are as follows (Mayo Clinic, 2021a):

- LDL: below 70 mg/dL for people who have heart disease or diabetes; below 100 mg/dL for people at risk of heart disease; and 100 to 129 mg/dL near optimal if there is no heart disease but high if there is heart disease.
- HDL: greater than 60 mg/dL
- Triglycerides: less than 150 mg/dL
- Total cholesterol: less than 200 mg/dL

Physical Inactivity
Physical inactivity contributes to overweight and obesity, cardiovascular disease, malignancies, diabetes, and many other adverse medical conditions. Participating in a regular physical exercise routine can increase insulin sensitivity, improve lipid levels, reduce blood pressure, reduce weight, lower the risk of cardiovascular disease, and improve blood glucose management in type 2 diabetes (Ignatavicius et al., 2018).

Smoking
Smoking is a significant risk factor for the development of type 2 diabetes and makes the disease harder to control after its development. Smokers are 30% to 40% more likely to develop type 2 diabetes than nonsmokers. People who smoke are more likely than nonsmokers to have trouble managing the disease (CDC, 2021e).

Medications
Such medications as glucocorticoids, thiazide diuretics, and atypical antipsychotics increase the risk of diabetes (American Diabetes Association, 2021b).

Healthcare Professional Consideration: Healthcare professionals need to be aware of the significance of metabolic syndrome. Metabolic syndrome is a group of conditions (hypertension, elevated blood glucose levels, excess amounts of body fat around the waist, and abnormal cholesterol level) that exist in conjunction with one another and increase the risk of cardiac disease, stroke, and diabetes. Taking steps to alter the impact of modifiable risk factors for diabetes can delay or possibly prevent the occurrence of serious health conditions (Mayo Clinic, 2020a). Assessing diabetic patients should include indicators for metabolic syndrome. Cholesterol level and blood pressure should be monitored at least yearly for obese patients at risk of diabetes.

Self-Assessment Quiz Question #4

When counseling patients about modifiable risk factors for diabetes, it is important to explain that:

a. A person is considered overweight of the BMI is 18.5 to <25.
b. Adults should engage in 60 minutes of moderate-intensity aerobic activity every week.
c. The desired HDL is less than 150 mg/dL.
d. Smokers are 30% to 40% more likely to develop type 2 diabetes than non-smokers.

PRESENTING CLINICAL SIGNS AND SYMPTOMS OF DIABETES MELLITUS

Many of the signs and symptoms of type 1 and type 2 diabetes are the same. There are, however, some differences. It is important for healthcare professionals to recognize all clinical manifestations of the disease and to know which of those signs and symptoms are more prevalent in one of the two types.

Clinical manifestations of type 1 diabetes mellitus

Type 1 diabetes is found most often in children. But the disease can also develop in adults. Patients with type 1 diabetes generally report an abrupt onset of symptoms. Following are the classic symptoms of type 1 diabetes (Khardori, 2021a; 2021b):

- Polyuria: production of abnormally large amounts of urine that is dilute
- Polydipsia: abnormally great thirst
- Polyphagia: excessive appetite or excessive feelings of hunger
- Unexplained weight loss

Polyuria is caused by osmotic diuresis secondary to hyperglycemia. Severe nocturnal enuresis (bedwetting) secondary to polyuria suggests type 1 diabetes in young children. Polyphagia develops to dehydration and hyperosmolar status (Khardori, 2021a; 2021b).

Following are other clinical manifestations of type 1 diabetes mellitus (Khardori, 2021a; 2021b):

- Weight loss occurs despite experiencing excessive appetite and hunger. This is caused by water depletion and a catabolic state with reduction in glycogen, proteins, and triglycerides.
- Fatigue and weakness may occur secondary to muscle wasting caused by a catabolic state of insulin deficiency, hypovolemia, and hypokalemia.
- Muscle cramping is caused by electrolyte imbalance.
- Blurred vision is a result of osmotic swelling of the lens, which alters its normal focal length.

Type 1 diabetes may also cause gastrointestinal (GI) disturbances (Khardori, 2021a; 2021b):

- Nausea, abdominal pain, and changes in bowel movements: these signs and symptoms may accompany acute diabetic ketoacidosis.
- Right upper quadrant pain because of acute fatty liver.
- Persistent GI disturbances, which may be caused by abdominal causes of diabetic ketoacidosis.

The onset of symptomatic type 1 diabetes may be abrupt. The first evidence of the disease may be the occurrence of ketoacidosis (Khardori, 2021a; 2021b).

Diabetic ketoacidosis (DKA)

DKA occurs most often in patients with type 1 diabetes and/or those less than 65 years of age, although it can occur with type 2 diabetes as well. DKA is an acute complication of hyperglycemic crisis. DKA is precipitated by acute insulin deficiency. Such deficiency can be caused by illness; stress; infection; and, in insulin-dependent patients, failure to take insulin (Ignatavicius et al., 2018; Mayo Clinic, 2020b; Rebar et al., 2019).

Without adequate amounts of insulin, which allow the cells to take in glucose to convert it to energy, glucose accumulates in the blood. The body begins to break down fat as an alternative fuel. When this happens, toxic acids known as ketones build up in the blood. Without treatment, DKA can result in coma or death (Ignatavicius et al, 2018; Mayo Clinic, 2020b).

The signs and symptoms of DKA usually develop rapidly, often within 24 hours. Patients experience polyuria, polydipsia, nausea, vomiting, abdominal pain, weakness or unusual fatigue, shortness of breath, fruity-scented breath, and confusion. Blood testing shows hyperglycemia and high levels of ketones in the urine (Mayo Clinic, 2020b; Rebar et al., 2019).

Because untreated DKA can be fatal, patients experiencing the signs and symptoms should seek emergency medical help. Emergency treatment usually includes insulin therapy, electrolyte replacement because inadequate amounts of insulin can reduce various electrolyte levels, and fluid replacement to correct dehydration (Mayo Clinic, 2020b).

Risk factors for DKA include having type 1 diabetes and frequently missing insulin doses. (Mayo Clinic, 2018g).

Persons with diabetes mellitus, especially those with type 1 diabetes, should work with their health care providers to manage conditions that trigger DKA. Following are examples of such conditions (Mayo Clinic, 2020b):

- Infections and illnesses: Infections and illnesses can cause the body to produce higher levels of adrenaline or cortisol, both of which are antagonistic to insulin. Common conditions that trigger DKA are pneumonia and urinary tract infections.
- Inadequate insulin therapy: Missing insulin treatments or taking inadequate amounts of insulin can trigger DKA.
- Miscellaneous problems: High fever, surgery, physical or emotional trauma, or alcohol or drug abuse, especially cocaine, can trigger DKA.

Healthcare Professional Consideration: It is imperative that healthcare professionals assess the knowledge of patients and families regarding the signs and symptoms of DKA, what causes it, and what to do about it. Parents may want to discuss the symptoms of DKA with their diabetic child's teachers, especially if the child participates in sports.

Self-Assessment Quiz Question #5

A patient is at risk for developing DKA if which of the following problems exist:

a. Excessive insulin.
b. Hypothermia.
c. Prediabetes.
d. Urinary tract infection.

CLINICAL MANIFESTATIONS OF TYPE 2 DIABETES MELLITUS

Until recently, it was believed that if diabetes occurred in childhood, it was type 1 diabetes. Now it is known that children also develop type 2 diabetes. As obesity in children increases, so does the incidence of type 2 diabetes in that population (Dansinger, 2021a). Therefore, it is important to identify risk factors and work with patients of all ages to reduce the risk of developing type 2 diabetes. It is also important to be alert to the clinical manifestations of the disease realizing that it can affect all age groups.

It can take years for the signs and symptoms of type 2 diabetes to become evident. Following are clinical manifestations of untreated diabetes (Ignatavicius et al., 2021; Mayo Clinic, 2021g):

- Polyuria and polydipsia: Excessive buildup of glucose in the blood stream causes fluid to move from the cells into the bloodstream to maintain homeostasis. This increases thirst and fluid intake casing an increase in dilute urine production.
- Polyphagia: When cells fail to receive adequate amounts of glucose for energy production, muscles, and organs experience energy depletion. This triggers intense hunger as the body attempts to obtain nourishment and energy.
- Weight loss: Even though patients may be eating more because of intense hunger, weight loss can occur. This is because the body is using alternative fuel sources in muscle and fat because it cannot metabolize glucose. Calories are lost as glucose is excreted in urine.
- Blurred vision: As glucose levels increase in the blood stream, fluid may be pulled from the lenses of the eyes to restore homeostasis. This can interfere with the ability of the eyes to focus, thus causing blurred vision.
- Fatigue: When cells are deprived of glucose and the ability to create energy, weakness, fatigue, and irritability can occur.
- Slow-healing cuts, lacerations or wounds, or frequent infections: Type 2 diabetes interferes with the body's ability to heal and to resist infections.
- Areas of darkened skin: Areas of darkened skin, called acanthosis nigricans, are dark velvety patches of skin in the folds and creases of the body. They are usually noted in the neck and axilla.

Healthcare Professional Consideration: Thirst mechanisms function less efficiently in elderly persons. So older adults may not report polydipsia when relaying signs and symptoms (Ignatavicius et al., 2018).

Diabetic hyperglycemic hyperosmolar syndrome (HHS) is a complication of type 2 diabetes. HHS is characterized by extremely high blood glucose levels without the presence of ketones, extreme dehydration, and decreased levels of consciousness. The kidneys attempt to rid the body of excess amounts of glucose in the blood by increasing urinary output. Without adequate fluid replacement, dehydration occurs. Additionally, dehydration makes the blood more concentrated with sodium, glucose, and other substances. This condition is known as hyperosmolarity and causes the body to withdraw fluid from other body organs (including the brain) to restore balance. Electrolyte balances are disturbed as well. If blood glucose levels are not returned to normal, an ongoing cycle of hyperglycemia and dehydration occurs that can lead to coma and even death (Ignatavicius et al. 2018; MedlinePlus, 2021a).

The goals of treatment are to correct dehydration, restore fluid and electrolyte balance, and control blood glucose levels. Intravenous fluids containing appropriate amounts of various electrolytes are administered as well as insulin via the venous route. Untreated, HHS may lead to shock, thrombosis formation, cerebral edema, and lactic acidosis (Ignatavicius, Workman, & Rebar, 2018; MedlinePlus, 2021a).

DIAGNOSIS OF DIABETES MELLITUS

Diabetes may be diagnosed based on plasma glucose criteria, either the fasting plasma glucose (FPG) value or the 2-hour plasma glucose (2-hour PG) value during a 75-g oral glucose tolerance test (OGTT), or A1C criteria (ADA, 2021b).

The ADA (2021b) diagnostic criteria include:

- A fasting plasma glucose (FPG) level >126 ng.dL (7.0 mmol/L), or
- A 2-hour plasma glucose level >200 mg/dL (11.1 mmol/L) during a 75-g oral glucose tolerance test (OGTT) or
- A random plasma glucose > 200 mg/dL (11.1 mmol/L) in a patient with classic symptoms of hyperglycemia or hyperglycemic crisis.

Details about the various tests used in the diagnostic process follow.

Random (casual) plasma glucose test

This test can be performed at any time of day when severe diabetic symptoms develop. Diabetes is diagnosed when the blood glucose is >200 mg/dL (ADA,2021n).

Fasting plasma glucose (FPG)

FPG assesses fasting blood glucose levels. Fasting is defined as not have anything to eat or drink except water for at least eight hours before the test. The test is typically performed first thing in the morning before breakfast. (ADA, 2021n).

FPG results are (ADA, 2021n):

- Normal: Less than 100 mg/dL
- Prediabetes: 100 mg/dL to 125 mg/dL
- Diabetes: 126 mg/dL or higher

Oral glucose tolerance test (OGTT)

An OGTT is performed to assess insulin response to glucose loading. A fasting blood sugar is obtained before the ingestion of an oral glucose solution, and blood samples are drawn at specifically timed intervals. The oral glucose solution should contain the equivalent of 75 g anhydrous glucose dissolved in water (ADA, 2021a; Pagana et al., 2019).

Results from the OGTT are (ADA, 2021a):

- Normal: less than 140 mg/dL.
- Prediabetes: 140 mg/dL to 199 mg/dL
- Diabetes: 200 mg/dL or higher

Patient care considerations and patient teaching include the following important factors (Pagana et al., 2019; Rebar et al, 2019):

- The patient should follow their usual diet and exercise regimen for three days before the test.
- The patient must be instructed to fast for 12 hours before the OGTT.
- Certain drugs may be withheld before testing based on the recommendations of the patient's health care provider. Examples of drugs that can interfere with test results are hormonal contraceptives, salicylates, diuretics, phenytoin, and nicotinic acid.
- Fasting blood and urine specimens are obtained.
- An oral glucose solution is administered that consists of 75 g of glucose or dextrose for patients who are not pregnant or 100 g for pregnant patients. The patient must drink the entire glucose solution. The amount of glucose in solution is based on body weight for pediatric patients.
- During the OGTT, the patient must not use tobacco or ingest coffee or tea because these substances cause physiological stimulation. They must be told not to eat or drink anything during the testing period except for the oral glucose solution provided by the test administrator—except for water, which the patient is encouraged to drink.
- A venous blood sample is collected at 30- and 60-minutes post-ingestion of the glucose solution and at hourly intervals thereafter.
- Urine samples are collected at hourly intervals.
- During the period of testing, the patient should be monitored for dizziness, sweating, weakness, and giddiness, which are usually transient and self-limiting.

A1C test

The A1C test is a blood test used to obtain information about a patient's average blood glucose over the past three months. The A1C is used in the diagnosis of type 2 diabetes and prediabetes and is the primary test used for diabetes management (NIDDK, 2018e).

The A1C test does not require fasting. Blood can be drawn at any time of day, thus making it more convenient than some other testing options. The test may also be used during the first health care pregnancy visit to determine if the woman had undiagnosed diabetes before becoming pregnant. After that, the oral glucose tolerance test (OGTT) or the glucose challenge test is used to test for gestational diabetes (NIDDK, 2018e; Pagana et al., 2019).

The A1C test is based on attachment of glucose to hemoglobin in red blood cells. Although red blood cells are continually forming and dying, they typically live for approximately three months. The A1C can reflect blood glucose levels over the previous three months. Reported as a percentage, the higher the percentage, the higher the blood glucose levels have been (NIDDK, 2018e).

Results of the A1C are (2021n):

- Normal: Less than 5.7%
- Prediabetes: 5.7 to 6.4%
- Diabetes: 6.5% or higher

Recommendations from the ADA include (2021n):

- Assess glycemic status (A1C or other glycemic measurement) at least two times a year in patients who are meeting treatment goals (and who have stable glycemic control).
- Assess glycemic status at least quarterly, and as needed, in patients whose therapy has recently changed and/or who are not meeting glycemic goals.

Healthcare Professional Consideration: Because A1C reflects average glucose status over several months, it has significant predictive value for diabetes complications. A1C testing should be performed routinely in all patients who have diabetes (ADA, 2021e).

Following are the A1C-range recommended goals (ADA, 2021e):

- An A1C goal for many nonpregnant adults of <7% (53 mmol/mol) without significant hypoglycemia is appropriate.
- If using ambulatory glucose profile/glucose management indicator to assess glycemia, a parallel goal is a time in range of >70% with time below range <4%.
- Based on provider judgment and patient preference, achievement of lower A1C levels than the goal of 7% may be acceptable, and even beneficial, if it can be achieved safely without significant hypoglycemia or other adverse effects of treatment.
- Less stringent A1C goals (such as <8% [64 mmol/mol]) may be appropriate for patients with limited life expectancy, or where the harms of treatment are greater than the benefits.
- Reassess glycemic targets over time based on the criteria specific to various age groups.

Table 1. Explanation of Results of Diabetes Screenings

Test	Normal	Prediabetes	Diabetes
A1C	Less than 5.7%	5.7% to 6.4%	6.5% or higher
Fasting plasma glucose	Less than 100 mg/dL	100 mg/dL to 125 mg/dL	126 mg/dL or higher
Oral glucose tolerance test	Less than 140 mg/dL	140 mg/dL to 199 mg/dL	200 mg/dL or higher

Compiled from: (ADA, 2021b; 2021e; 2021n)

Self-Assessment Quiz Question #6

When teaching a patient about the random plasma glucose test, it is important to explain that:

a. The test should be performed first thing in the morning.
b. The random plasma glucose test requires that the patient fast for 8 hours before the test.
c. The test is performed when severe diabetic symptoms develop.
d. Diabetes is diagnosed when the blood glucose is > 150 mg/dL.

MANAGEMENT OF DIABETES MELLITUS

Management of diabetes mellitus focuses on glycemic control and prevention and reduction of complications. Successful management depends on a team approach that involves physicians, nurse practitioners, nurses, dieticians, pharmacists, and mental health professionals who have expertise in diabetes mellitus management. The most critical members of the team are patients and families who are ultimately responsible for adhering, or helping loved ones to adhere to, the treatment regimen (ADA, 2021l).

Glycemic control

Glycemic control is assessed by the A1C measurement, continuous glucose monitoring (CGM), and self-monitoring of blood glucose (SMBG). Rationale for these tests includes (ADA, 2021e; 2021m):

- A1C reflects average glycemia over about a period of three months. This test is the primary test for the assessment of glycemic control and has strong predictive value for diabetic complications.
- CGM: CGM plays an important role in the assessment of the effectiveness and safety of treatment in many patients with type1 diabetes, including the prevention of hypoglycemia and in selected patients with type 2 diabetes.
- SMBG: SMBG can be used with self-management and medication adjustment, especially in persons who are taking insulin.

Recommendations for glycemic assessment are (ADA, 2021e):

- Assess glycemic status (A1C or other glycemic measurement) at least two times a year in patients who are meeting treatment goals (and who have stable glycemic control).
- Assess glycemic status at least quarterly, and as needed, in patients whose therapy has recently changed and/or who are not meeting glycemic goals.

Self-monitoring blood glucose (SMBG)

SMBG is essential to effective diabetes management. Individual patients' needs and goals guide SMBG frequency and timing. Research findings have shown that in patients who have type 1 diabetes, there is a correlation between greater SMBG frequency and lower A1C (American Diabetes Association, 2021e).

Continuous glucose monitoring (CGM)

Most of the people who use CGM have type1 diabetes. Research is now underway to learn how CGM might help people who have type 2 diabetes. A healthcare provider's prescription is needed to obtain CGM systems (NIDDK, 2021f).

CGMs are approved for use by adults and children. Some models may be used for children as young as two years of age. CGM may be recommended if the patient (NIDDK, 2021f):

- Is on intensive insulin therapy (also referred to as tight blood sugar control)
- Has hypoglycemia unawareness (Hypoglycemia unawareness occurs when the patient does not feel or recognize the signs or symptoms of hypoglycemia; patients who have frequent episodes of hypoglycemia may no longer experience hypoglycemia's usual warning symptoms).
- Often experiences episodes of elevated or low blood glucose

CGM has evolved swiftly in terms of both accuracy and affordability. This means that many patients have data available to assist with both self-management and assessment by healthcare providers (ADA, 2021e).

The ADA (2021e) makes the following recommendations for glucose assessment by continuous glucose monitoring.

- Standardized, single-page glucose reports from continuous glucose monitoring (CGM) devices with visual cues, such as the ambulatory glucose profile (AGP), should be considered as a standard printout for all CGM devices.
- Time in range (TIR) is associated with the risk of microvascular complications, should be an acceptable end point for clinical trials moving forward, and can be used for assessment of glycemic control. Additionally, time below target (,70 and ,54 mg/dL [3.9 and 3.0 mmol/L]) and time above target (.180 mg/dL [10.0 mmol/L]) are useful parameters for reevaluation of the treatment regimen.

CGM systems use a tiny sensor that is inserted under the skin to check glucose levels in tissue fluid. The sensor remains in place for several days to a week and then is replaced. A transmitter relays information about glucose levels via radio waves from the sensor to a wireless monitor (NIDDK, 2021f).

Advantages of a CGM system include (NIDDK, 2021f):

- An alarm can sound when glucose levels are too high or too low
- Meals, physical activity, and medicines can be noted in a CGM device, as well as glucose levels
- Data can be downloaded to a computer or smart device to improve visibility of glucose trends
- CGM systems offer better management of daily glucose levels
- There are fewer hypoglycemic emergencies with the use of a CGM
- With a CGM, fewer finger sticks are needed

CGM has limitations, as well as advantages. These limitations include (NIDDK, 2021f):

- Most CGM models cannot be used to make treatment decisions unless the CGM reading is confirmed by doing a finger-stick glucose test.
- A CGM is more expensive than using a standard glucose meter. Patients should check their insurance plans or Medicare to see what costs are covered.

Insulin pumps

Most people with type 1 diabetes should be treated with multiple daily injections of prandial insulin and basal insulin or continuous subcutaneous insulin infusion. Most people with type 1 diabetes should use rapid-acting insulin analogs to reduce hypoglycemia risk (ADA 2021k).

Patient/family education regarding pharmacological management with insulin should include matching prandial insulin doses to carbohydrate intake, premeal blood glucose levels, and anticipated physical activity. Individuals with type 1 diabetes who have been successfully using continuous subcutaneous insulin infusion should have continued access to this therapy after they turn 65 years of age (ADA, 2021k).

Hundreds of thousands of people of all ages throughout the world are using an insulin pump for diabetes mellitus management. First used by patients with type 1 diabetes, some persons with type 2 diabetes use them as well. (Stoppler, 2018).

Insulin pumps are about the size of a small cell phone and are computerized. Insulin pumps provide a constant stream of insulin so that fewer needle sticks are required. Pumps are a good option for children or anyone else who has trouble remembering to administer their insulin injections (Cleveland Clinic, 2021).

Insulin pumps may be especially useful for people who (Cleveland Clinic, 2021):

- Experience delays in the absorption of food
- Are active and may want to pause insulin doses when exercising
- Have severe reactions to hypoglycemia
- Have diabetes and are planning a pregnancy

Traditional insulin pumps transport insulin from a chamber within the pump via tubing to a site on the skin that is connected to a smaller flexible plastic cannula. The cannula is a few millimeters long and delivers the insulin underneath the skin (Cleveland Clinic, 2021).

Insulin patch pumps also use a cannula beneath the skin. However, the insulin delivery chamber and the cannula are part of one pod that "sits" in the skin with an adhesive patch. The patch can be directly placed on the stomach or arm. There is no external tubing, and it is controlled wirelessly via a handheld controller (Cleveland, Clinic, 2021).

There are both advantages and disadvantages of insulin pumps. Advantages include:

- Consistent, adjustable insulin delivery
- Fewer insulin injections
- Flexibility and privacy
- Improved blood glucose levels
- Improved lifestyle freedom and flexibility

Risks or complications of insulin pumps include (Cleveland Clinic, 20210:

- Setting up the pump incorrectly
- Costing more than injections
- Problems hiding the tubing or pump with non-patch styles (Cleveland, Clinic, 2021)

Artificial Pancreas Device System

The Artificial Pancreas Device System is a system of devises that closely mimics the functioning of a healthy pancreas. Most of these systems consist of a continuous glucose monitoring system, and an insulin infusion pump. A blood glucose device is used to calibrate CGM. A computer-controlled algorithm connects the CGM and insulin pump to facilitate ongoing communication between the two devices (Food and Drug Administration (FDA), 2018).

An artificial pancreas device system replaces manual blood glucose testing and the use of insulin injections. The system monitors blood glucose levels 24-hours a day. The system can be monitored remotely (e.g., by parents or healthcare professionals) (NIDDK, 2021f).

There are three categories of artificial pancreas device systems. These include:

1. Threshold suspend device systems (also called low glucose suspend systems): This type of system temporarily suspends insulin delivery when the glucose level falls to or approaches a low glucose threshold. Its purpose is to reduce the severity of or reverse hypoglycemia.
2. Insulin-only system: This system "achieves a target glucose level by automatically increasing or decreasing the amount of insulin infused based on the CGM values.
3. Bi-hormonal control system: This device "achieves a target glucose level by using two algorithms to instruct an infusion pump to deliver two different hormones—one hormone (insulin) to lower glucose levels and another (such as glucagon) to increase blood glucose levels. The bi-hormonal system mimics the glucose-regulating function of a healthy pancreas more closely than an insulin-only system (FDA, 2017).

Research continues regarding the development of artificial pancreas device systems. To date, the FDA has approved two systems. These are (Tenderich, 2020).

- Medtronic MiniMed 670G: This is a hybrid closed-loop system.
- Control-IQ from Tandem Diabetes Care: This system combines Tandem's touchscreen insulin pump with the Dexcom CGM and a smart algorithm for the purpose of auto-adjusts for high and low blood glucose levels and automatic corrections for unexpected highs.

Insulin

Typical blood glucose levels targets are to keep daytime blood glucose levels before meals between 80 and 130 mg/dL (4.44 to 7.2 mmol/L) and after meal results to no higher than 180 mg/dL (10 mmol/L), two hours after eating (Mayo Clinic, 2021f).

Persons with type 1 diabetes typically need lifelong insulin therapy. There are many types of insulin therapy and include:

- Short-acting (regular) insulin
- Rapid acting insulin
- Intermediate-acting (NPH) insulin.
- Long-acting insulin (Mayo Clinic, 2021f)

Examples of the various types of insulin include (Mayo Clinic, 2021f):

- Short-acting: Humulin R and Novolin R
- Rapid-acting: Glulisine (Apidra), insulin lispro (Humanlog), and insulin aspart (Novolog)
- Intermediate-acting: Insulin NPH (Novolin N, Humulin N0
- Long-acting: Insulin glargine (Lantus, Toujeo Solostar), insulin detemir (Levemir), and insulin degludec (Tresiba)

Inhaled insulin is available as a rapid-acting insulin. Inhaled insulin is contraindicated in patients with chronic lung disease and is not recommended in patients who smoke or who recently stopped smoking. All patients require spirometry evaluation to identify potential lung disease before and after starting inhaled insulin therapy (ADA, 2021k).

Self-Assessment Quiz Question #7

Pharmacological therapy for the treatment of diabetes includes which of the following interventions?

a. Administration of inhaled insulin is contraindicated in patients who smoke.
b. Administration of Lantus is the preferred initial pharmacological agent for patients with type 2 diabetes.
c. Incorporating manual blood glucose testing in conjunction with an artificial pancreas system.
d. Using inhaled insulin is available as a long-acting insulin.

Pharmacologic therapy for type 2 diabetes

The FDA (2021k) makes the following recommendations for pharmacologic therapy for type 2 diabetes.

- Metformin is the preferred initial pharmacologic agent for the treatment of type 2 diabetes.
- Once initiated, metformin should be continued as long as it is tolerated and not contraindicated; other agents, including insulin, should be added to metformin.
- Early combination therapy can be considered in some patients at treatment initiation to extend the time to treatment failure.
- The early introduction of insulin should be considered if there is evidence of ongoing catabolism (weight loss), if symptoms of hyperglycemia are present, or when A1C levels (>10% [86 mmol/mol]) or blood glucose levels (≥300 mg/dL [16.7 mmol/L]) are very high.
- A patient-centered approach should be used to guide the choice of pharmacologic agents. Considerations include effect on cardiovascular and renal comorbidities, efficacy, hypoglycemia risk, impact on weight, cost, risk for side effects, and patient preferences.
- Among patients with type 2 diabetes who have established atherosclerotic cardiovascular disease or indicators of high risk, established kidney disease, or heart failure, a sodium–glucose cotransporter 2 inhibitor or glucagon-like peptide 1 receptor agonist with demonstrated cardiovascular disease benefit is recommended as part of the glucose-lowering regimen independent of A1C and in consideration of patient-specific factors.
- In patients with type 2 diabetes, a glucagon-like peptide 1 receptor agonist is preferred to insulin when possible.
- Recommendation for treatment intensification for patients not meeting treatment goals should not be delayed.
- The medication regimen and medication-taking behavior should be reevaluated at regular intervals (every 3–6 months) and adjusted as needed to incorporate specific factors that impact choice of treatment.
- Clinicians should be aware of the potential for over-basalization with insulin therapy. Over-basalization is titration of basal insulin beyond an appropriate dose to achieve glycemic targets. Clinical signals that may prompt evaluation of over-basalization include basal dose more than 0.5 IU/kg, high bedtime-morning or post-preprandial glucose differential, hypoglycemia (aware or unaware), and high variability. Indication of over-basalization should prompt reevaluation to further individualize therapy.

Non-pharmacologic diabetes management

Nutrition

Nutrition therapy is recommended for all patients with type 1 and type 2 diabetes. For those patients who are overweight or obese, modest weight loss may provide significant clinical benefits such as improved glucose control and lipid levels and reduction in blood pressure, especially early in the course of the disease (ADA, 2021h).

Evidence-based practice! Research suggests that there is a benefit to eating protein or protein and vegetables before eating the carbohydrate portion of a meal (ADA, 2021h). healthcare professionals should collaborate to ensure patients and families have access to planning the best meal options for persons with diabetes.

The goal of a good nutrition plan is to get the nutrients needed while keeping blood glucose levels within target range. The patient's goals, tastes, preferences, lifestyle, and medications should be considered when meal planning (CDC, 2021f).

According to the CDC (2021f) a good meal plan will:

- Include more non-starchy vegetables, such as broccoli, spinach, and green beans.
- Include fewer added sugars and refined grains such as white bread, rice, and pasta with less than two grams of fiber per serving.
- Focus on whole foods instead of highly processed foods as much as possible.

The CDC (2021f) recommends using a plate method as part of the meal planning process. Patients should consider a nine-inch dinner plate and:

- Fill half of the plate with non-starchy vegetables, such as salad, green beans, broccoli, cauliflower, cabbage, and carrots.
- Fill one-quarter of the plate with a lean protein, such as chicken, turkey, beans, tofu, or eggs.
- Fill one-quarter of the plate with carb foods such as grains, starchy vegetables (peas, potatoes), rice, pasta, fruit, and yogurt. A cup of milk counts as a carb food.
- Choose water or a low-calorie drink such as unsweetened tea to go with a meal.

Many people appreciate having a guide as to what constitutes a "portion" of a particular nutrient. The CDC (2021f) offers the following suggestions for estimating portion size.

- Three ounces of meat, fish, or poultry: Palm of hand (no fingers)
- One ounce of meat or cheese: Thumb tip to base
- One cup or one medium fruit: Fist
- One to two ounces of nuts or pretzels: Cupped hand
- One Tablespoon: Thumb tip (tip to first joint)
- One teaspoon: Fingertip (tip to first joint)

Physical activity

Being overweight or obese is linked to a vast number of medical problems, including heart disease and cancer. Proper nutritional intake and physical activity not only help patients to achieve weight goals but also have a positive impact on diabetes. Exercise may also have a positive effect for depression associated with the consequences of the need for diabetes management.

As previously noted, the American Heart Association (2021) recommends:

- At least 150 minutes per week of moderate-intensity aerobic physical activity;
- Or 75 minutes per week of vigorous-intensity aerobic physical activity (or a combination of the two);
- And muscle-strengthening exercises at least two days per week.

People who have diabetes must monitor their physical activity in relation to their glycemic levels. For example, exercise can lead to hyperglycemia or hypoglycemia depending on its intensity, timing, duration, and type of physical activity (ADA 2021h).

People who take insulin or oral pharmacological agents are at risk for hypoglycemia if insulin dose or carbohydrate intake is not adjusted with exercise. Exercise regimens should be planned with the healthcare team. The ADA (n.d.) recommends following the 15-15 rule:

- Check blood sugar
- If the reading is 100mg/dL or lower have 15-20 grams of carbohydrate. Examples include four glucose tablets, one glucose gel tube, four ounces of juice ore regular soda, or one tablespoon of sugar or honey.
- Check blood sugar again after 15 minutes. If it is still below 100 mg/dL another servicing of 15 grams of carbohydrate is needed.
- Repeat these steps every 15 minutes until blood sugar is at least 100 mg/dL.

Smoking cessation

All patients should be advised not to use any tobacco products or e-cigarettes. Nonsmokers should be advised not to use e-cigarettes. Smoking cessation should be a routine part of diabetes management (American Heart Association, 2021).

Psychosocial care

Mental health and well-being are important to general health and wellness and can impact the patient's or family's ability to implement diabetes treatment. The physical and emotional stress that can accompany a chronic health problem can put the patient and her family at risk for mental health problems (ADA, 2021o; Grygotis, 2016).

Psychosocial screening and follow-up treatment include attitudes about illness; expectations for management and outcomes; affect/mood; quality of life experiences and expectations; financial, social, and emotional resources; and psychiatric history. Patients should also be routinely screened for such issues as depression and diabetes-related distress, anxiety, eating disorders, and impairment of cognitive functioning (ADA, 2021o; Grygotis, 2016).

Support groups for diabetics may offer some therapeutic value. In addition, group exercise such as yoga, workout groups, or swimming exercise classes can provide both psychosocial support and a physical benefit for weight loss and improved cardiovascular condition. Meditation, pet therapy, behavioral therapy, and religious support may be of interest to some patients. Antidepressant medication may be considered if needed (ADA, 2021o; Grygotis, 2016).

Hypoglycemia prevention

Hypoglycemia is the primary factor limiting the glycemic management of type 1 and insulin-treated type 2 diabetes. It is imperative that nurses and other members of the health care team instruct patients and families how to recognize signs and symptoms of hypoglycemia, identify situations that increase their risk for hypoglycemia such as fasting, during or after intense exercise, and during sleep. They must be taught to balance insulin use, carbohydrate intake, and exercise to prevent and reduce hypoglycemic episodes (ADA, 2021e).

Immunizations

There are several recommendations for adults who have diabetes mellitus (ADA, 2021c).

- Provide routinely recommended vaccinations for adults with diabetes by age. Children should also receive routine vaccinations by age.
- Administer Hepatitis B vaccine for persons less than 60 years of age. For persons over 60 healthcare providers should be consulted.
- Administer HPV vaccine to persons 26 years old and under. Persons between the ages of 27-45 years may also be vaccinated after consulting with their healthcare providers.
- Administer influenza vaccine to all patients annually. All patients should be advised not to receive live attenuated influenza vaccine.
- Administer pneumonia PPSV23 pneumovax to persons 19-64 years of age. Persons 65 and older should receive a second dose at least five years from prior pneumovax vaccine.
- There are no recommendations for the administration of pneumonia (PCV13 Prevnar) to persons 19-64 years of age. For persons 65 and older who are not immunocompromised, have a cochlear implant, or cerebrospinal fluid leak, decisions must made in conjunction with their healthcare providers.
- Administer tetanus, diphtheria, pertussis (TDAP) to all adults with a booster every 10 years. All adult pregnant women should have an extra dose of this vaccine.
- Administer Zoster vaccine to all persons 50 years of age or older (two-dose Shingrix even if previously vaccinated).
- COVID vaccinations for all patients, as permitted by age.

Obesity management

Overweight and obesity contribute to a myriad of health problems. There is significant evidence that managing obesity can delay the progression from prediabetes to type 2 diabetes and may contribute to successful management of type 2 diabetes (ADA, 2021j).

The ADA (2021j) recommends that BMI be calculated and documented at all patient visits. Additional recommendations state that overweight and obese patients should participate in a regimen of diet, physical activity, and behavioral therapy to achieve >5% weight loss. Furthermore, such interventions should be individualized to the patient. After weight loss goals have been achieved, diet, physical activity, and behavioral therapy should be continued to maintain weight loss and achieve treatment goals.

Healthcare Professional Consideration: It is important that patients' medication regimens be evaluated for their impact on weight. This evaluation should include all the medications the patient takes: prescription drugs, over-the-counter supplements, and herbal preparations. If necessary, weight loss medications may be prescribed to help lose weight. Potential benefits of these medications should be weighed against potential risks and side effects (ADA, 2021j). Patients should be cautioned not to take any weight loss products without prior consultation with their health care providers.

Metabolic surgery

Metabolic surgery is the phrase used to describe surgery and procedures that treat metabolic diseases, especially type 2 diabetes (ADA, 2021j). Bariatric surgery that aims to treat comorbid conditions, such as diabetes mellitus associated with obesity, is called as metabolic surgery. Metabolic surgery is usually limited to patients with a body mass index (BMI) >35. The surgeon typically connects one end of the stomach to an opening in the new stomach pouch. After this surgery, when you eat, food bypasses most of the stomach and the first part of the small intestines. That makes this surgery both restrictive and malabsorptive.

Following are recommendations and suggestions for metabolic surgery (ADA, 2021j).

- Recommend metabolic surgery as an option for the treatment of type 2 diabetes in appropriate surgical candidates with BMI > 40 kg/m2 (BMI >37.5 kg/m2 in Asian Americans and in adults with BMI 35.0-39.9 kg/m2 (32.5-37.4 kg/m2 in Asian Americans.
- Suggest metabolic surgery as an option for adults with type 2 diabetes and BMI 30.0 to 34.9 kg/m2, (27.5 to 32.4 kg/m2 in Asian Americans, if hyperglycemia is inadequately controlled despite appropriate medical intervention.
- Metabolic surgery should be done in health care facilities that perform high-volume numbers of such surgeries and where multidisciplinary teams experienced in metabolic surgery work.
- Provide long-term support and monitoring of patients who have undergone metabolic surgery according to national and international standards.
- Perform a comprehensive mental health evaluation before surgery.
- Postpone surgery in patients with histories of alcohol abuse, substance abuse, depression, suicidal ideation, and other mental health concerns until these issues have been adequately addressed.
- Evaluate the need for ongoing mental health services to help with medical and psychosocial changes post-surgery.

Research has shown that metabolic surgery leads to "superior glycemic control and reduction of cardiovascular risk factors in obese patients with type 2 diabetes compared with various lifestyle/medical interventions" (ADA, 2021j).

Pancreas transplant

A pancreas transplant is performed to implant a healthy pancreas from a deceased donor into a patient with diabetes. Almost all pancreas transplants are done to treat cases of type 1 diabetes and are usually reserved for those patients with serious diabetes complications because side effects of transplantation are significant. The pancreas must be meticulously matched to the recipient and is transported in a cooled solution that preserves the organ for up to approximately 15 to 20 hours. Once a pancreas becomes available, it must be transplanted into a recipient within 18-24 hours. Pancreas transplant is often done in conjunction with a kidney transplant or after successful kidney transplantation in persons whose kidneys have been damaged by diabetes. The average waiting time for a pancreas transplant is about 23 months. The average wait for a simultaneous kidney-pancreas transplant is about 13 months (Mayo Clinic, 2019; MedlinePlus, 20121b).

Candidates for a pancreas transplant typically have type 1 diabetes, along with kidney damage, nerve damage, or eye problems, or other complications. Transplant candidates usually have diabetes that is out of control despite medical treatment. Some people who have type 2 diabetes may be candidates for transplant if they have both low insulin resistance and low insulin production (Johns Hopkins Medicine, 2021).

About 10% of all pancreas transplants are performed in people with type 2 diabetes. This is generally because of the patients' having both low insulin resistance and low insulin production (Mayo Clinic, 2019).

Surgical pancreatic transplant takes about three hours. If done in conjunction with a kidney transplant, the combined surgery takes about six hours. The patient's diseased pancreas is not removed during the surgery. The donor pancreas is usually placed in the right lower part of the abdomen, and blood vessels from the new pancreas are attached to the patient's blood vessels. The donor duodenum is attached to the patient's intestine or bladder (MedlinePlus, 2019).

- The following are complications associated with the transplant surgery (Mayo Clinic, 2019).
- Hemorrhage
- Blood clots
- Infection
- Hyperglycemia
- Urinary tract infections
- Failure of the donated pancreas
- Rejection of the donated pancreas

Following a pancreas transplant the patient must take medications for the rest of his life to help prevent rejection of the donor pancreas. Such medications have several side effects (Mayo Clinic, 2019):

- Thinning of bones
- Elevated cholesterol
- Hypertension
- Skin sensitivity
- Fluid retention
- Weight gain
- Swollen gums
- Acne
- Excessive hair growth

Before transplantation, patients are evaluated both physically and mentally. Patients must be able to cope with and adhere to lifelong medical follow-up, the need to take medications to help prevent organ rejection for the rest of their lives, and the ability to cope with side effects of medications needed after transplantation (Mayo Clinic, 2019; MedlinePlus, 2021b18b).

Self-Assessment Quiz Question #8

All of the following immunization recommendations for adults who have diabetes mellitus are accurate EXCEPT:

a. Administer influenza vaccine to all patients annually.
b. The TDAP vaccine should not be administered to pregnant women.
c. All persons 50 years of age or older should receive the two-dose Shingrix vaccine.
d. The HPV vaccine should be given to persons 26 years old and under.

Case study: Jeremy Wilson

Jeremy is a 16-year-old high-school student who has a history of hard-to-control type1 diabetes. Jeremy is struggling to live what he calls "a normal life like my friends." Because of the seriousness of his condition he, his parents, and his healthcare providers agree that he is a candidate for pancreas transplant.

Question 1: How long will it take to obtain a pancreas for transplantation?

Discussion:
The average wait time for a pancreas transplant is about 23 months. The pancreas must be meticulously matched to the recipient and is transported in a cooled solution that preserves the organ for up to approximately 15 to 20 hours. Once a pancreas becomes available, it must be transplanted into a recipient within 18-24 hours. Jeremy needs to know about the waiting period for a pancreas. It may be a difficult waiting period as he is anxious to live "a normal life." Jeremy, and his family, may benefit from counseling as they wait and in preparation for undergoing, and living with, transplantation.

Question 2: What happens during the transplant procedure?

Discussion
Surgical pancreatic transplant takes about three hours. If done in conjunction with a kidney transplant, the combined surgery takes about six hours. The patient's diseased pancreas is not removed during the surgery. The donor pancreas is usually placed in the right lower part of the abdomen, and blood vessels from the new pancreas are attached to the patient's blood vessels. The donor duodenum is attached to the patient's intestine or bladder

Question 3: Why is a mental health examination needed before transplant surgery?

Discussion
Before transplantation, patients are evaluated both physically and mentally. Patients must be able to cope with and adhere to lifelong medical follow-up, the need to take medications to help prevent organ rejection for the rest of their lives, and the ability to cope with side effects of medications needed after transplantation

PREVENTION AND MANAGEMENT OF COMPLICATIONS OF DIABETES

The possibility of complications must be addressed with patients and families. Healthcare professionals must not only monitor patients but also teach patients and families to recognize signs and symptoms of complications and how to adhere to treatment regimens for complications if they occur.

The CDC identifies the following risk factors for diabetes-related complications (CDC, 2020c):

Smoking

- 21.6% were tobacco users based on self-report or levels of serum cotinine.
- 15.0% reported current cigarette smoking.
- 36.4% had quit smoking but had a history of smoking at least 100 cigarettes in their lifetime.

Overweight and obesity

- 89.0% were overweight or had obesity, defined as a body mass index (BMI) of 25 kg/m2 or higher.

Specifically:
- 27.6% were overweight (BMI of 25.0 to 29.9 kg/m2)
- 45.8% had obesity (BMI of 30.0 to 39.9 kg/m2)
- 15.5% had extreme obesity (BMI of 40.0 kg/m2 or higher)

Physical inactivity

• 38.0% were physically inactive, defined as getting less than 10 minutes a week of moderate or vigorous activity in each physical activity category of work, leisure time, and transportation.

A1C

- 50.0% had an A1C value of 7.0% or higher

Specifically:
- 22.3% had an A1C value of 7.0% to 7.9%
- 13.2% had an A1C value of 8.0% to 9.0%
- 14.6% had an A1C value higher than 9.0%
- 16.3% of adults aged 18–44 years had A1C levels of 10% or higher, compared to 12.7% of those aged 45–64 years and 4.3% of those aged 65 years or older.

High blood pressure

- 68.4% had a systolic blood pressure of 140 mmHg or higher or diastolic blood pressure of 90 mmHg or higher or were on prescription medication for their high blood pressure.

High cholesterol

- 43.5% had a non-HDL level of 130 mg/dL or higher

Specifically:
- 22.4% had a non-HDL level of 130 to 159 mg/dL
- 11.2% had a non-HDL level of 160 to 189 mg/dL
- 9.9% had a non-HDL level of 190 mg/dL or higher

Cardiovascular disease

Prevention and management of complications of diabetes are important strategies for the promotion of health and wellness among those persons with diabetes mellitus. Cardiovascular disease (CVD) is the major cause of morbidity and mortality for persons who have diabetes as well as the largest contributor to both direct and indirect costs of diabetes. Research has shown that controlling individual cardiovascular risk factors helps prevent or slow CVD development in people with diabetes (ADA, 2021a).

Hypertension

Hypertension is a significant problem among people with diabetes and is a major risk factor for cardiovascular disease. There are generally three categories of blood pressure (CDC, 2020b):

1. Normal: systolic is less than 120 mmHg; diastolic is less than 80 mmHg.
2. Prehypertension: systolic is 120 to 139 mmHg; diastolic is 80 to 89 mmHg.
3. Hypertension: systolic is 140 mmHg or higher; diastolic is 90 mmHg or higher.

Persons who have elevated blood pressure should have blood pressure confirmed by using multiple readings and on separate days to diagnose hypertension. Additionally, all patients with hypertension and diabetes should monitor their blood pressure at home (American Diabetes Association, 2021a).

In pregnant patients with diabetes and pre-existing hypertension, blood pressure targets of 110-135/85 mmHg are suggested (ADA, 2021a).

The ADA (2021a) Standards of Medical Care in Diabetes recommends the following treatment initiatives for blood pressure control in persons with diabetes (American Diabetes Association, 2021a):

- Blood pressure should be measured at every routine clinical visit. Patients found to have elevated blood pressure (≥140/90 mmHg) should have blood pressure confirmed using multiple readings, including measurements on a separate day, to diagnose hypertension.
- All hypertensive patients with diabetes should monitor their blood pressure at home.
- For patients with diabetes and hypertension, blood pressure targets should be individualized through a shared decision-making process that addresses cardiovascular risk, potential adverse effects of antihypertensive medications, and patient preferences.
- For individuals with diabetes and hypertension at higher cardiovascular risk (existing atherosclerotic cardiovascular disease [ASCVD] or 10-year ASCVD risk ≥15%), a blood pressure target of <130/80 mmHg may be appropriate if it can be safely attained.
- For individuals with diabetes and hypertension at lower risk for cardiovascular disease (10-year atherosclerotic cardiovascular disease risk <15%), treat to a blood pressure target of <140/90 mmHg.
- In pregnant patients with diabetes and preexisting hypertension, a blood pressure target of 110–135/85 mmHg is suggested in the interest of reducing the risk for accelerated maternal hypertension and minimizing impaired fetal growth.
- For patients with blood pressure >120/80 mmHg, lifestyle intervention consists of weight loss when indicated, a Dietary Approaches to Stop Hypertension (DASH)-style eating pattern including reducing sodium and increasing potassium intake, moderation of alcohol intake, and increased physical activity.
- Patients with confirmed office-based blood pressure ≥140/90 mmHg should, in addition to lifestyle therapy, have prompt initiation and timely titration of pharmacologic therapy to achieve blood pressure goals.
- Patients with confirmed office-based blood pressure ≥160/100 mmHg should, in addition to lifestyle therapy, have prompt initiation and timely titration of two drugs or a single-pill combination of drugs demonstrated to reduce cardiovascular events in patients with diabetes.
- Treatment for hypertension should include drug classes demonstrated to reduce cardiovascular events in patients with diabetes. ACE inhibitors or angiotensin receptor blockers are recommended first-line therapy for hypertension in people with diabetes and coronary artery disease.
- Combination drug therapy is generally required to achieve blood pressure targets. However, combinations of ACE inhibitors and angiotensin receptor blockers and combinations of ACE inhibitors or angiotensin receptor blockers with direct renin inhibitors should not be used. These combinations increase the risk of hypotension, hyperkalemia, and renal impairment.
- An ACE inhibitor or angiotensin receptor blocker, at the maximum tolerated dose indicated for blood pressure treatment, is the recommended first-line treatment for hypertension in patients with diabetes and urinary albumin-to-creatinine ratio ≥300 mg/g creatinine or 30–299 mg/g creatinine. If one class is not tolerated, the other should be substituted.
- For patients treated with an ACE inhibitor, angiotensin receptor blocker, or diuretic, serum creatinine/estimated glomerular filtration rate and serum potassium levels should be monitored at least annually.
- Patients with hypertension who are not meeting blood pressure targets on three classes of antihypertensive medications (including a diuretic) should be considered for mineralocorticoid receptor antagonist therapy.

The DASH (Dietary Approaches to Stop Hypertension) diet focuses on fruits, vegetables, whole grains, and other foods that are deemed to be heart healthy and low in fat, cholesterol, and sodium. DASH also emphasizes intake of fat-free or low-fat dairy products, fish, poultry, and nuts. The intake of red meats, sweets, added sugars, and sugar-containing beverages is reduced. DASH is rich in nutrients, protein, and fiber (Mayo Clinic, 2020e; 2021c). This diet has been shown to help diabetic patients lose weight and maintain a more stable blood sugar.

Salt should be limited. Foods that are low in sodium and contain no added salt should be chosen. Salt should not be on the table during meals. No more than one teaspoon of salt per day should be consumed (Mayo Clinic, 2020e; 2021c).

Patients who smoke should be referred to smoking cessation programs. Smoking constricts and damages blood vessels and increases hypertension risk (Mayo Clinic, 2021c).

Finally, patients must be instructed in stress management techniques. Relaxation training, deep breathing exercises, guided imagery, and exercise all have been shown to facilitate stress reduction. Equally important is to help patients identify stressors in their lives and how to deal with them. For example, financial issues may prove to be significant stressors. The costs of a chronic illness, even with insurance coverage, can place a financial burden on patients and families. Relaxation techniques may be helpful, but patients may also need referral to financial counseling or resources that may be able to help defray the cost of medications and other treatments (Mayo Clinic, 2021c).

Lipid management

Lifestyle modifications that focus on weight loss if needed, dietary changes as needed (reduce intake of saturated fat, trans fat, and cholesterol; increase intake of n-3 fatty acids, fiber, and plant stanols/sterols), and glycemic control are central to lipid management (American Diabetes Association, 2021a).

The American Diabetes Association (2021a) offers the following recommendations for lipid management:

- For adults not taking lipid-lowering therapy, obtain a lipid profile at the time of diabetes diagnosis, at an initial medical evaluation, and every 5 years thereafter if younger than 40 years of age. Testing may be done more frequently as needed.
- A lipid profile should be obtained at the start of lipid-lowering therapy 4 to 12 weeks after starting therapy or when there is a change in dosage and annually thereafter.

- In adults not taking statins or other lipid-lowering therapy, it is reasonable to obtain a lipid profile at the time of diabetes diagnosis, at an initial medical evaluation, and every five years thereafter if under the age of 40 years, or more frequently if indicated.
- For patients with diabetes aged 40–75 years without atherosclerotic cardiovascular disease, use moderate-intensity statin therapy in addition to lifestyle therapy.
- For patients with diabetes aged 20–39 years with additional atherosclerotic cardiovascular disease risk factors, it may be reasonable to initiate statin therapy in addition to lifestyle therapy.
- In patients with diabetes at higher risk, especially those with multiple atherosclerotic cardiovascular disease risk factors or aged 50–70 years, it is reasonable to use high-intensity statin therapy.
- In adults with diabetes and 10-year atherosclerotic cardiovascular disease risk of 20% or higher, it may be reasonable to add ezetimibe to maximally tolerated statin therapy to reduce LDL cholesterol levels by 50% or more.
- For patients of all ages with diabetes and atherosclerotic cardiovascular disease, high-intensity statin therapy should be added to lifestyle therapy.
- For patients with diabetes and atherosclerotic cardiovascular disease considered very high risk using specific criteria, if LDL cholesterol is ≥70 mg/dL on maximally tolerated statin dose, consider adding additional LDL-lowering therapy (such as ezetimibe or PCSK9 inhibitor). Ezetimibe may be preferred because of lower cost.
- For patients who do not tolerate the intended intensity, the maximally tolerated statin dose should be used.
- In adults with diabetes aged >75 years already on statin therapy, it is reasonable to continue statin treatment.
- In adults with diabetes aged >75 years, it may be reasonable to initiate statin therapy after discussion of potential benefits and risks.
- Statin therapy is contraindicated in pregnancy.
- For patients with fasting triglyceride levels ≥500 mg/dL, evaluate for secondary causes of hypertriglyceridemia and consider medical therapy to reduce the risk of pancreatitis.
- In adults with moderate hyper-triglyceridemia (fasting or non-fasting triglycerides 175–499 mg/dL), clinicians should address and treat lifestyle factors (obesity and metabolic syndrome), secondary factors (diabetes, chronic liver or kidney disease and/or nephrotic syndrome, hypothyroidism), and medications that raise triglycerides.
- In patients with atherosclerotic cardiovascular disease or other cardiovascular risk factors on a statin with controlled LDL cholesterol but elevated triglycerides (135–499 mg/dL), the addition of icosapent ethyl can be considered to reduce cardiovascular risk.
- Statin plus fibrate combination therapy has not been shown to improve atherosclerotic cardiovascular disease outcomes and is generally not recommended.
- Statin plus niacin combination therapy has not been shown to provide additional cardiovascular benefit above statin therapy alone, may increase the risk of stroke with additional side effects, and is generally not recommended.

Antiplatelet agents for the management of CVD

Research findings indicate that aspirin has been shown to help reduce cardiovascular morbidity and mortality in patients who are high risk and who have had previous heart attack or stroke. However, its overall benefit in primary prevention among adults with no previous cardiovascular events (heart attack or stroke) is controversial for patients with or without a history of diabetes. Aspirin is not recommended for persons at low risk of ASCVD (men and women younger than 50 years of age with no other major ASCVD risk factors). This is because the low potential benefit is outweighed by the risks for bleeding (American Diabetes Association, 2021a).

Following are recommendations regarding aspirin therapy (American Diabetes Association, 2018j):

- Use aspirin therapy (75 to 162 mg/day) as a secondary prevention strategy for persons with diabetes and a history of ASCVD.
- Use clopidogrel (75 mg/day) for those patients with ASCVD and documented aspirin allergy.
- The use of dual antiplatelet therapy (low-dose aspirin and a P2Y12 inhibitor) is deemed reasonable for a year after an acute coronary syndrome and may have benefits beyond one year.
- Long-term treatment with dual antiplatelet therapy should be considered for patients with prior coronary intervention, high ischemic risk, and low bleeding risk to prevent major adverse cardiovascular events.
- Combination therapy with aspirin plus low-dose rivaroxaban should be considered for patients with stable coronary and/or peripheral artery disease and low bleeding risk to prevent major adverse limb and cardiovascular events.
- Aspirin therapy (75 to 162 mg/day) may be considered as a primary prevention strategy for those patients with type 1 or type 2 diabetes who have increased cardiovascular risk.

Screening and treatment recommendations for cardiovascular disease

The American Diabetes Association (2021a) does not recommend routine screening for coronary artery disease in asymptomatic patients if ASCVD risk factors are treated. Investigations for coronary artery disease should be considered if any of the following is present:

- Unexplained dyspnea
- Chest discomfort
- Carotid bruits
- Transient ischemic attack
- Stroke
- Claudication
- Peripheral arterial disease
- Electrocardiogram abnormalities

Following are recommendations for treatment of coronary heart disease for patients with diabetes (American Diabetes Association, 2021a):

- Among patients with type 2 diabetes who have established atherosclerotic cardiovascular disease or established kidney disease, a sodium–glucose cotransporter 2 inhibitor or glucagon-like peptide 1 receptor agonist with demonstrated cardiovascular disease benefit is recommended as part of the comprehensive cardiovascular risk reduction and/or glucose-lowering regimens.
- In patients with type 2 diabetes and established atherosclerotic cardiovascular disease, multiple atherosclerotic cardiovascular disease risk factors, or diabetic kidney disease, a sodium–glucose cotransporter 2 inhibitor with demonstrated cardiovascular benefit is recommended to reduce the risk of major adverse cardiovascular events and/or heart failure hospitalization.
- In patients with type 2 diabetes and established atherosclerotic cardiovascular disease or multiple risk factors for atherosclerotic cardiovascular disease, a glucagon-like peptide 1 receptor agonist with demonstrated cardiovascular benefit is recommended to reduce the risk of major adverse cardiovascular events.
- In patients with type 2 diabetes and established heart failure with reduced ejection fraction, a sodium–glucose cotransporter 2 inhibitor with proven benefit in this patient population is recommended to reduce risk of worsening heart failure and cardiovascular death.
- In patients with known atherosclerotic cardiovascular disease, particularly coronary artery disease, ACE inhibitor

or angiotensin receptor blocker therapy is recommended to reduce the risk of cardiovascular events.
- In patients with prior myocardial infarction, β-blockers should be continued for 3 years after the event.
- Treatment of patients with heart failure with reduced ejection fraction should include a β-blocker with proven cardiovascular outcomes benefit, unless otherwise contraindicated.
- In patients with type 2 diabetes with stable heart failure, metformin may be continued for glucose lowering if estimated glomerular filtration rate remains >30 mL/min/1.73 m2 but should be avoided in unstable or hospitalized patients with heart failure.

Diabetic neuropathy

Diabetic neuropathy is a group of nerve disorders caused by diabetes mellitus. Over the course of time, nerve damage can occur throughout the body. Some persons have no symptoms of nerve damage, but others may feel pain, tingling, or numbness in the hands, arms, feet, and legs. Neuropathy can occur in every organ system throughout the body (NIDDK, n.d).

The following persons are at highest risk for diabetic neuropathy (Mayo Clinic, 2021b):
- Those who are overweight
- Those who are hypertensive
- Those who have elevated cholesterol
- Those who have advanced renal disease
- Those who drink large amounts of alcohol
- Those who smoke

The American Diabetes Association (2021i) advocates the following screenings and treatments:
- Assess all patients for diabetic peripheral neuropathy beginning at diagnosis of type 2 diabetes and five years after the diagnosis of type 1 diabetes. After these initial assessments, patients should be evaluated at least annually.
- Include a careful history and assessment of either temperature or pinprick sensation as part of the assessment for distal symmetric polyneuropathy.
- Assess for signs and symptoms of autonomic neuropathy in patients who have microvascular complications.
- Optimize glucose control to prevent or delay the development of neuropathy or to slow its progression.
- Assess and treat patients to reduce pain related to diabetic peripheral neuropathy and symptoms of autonomic neuropathy.
- Prescribe either pregabalin or duloxetine as initial pharmacologic treatments for neuropathic pain in diabetes.

There are four types of diabetic neuropathy (NIDDK, n.d.):
1. Peripheral
2. Autonomic
3. Proximal
4. Focal

Peripheral Diabetic Neuropathy

Peripheral neuropathy is the most common type of diabetic neuropathy. The areas of the body most affected are the feet and legs. Rarely, other areas of the body—the arms, abdomen, and back—may be affected by peripheral neuropathy. Nerve damage can lead to a loss of sensation in the feet and legs placing the patient at significant risk for foot problems. Injuries, lesions, blisters, and sores on the feet may go unnoticed because of a lack of sensation. Infection can easily occur, and if not treated promptly, the infection can spread to the bone. Such infections may lead to amputation of toes, feet, and lower limbs. Many amputations can be prevented with meticulous skin care and swift recognition and treatment of infections (Dansinger, 2021b; Mayo Clinic, 2021e; NIDDK, 2018).

Common symptoms of diabetic peripheral neuropathy are tingling (resembling a "pins and needles" sensation), numbness (which can become permanent), burning (especially in the evening), and pain. Discomfort related to these symptoms may be reduced or controlled when blood glucose levels are under control (NIDDK, 2018c).

Painful diabetic neuropathy may be treated with oral medications (NIDDK, 2018c):
- Tricyclic antidepressants and other types of antidepressants as appropriate
- Anticonvulsants
- Skin creams, patches, or sprays (e.g., lidocaine)

Healthcare professionals must instruct patients and families in skin care, especially the care of the feet, because the nerves to the feet are the longest in the body and are the nerves most often impacted by neuropathy. Education should include the following instructions (Dansinger, 2021b; Mayo Clinic, 2021e):
- Clean the feet daily using warm, not hot, water and a mild soap. Do not soak the feet. Dry the feet gently but thoroughly with a soft towel, paying special attention to the skin between the toes.
- Apply gentle, non-perfumed lotion to the feet if they are dry. Do not put lotion between the toes.
- Inspect the feet and toes every day for cuts, blisters, redness, sores, calluses, or other problems. Use a mirror to check the bottom of the feet. If any abnormalities are noted, notify a health care provider immediately. Rigorous attention to leg and foot ulcers may include debridement, hyperbaric oxygen therapy, or intensive would care.
- Go to a podiatrist, if possible, to avoid injuring the toes when toenails need to be trimmed.
- Never go barefoot. Wear properly fitting shoes or slippers at all times to protect the feet from injuries. Shoes should not be tight; the toes should be able to move when wearing them. New shoes should be broken in gradually by wearing them for only an hour at a time initially.
- Examine shoes and slippers before putting them on, including feeling the insides. This is done to be sure that shoes and slippers are free from tears, sharp edges, or objects that might damage the feet.
- Participate in regular, gentle exercise. Routines such as yoga and tai chi might be of benefit.
- Stop smoking.
- Eat healthy meals.
- Avoid excessive amounts of alcohol.
- Monitor blood glucose levels per health care provider instructions.

Autonomic diabetic neuropathy

Autonomic neuropathy is damage to the nerves that are responsible for the control of the internal organs. Autonomic neuropathy can lead to problems in the cardiovascular, digestive, and renal systems. It can also cause sexual dysfunction, vision problems, and alterations in the function of the sweat glands (NIDDK, 2018a).

Heart and Blood Vessel Impact of Autonomic Neuropathy

Damage to the nerves of the cardiovascular system adversely affects the body's ability to adjust blood pressure and heart rate. This can lead to orthostatic hypotension, dizziness, lightheadedness, or fainting. Damage to the nerves that control heart rate can lead to tachycardia instead of normal increases and decreases in heart rate in response to body functions, stress, and physical activity (NIDDK, 2018a).

Patients must be taught to avoid changing position too quickly, especially from a lying to a sitting or standing position. Wearing elastic stockings may be helpful, and physical therapy can be useful when dealing with muscle weakness or loss of coordination. Heart healthy interventions such as smoking cessation, lipid management, blood pressure control, exercise, and diet may help

to decrease the development or progression of heart and blood vessel autonomic neuropathy (NIDDK, 2018a).

Digestive System Autonomic Neuropathy.
Following are common symptoms of digestive autonomic neuropathy (NIDDK, 2018a):

- Bloating
- Diarrhea
- Constipation
- Difficulty swallowing
- Feeling full after eating only a small amount of food
- Loss of appetite
- Nausea
- Vomiting
- Fecal incontinence

Treatments include dietary changes and medications to treat symptoms of constipation, diarrhea, fecal incontinence, and gastroesophageal reflux (NIDDK, 2018a).

Urinary Tract Involvement
Nerve damage can cause incomplete emptying of the bladder and increase the likelihood of urinary tract infections. Patients may also experience incontinence and increased urination at night (NIDDK, 2018a).

Patients are encouraged to drink plenty of fluids to help prevent infections. Because they may not be able to sense when their bladders are full, patients may implement a regular schedule of voiding such as every four hours (NIDDK, 2018a).

Sexual Organs Involvement
Autonomic neuropathy can gradually decrease sexual response in men and women even though sex drive may be unchanged. Men may be unable to have or unable to maintain an erection or have dry or reduced ejaculations. Women may have difficulty becoming aroused or achieving orgasm or experience a decrease in vaginal lubrication that can lead to painful intercourse (NIDDK, 2018a).

Treatment of erectile dysfunction in men begins with testing to rule out hormonal causes. To treat erectile dysfunction caused by neuropathy, medications that increase blood flow to the penis may be prescribed. Some medications are oral; others are injected into the penis or inserted into the urethra at the tip of the penis. Other interventions include the use of mechanical vacuum devices to increase blood flow to the penis or surgical implantation of an inflatable or semirigid device in the penis (Dansinger, 2021b; Ignatavicius et al., 2018; NIDDK, 2018a).

For women, the use of vaginal lubricants, estrogen creams, suppositories, and rings or medications to help reduce symptoms and facilitate arousal may be prescribed (Dansinger, 2021b; Ignatavicius et al., 2018; NIDDK, 2018a).

Self-Assessment Quiz Question #9

When counseling patients about autonomic diabetic neuropathy, healthcare professionals must know that:

a. The impact on heart and blood vessels can lead to orthostatic hypotension or fainting.
b. This type of neuropathy has no impact on sexual functioning.
c. It is important to limit fluid intake.
d. The use of elastic stockings is contraindicated.

Focal diabetic neuropathy

Focal diabetic neuropathy can appear suddenly. It affects specific nerves most often in the head, torso, or leg (NIDDK, 2018b).

Focal diabetic neuropathy may cause the following problems (NIDDK, 2018b):

- Double vision
- Aching behind one eye
- Bell's palsy (paralysis on one side of the face)
- Difficulty focusing the eyes

Focal diabetic neuropathy is unpredictable as well as being painful and is seen most often in older patients with focal neuropathy who tend to develop nerve compressions, also called entrapment syndromes. Carpal tunnel syndrome, which causes numbness and tingling of the hand and sometimes muscle weakness and pain, is a common example of such compression. Other nerves that are vulnerable to entrapment may cause pain on the outside of the shin or the inside of the foot (NIDDK, 2018b).

Diabetic retinopathy

Diabetic retinopathy is the most common diabetic eye disease and a leading cause of blindness in American adults. Initially, diabetic retinopathy may not cause any symptoms or only mild vision disturbances. However, the complication can eventually result in blindness (Mayo Clinic, 2021b; National Eye Institute, 2019).

The American Diabetes Association (2021i) recommends that to slow progression of diabetic retinopathy, patients should optimize glycemic control, blood pressure, and serum lipid control.

Diabetic retinopathy has four stages (Dansinger, 2021c):

1. Mild non-proliferative retinopathy: Microaneurysms occur, which are small areas of balloon-like swelling in the blood vessels of the retina.
2. Moderate non-proliferative retinopathy: Some blood vessels that provide nourishment to the retina are blocked.
3. Severe non-proliferative retinopathy: More and more blood vessels are blocked. Several areas of the retina are deprived of their blood supply, and they transmit messages to the body to grow new, additional blood vessels to supply nourishment.
4. Proliferative retinopathy: New blood vessels grow in an attempt to nourish the retina. This condition is referred to as proliferative retinopathy. These new blood vessels are fragile and abnormal and grow along the retina and along the surface of the clear vitreous gel that fills the inside of the eye. Because the walls of the abnormal vessels are so thin and fragile, they leak blood causing severe vision loss and even blindness.

It is rare to have signs and symptoms of the disease during early stages of diabetic retinopathy. However, as the disease progresses, symptoms may include the following Mayo Clinic, 2021b; National Eye Institute, 2019):

- Spots or dark strings floating in the visual field (commonly referred to as floaters)
- Blurred vision
- Dark or empty areas in vision
- Vision loss
- Problems with color perception

The American Diabetes Association (2021i) recommends that adults with type 1 diabetes have their first eye exam within five years of diagnosis. Persons with type 2 diabetes should get the initial eye exam soon after receiving a diagnosis. After the initial exam. The ADA recommends that all people with diabetes get an annual eye exam. Patients who have no evidence of retinopathy for one or more annual eye exams and glycemia is well controlled, then screening every one to two years may be considered.

The early stage of diabetic retinopathy may not require treatment. However, as the disease progresses, treatment is generally needed. Proliferative diabetic retinopathy requires prompt treatment (Mayo Clinic, 2021b).

Focal laser treatment
Also known as photocoagulation, focal laser treatment can stop or slow the leakage of blood or fluid in the eye. This procedure is performed in the office setting or at an eye clinic and is generally done in a single session. Vision may be blurry for a day after the procedure, and the patients may see small spots in their visual field for several weeks (University of Michigan Health, 2020).

Scatter laser treatment
Also known as panretinal photocoagulation, this treatment can shrink abnormal blood vessels. Also performed in an office or eye clinic setting, this procedure involves treating affected areas with scattered laser burns. The burns cause the abnormal blood vessels to shrink and scar. Scatter laser treatment is usually done in two or more sessions and causes blurred vision for about a day after the procedure. Some loss of peripheral vision or night vision after undergoing the procedure is possible (University of Michigan Health, 2020).

Vitrectomy
A vitrectomy is performed to remove blood from the middle of the eye (vitreous) as well as any scar tissue that is pulling on the retina. A vitrectomy is performed in a surgical center or hospital using local or general anesthesia. A tiny incision is made in the eye through which scar tissue and blood are removed and replaced with a saline solution to maintain the normal shape of the eye. A gas bubble may be placed in the cavity of the eye to help reattach the retina. If so, the patient may need to remain prone (face down) for several days until the gas bubble dissipates. An eye patch is worn, and medicated eye drops instilled for a few days or weeks. Vitrectomy may be followed or accompanied by laser treatment (Johns Hopkins Medicine, n.d.b).

Nursing Considerations: Patients treated with Scatter Laser procedures or vitrectomy may be extremely anxious for the fear of both pain and the possible complete loss of vision. Coaching, information about the procedures, and possible pre-mediation for anxiety should be considered. Patients required to remain prone for extended periods may also present nursing care challenges for eating and elimination.

Diabetic nephropathy

Diabetic nephropathy refers to damage to the kidneys caused by diabetes. Not all diabetics develop diabetic nephropathy. Diabetics who are at higher risk for its development include persons with hypertension, elevated cholesterol, smoking history, and uncontrolled blood glucose (ADA, 2021i).

Diabetic nephropathy does not produce symptoms in its early stages. Therefore, testing urine for the presence of albumin is very important so that kidney damage can be detected as soon as possible. Early kidney damage may be reversed (ADA, 2021g; 2021i).

Symptoms, when they appear, are not particularly specific. Fluid retention and edema, loss of sleep, loss of appetite, nausea and vomiting, weakness, and trouble concentrating are reported (ADA, 2020g; 2021i).

The primary treatment for diabetic nephropathy is to lower blood pressure. ACE inhibitors are recommended for most people who have hypertension, diabetes, and renal disease. Cholesterol and triglyceride levels must also be controlled; statins are generally prescribed (ADA, 2021g; 2021i).

As with most complications, the best way to prevent diabetic nephropathy is to control blood glucose levels. Blood pressure management, a healthy diet, regular physical exercise, and adhering to prescribed medication schedules are all extremely important. A low protein diet may be recommended (ADA, 2021g; 2021i).

Self-Assessment Quiz Question #10

All of the following statements pertaining to diabetic nephropathy are true EXCEPT:

a. Risk factors for the development of diabetic nephropathy include hypertension, smoking, and elevated cholesterol.
b. Diabetic nephropathy produces symptoms even in its early stages.
c. Symptoms of diabetic nephropathy are not particularly specific.
d. The primary treatment for diabetic nephropathy is to lower blood pressure.

Resources

There are a number of resources that may be helpful for patients, families, and healthcare professionals.

- American Association of Diabetes Educators https://journals.lww.com/nursing/Fulltext/2019/11000/Online_resources_for_patients_with_diabetes.19.aspx
- American Diabetes Association https://www.diabetes.org/resources
- Association of Diabetes Care & Education Specialists https://www.diabeteseducator.org/living-with-diabetes
- Centers for Disease Control and Prevention https://www.cdc.gov/diabetes/professional-info/index.html
- DiabetesCare.net http://www.diabetescare.net/resources
- Johns Hopkins Medicine https://www.hopkinsmedicine.org/gim/faculty-resources/core_resources/Patient%20Handouts/

Conclusion

Diabetes mellitus is a chronic disease that affects millions of people of all ages in the United States and around the world. It has the potential to cause complications that can affect all facets of a person's life as well as placing significant financial burden on patients, families, and society. But by adhering to individualized treatment regimens that rely on pharmacological therapy, diet, exercise, and healthy lifestyle habits, persons with diabetes can lead long, productive lives.

It is important to note that patients and families need a significant amount of education to carry out prescribed management interventions. They also need emotional support and referrals to mental health professionals as needed. The health care community must remember that dealing with a chronic illness places a great deal of stress not only on patients and loved ones but also on society as a whole. The costs of a chronic disease can be overwhelming. Sick time away from work can impact employers and work colleagues.

Effective management of diabetes also helps to prevent or reduce the occurrence of complications associated with the disease. Complications can range from mild inconveniences to serious consequences, including kidney failure, vision loss, and cardiovascular disease. The importance of taking every possible step to control blood glucose levels cannot be overemphasized.

But achieving and maintaining such control can be a challenge. The constant need to monitor blood glucose levels, exercise, monitor one's weight, and adhere to dietary mandates can be frustrating. The realization that such lifestyle mandates are lifelong can make some people disregard treatment recommendations. Thus, it is important that ongoing support and encouragement are provided by the health care team.

References

- American Diabetes Association (ADA). (n.d.). *Blood sugar and exercise.* https://www.diabetes.org/healthy-living/fitness/getting-started-safely/blood-glucose-and-exercise
- American Diabetes Association (ADA). (2021a). Cardiovascular disease and risk management: Standards of medical care in diabetes: 2021. *Diabetes Care,* 44(Supplement 1): S125-S150.https://doi.org/10.2337/dc21-S010.
- American Diabetes Association (ADA). (2021b). Classification and diagnosis of diabetes: Standards of medical care in diabetes: 2021. *Diabetes Care*, 44(Supplement 1, S115-533. https://doi.org/10.2337/dc21-S002.
- American Diabetes Association (ADA). (2021c). Comprehensive medical evaluation and assessment of comorbidities: Standards of medical care in diabetes: 2021. *Diabetes Care,* 44(Supplement 1)., S40-S52. https://doi.org/10.2337/dc21-S004.
- American Diabetes Association (ADA). (2021d). *Gestational diabetes treatment & perspective.* https://www.diabetes.org/diabetes/gestational-diabetes/how-to-treat-gestational-diabetes
- American Diabetes Association (ADA). (2021e). Glycemic targets: Standards of medical care in diabetes:2021. *American Diabetes Association Diabetes Care 2021,*44(Supplement 1): 573-584. https://doi.org/10.2337/dc21-S006.
- American Diabetes Association (ADA). (2021f). *How gestational diabetes can impact your baby.* https://www.diabetes.org/diabetes/gestational-diabetes/how-will-this-impact-my-baby
- American Diabetes Association (ADA). (2021g). *Kidney disease (nephropathy).* https://www.diabetes.org/diabetes/complications/kidney-disease-nephropathy
- American Diabetes Association (ADA). (2021h). *Lifestyle management: Five evidence-based lifestyle habits people with diabetes can use.* https://clinical.diabetesjournals.org/content/38/3/273
- American Diabetes Association (ADA). (2021i). Microvascular complications and foot care: Standards of medical care in diabetes: 2021. *Diabetes Care,* 44(Supplement 1): S151-S167. https://doi.org/10.2337/dc21-S011.
- American Diabetes Association (ADA). (2021j). Obesity management for the treatment of type 2 diabetes: Standards of medical care in diabetes: 2021. *Diabetes Care,* 44(Supplement 1): S100-S110. https://doi.org/10.2337/dc21-S008.
- American Diabetes Care (ADA). (2021k). Pharmacologic approaches to glycemic treatment: Standards of medical care in diabetes: 2021. *Diabetes care,* 44(Supplement 1), S111-S124. https://doi.org/10.2337/dc21-S009.
- American Diabetes Association (ADA). (2021l). *Standards of medical care in diabetes: 2021.* https://care.diabetesjournals.org/content/44/Supplement_1
- American Diabetes Association (ADA). (2021m). *Summary of revisions: Standards of medical care in diabetes: 2021.* https://care.diabetesjournals.org/content/44/Supplement_1/S4
- American Diabetes Association (ADA). (2021n). *Understanding A1C: Diagnosis.* https://www.diabetes.org/a1c/diagnosis
- American Diabetes Association (ADA). (2021o). *Understanding and facilitating behavioral change and well-being to improve health outcomes: Standards of medical care in diabetes.* https://care.diabetesjournals.org/content/44/Supplement_1/S53
- American Heart Association. (2021). *Diabetes risk factors.* https://www.heart.org/en/health-topics/diabetes/understand-your-risk-for-diabetes
- Castro, M. R. (2021). *Latent autoimmune diabetes in adults (LADA): What is it?* https://www.mayoclinic.org/diseases-conditions/type-1-diabetes/expert-answers/lada-diabetes/faq-20057880
- Cefalu, W. T., Dawes, D. Ed., Gavlak, G., Goldman, D., Herman, W. H., Van Nuys, K., Powers, A. C., Taylor, S. I., & Yatvin. (2018). Insulin access and affordability working group: Conclusions and recommendations. *Diabetes Care,* 41(6), 1299-1311. https://doi.org/10.2337/dci18-0019.
- Centers for Disease Control and Prevention (CDC) (2020a). *How much physical activity do adults need?* https://www.cdc.gov/physicalactivity/basics/adults/index.htm
- Centers for Disease Control and Prevention (CDC). (2020b). *Measuring blood pressure. About high blood pressure.* https://www.cdc.gov/bloodpressure/about.htm
- Centers for Disease Control and Prevention (CDC). (2020c) *National diabetes statistics report.* https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf
- Centers for Disease Control and Prevention (CDC). (2020d). *National diabetes statistics report, 2020.* https://www.cdc.gov/diabetes/library/features/diabetes-stat-report.html
- Centers for Disease Control and Prevention (CDC). (2020e). *National diabetes statistics report 2020.* https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf
- Centers for Disease Control and Prevention (CDC). (2020f). *Prevalence of both diagnosed and undiagnosed diabetes.* https://www.cdc.gov/diabetes/data/statistics-report/diagnosed-undiagnosed-diabetes.html
- Centers for Disease Control and Prevention (CDC). (2020g). *Rates of new diagnosed cases of type1 and type 2 diabetes continue to rise among children, teens.* https://www.cdc.gov/diabetes/research/reports/children-diabetes-rates-rise.html.
- Centers for Disease Control and Prevention (CDC). (2021a). *Defining adult overweight & obesity: Adult body mass index.* https://www.cdc.gov/obesity/adult/defining.html
- Centers for Disease Control and Prevention (CDC). (2021b). *Diabetes risk factors.* https://www.cdc.gov/diabetes/basics/risk-factors.html
- Centers for Disease Control and Prevention (CDC). (2021c). *Cost-effectiveness of diabetes.* https://www.cdc.gov/chronicdisease/programs-impact/pop/diabetes.htm
- Centers for Disease Control and Prevention (CDC). (2021d). *Leading causes of death.* https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm
- Centers for Disease Control and Prevention (CDC). (2021e). *Tips from former smokers.* https://www.cdc.gov/tobacco/campaign/tips/diseases/diabetes.html
- Centers for Disease Control and Prevention (CDC). (2021f). *Tips regarding diabetes meal planning.* https://www.cdc.gov/diabetes/managing/eat-well/meal-plan-method.html
- Cleveland Clinic. (2021). *Insulin pumps.* https://my.clevelandclinic.org/health/articles/9811-insulin-pumps
- Dansinger, M. (2019a). *Gestational diabetes.* https://www.webmd.com/diabetes/gestational-diabetes#1-1
- Dansinger, M. (2019b-). *Prediabetes (borderline diabetes).* https://www.webmd.com/diabetes/what-is-prediabetes
- Dansinger, M. (2021a). *Type 2 diabetes in children.* https://www.webmd.com/diabetes/type-2-diabetes-in-children#1
- Dansinger, M. (2021b). *What is diabetic neuropathy?* https://www.webmd.com/diabetes/diabetes-neuropathy#2-6
- Dansinger, M. (2021c). *What are the stages of diabetic retinopathy?* https://www.webmd.com/diabetes/eyes-21/dr/diabetic-retinopathy-stages
- Food and Drug Administration (FDA). (2017). *Types of artificial pancreas device systems.* https://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/HomeHealthandConsumer/ConsumerProducts/ArtificialPancreas/ucm259555.htm - TSDS
- Food and Drug Administration (FDA). (2018). *What is an artificial pancreas device system?* https://www.fda.gov/medical-devices/artificial-pancreas-device-system/what-pancreas-what-artificial-pancreas-device-system
- Grygotis, L. (2016). *ADA releases guidelines for psychosocial care for diabetes patients.* https://www.clinicaladvisor.com/home/topics/diabetes-information-center/ada-releases-guidelines-for-psychosocial-care-for-diabetes-patients/
- Ignatiavicius, D. D., Workman, M. L., Rebar, C., & Heimgartner, N. M. (2021). *Medical-surgical nursing (10th ed.).* Elsevier.
- Johns Hopkins Medicine. (n.d.a). *The pancreas.* https://www.hopkinsmedicine.org/health/conditions-and-diseases/the-pancreas
- Johns Hopkins Medicine. (n.d.b). *Vitrectomy.* https://www.hopkinsmedicine.org/health/wellness-and-prevention/vitrectomy
- Johns Hopkins Medicine. (2021). *Pancreas transplantation.* https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/pancreas-transplant
- Kalyani, R. R. (2017). *Diagnosis and classification of diabetes. https://www.hopkinsguides.com/hopkins/view/Johns_Hopkins_Diabetes_Guide/547038/all/Diagnosis_and_Classification_of_Diabetes*
- Khardori, R. (2021a). *Type 1 diabetes mellitus.* https://emedicine.medscape.com/article/117739-overview
- Khardori, R. (2021b). *Type 1 diabetes mellitus clinical presentation.* https://emedicine.medscape.com/article/117739-clinical
- Khardori, R. (2021c.). *What are common causes of secondary diabetes?* https://www.medscape.com/answers/117853-6389/what-are-common-causes-of-secondary-diabetes
- Kumok, Z. (2021). *Living with diabetes in 2021 means skyrocketing financial costs.* https://www.health.com/money/living-with-diabetes-costs
- Santos-Longhurst, A. (2020). *Type 2 diabetes statistics and facts.* https://www.healthline.com/health/type-2-diabetes/statistics
- Mayo Clinic. (2019). *Pancreas transplant.* https://www.mayoclinic.org/tests-procedures/pancreas-transplant/about/pac-20384783
- Mayo Clinic. (2020a). *Diabetes.* https://www.mayoclinic.org/diseases-conditions/diabetes/symptoms-causes/syc-20371444
- Mayo Clinic. (2020b). *Diabetic ketoacidosis.* https://www.mayoclinic.org/diseases-conditions/diabetic-ketoacidosis/symptoms-causes/syc-20371551
- Mayo Clinic. (2020c). *Gestational diabetes.* https://www.mayoclinic.org/diseases-conditions/gestational-diabetes/symptoms-causes/syc-20355339
- Mayo Clinic. (2020d). *Prediabetes. https://www.mayoclinic.org/diseases-conditions/prediabetes/symptoms-causes/syc-20355278*
- Mayo Clinic. (2020e). *Sample menus for the DASH diet.* https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/dash-diet/art-20047110
- Mayo Clinic. (2021a). *Cholesterol test.* https://www.mayoclinic.org/tests-procedures/cholesterol-test/about/pac-20384601
- Mayo Clinic. (2021b). *Diabetic retinopathy.* https://www.mayoclinic.org/diseases-conditions/diabetic-retinopathy/symptoms-causes/syc-20371611
- Mayo Clinic. (2021c). *High blood pressure (hypertension).*https://www.mayoclinic.org/diseases-conditions/high-blood-pressure/diagnosis-treatment/drc-20373417
- Mayo Clinic. (2021d). *Metabolic syndrome.* https://www.mayoclinic.org/diseases-conditions/metabolic-syndrome/symptoms-causes/syc-20351916
- Mayo Clinic. (2021e). *Peripheral neuropathy.* https://www.mayoclinic.org/diseases-conditions/peripheral-neuropathy/diagnosis-treatment/drc-20352067
- Mayo Clinic. (2021f). *Type 1 diabetes diagnosis.* https://www.mayoclinic.org/diseases-conditions/type-1-diabetes/diagnosis-treatment/drc-20353017
- Mayo Clinic. (2021g). *Type 2 diabetes.* https://www.mayoclinic.org/diseases-conditions/type-2-diabetes/symptoms-causes/syc-20351193
- Mayo Clinic. (2021h). *Type 2 diabetes. Diagnosis. https://www.mayoclinic.org/diseases-conditions/diabetes/symptoms-causes/syc-20371444*
- Medline Plus. (2021a). *Diabetic hyperglycemic hyperosmolar syndrome.* https://medlineplus.gov/ency/article/000304.htm
- Medline Plus. (2021b). *Pancreas transplant.* https://medlineplus.gov/ency/article/003007.htm
- Morr, M. (2018). *Diabetes prevalence by type in the United States: CDC report.* https://www.clinicaladvisor.com/home/topics/diabetes-information-center/diabetes-prevalence-by-type-in-the-united-states-cdc-report/
- National Eye Institute. (2019). *Diabetic retinopathy.* https://www.nei.nih.gov/learn-about-eye-health/eye-conditions-and-diseases/diabetic-retinopathy
- National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). (n.d.). *Diabetic neuropathy.* https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-problems/nerve-damage-diabetic-neuropathies/all-content#section5
- National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). (2018a). *Autonomic neuropathy.* https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-problems/nerve-damage-diabetic-neuropathies/autonomic-neuropathy
- National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). (2018b). *Focal neuropathies. https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-problems/nerve-damage-diabetic-neuropathies/focal-neuropathies*
- National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). (2018c). *Peripheral neuropathy.* https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-problems/nerve-damage-diabetic-neuropathies/peripheral-neuropathy
- National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). (2018d). *Proximal neuropathy. https://www.niddk.nih.gov/health-information/diabetes/overview/preventing-problems/nerve-damage-diabetic-neuropathies/proximal-neuropathy*
- National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). (2018e). *The A1C test & diabetes.* https://www.niddk.nih.gov/health-information/diagnostic-tests/a1c-test?dkrd=/health-information/diabetes/overview/tests-diagnosis/a1c-test#whatis
- National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). (2021f). *Continuous glucose monitoring. https://www.niddk.nih.gov/health-information/diabetes/overview/managing-diabetes/continuous-glucose-monitoring*
- O'Connell, J. M., & Manson, S. M. (2019). Understanding the economic costs of diabetes and prediabetes and what we may learn about reducing health and economic burden of these conditions. *Diabetes Care,* 42(9), 1609-1611. https://doi.org/10.2337/dci19-0017.
- Pagana, K. D., Pagana, T. J., & Pagana, T. N. (2019). *Mosby's diagnostic and laboratory test reference.* Elsevier.
- Rebar, C. R., Heimgartner, N. M., & Gersch, C. J. (Clinical Eds.). (2019). *Pathophysiology made incredibly easy (6th ed.).* Wolters Kluwer.
- Santos-Longhurst, A. (2020). *Type 2 diabetes statistics and facts.* https://www.healthline.com/health/type-2-diabetes/statistics
- Stoppler, M. C. (2018). *Insulin pump for diabetes.* https://www.medicinenet.com/insulin_pump_for_diabetes_mellitus/article.htm#what_is_an_insulin_pump
- Taylor, S. I. (2020a). The high cost of diabetes drugs: Disparate impact on the most vulnerable patients. *Diabetes Care,* 43(10), 2330-2332. https://doi.org/10.2337/dci20-0039. https://care.diabetesjournals.org/content/43/10/2330
- Taylor, S. I. (2020b). *What increases my risk of diabetes?* https://www.webmd.com/diabetes/guide/risk-factors-for-diabetes#1
- Tenderich, A. (2020). *Artificial pancreas: What you should know.* https://www.healthline.com/diabetesmine/artificial-pancreas-what-you-should-know
- The Pancreas Center. (n.d.). *The pancreas and its functions.* https://columbiasurgery.org/pancreas/pancreas-and-its-functions
- University of Michigan Health. (2020). *Laser photocoagulation retinopathy.* https://www.uofmhealth.org/health-library/tf4075
- Willis, L. M. (Clinical Ed.). (2018). *Anatomy & physiology made incredibly easy (5th ed.).* Wolters Kluwer.
- World Health Organization (WHO). (2021). *Diabetes.* https://www.who.int/news-room/fact-sheets/detail/diabetes

Self-Assessment Answers and Rationales

1. The correct answer is A.
Rationale: Prevalence of diagnosed diabetes was highest among American Indians/Alaska Natives (14.7%), people of Hispanic origin (12.5%), and non-Hispanic blacks (11.7%), followed by non-Hispanic Asians (9.2%) and non-Hispanic whites (7.5%).

2. The correct answer is C.
Rationale: The endocrine function of the pancreas focuses on hormone secretion. The endocrine cells of the pancreas are islet cells, or islets of Langerhans. These islet cells exist as clusters of cells that are scattered among the acinar cells. They consist of alpha, beta, and delta cells.

3. The correct answer is A.
Rationale: Pregnant women not previously found to have diabetes should be tested for gestational diabetes mellitus at 24-28 weeks of gestation.

4. The correct answer is D.
Rationale: Smoking is a significant risk factor for the development of type 2 diabetes and makes the disease harder to control after its development. Smokers are 30% to 40% more likely to develop type 2 diabetes than nonsmokers. People who smoke are more likely than nonsmokers to have trouble managing the disease.

5. The correct answer is D.
Rationale: Infections and illnesses can cause the body to produce higher levels of adrenaline or cortisol, both of which are antagonistic to insulin. Common conditions that trigger DKA are pneumonia and urinary tract infections.

6. The correct answer is C.
Rationale: This test can be performed at any time of day when severe diabetic symptoms develop. Diabetes is diagnosed when the blood glucose is >200 mg/dL.

7. The correct answer is A.
Rationale: Inhaled insulin is contraindicated in patients with chronic lung disease and is not recommended in patients who smoke or who recently stopped smoking.

8. The correct answer is B.
Rationale: Administer tetanus, diphtheria, pertussis (TDAP) to all adults with a booster every 10 years. All adult pregnant women should have an extra dose of this vaccine.

9. The correct answer is A.
Rationale: Damage to the nerves of the cardiovascular system adversely affects the body's ability to adjust blood pressure and heart rate. This can lead to orthostatic hypotension, dizziness, lightheadedness, or fainting.

10. The correct answer is B.
Rationale: Diabetic nephropathy does not produce symptoms in its early stages. Therefore, testing urine for the presence of albumin is very important so that kidney damage can be detected as soon as possible. Early kidney damage may be reversed

Course Code: ANCCOH05DM

Hypertension Management: Evidence-Based Guidelines

4 Contact Hours

Release Date: January 6, 2022

Expiration Date: January 6, 2025

Faculty

Author: Katie Blair, PharmD, RPh, is a pharmacist and freelance writer specializing in pharmacy education. She works as a consultant pharmacist in Vancouver, Washington, serving long-term care facilities in the area. She also has over 6 years of experience working as a staff pharmacist at a community pharmacy in Seattle. Dr. Blair graduated from Northeastern University in Boston in 2009 with a Doctor of Pharmacy degree. She has done freelance work writing and revising continuing education programs for pharmacists, pharmacy technicians, and nurses, as well as writing practice questions for various pharmacy technician exams.

Katie Blair has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Reviewer: Susan L. Rubin, MSN, RN received her baccalaureate degree in nursing from West Chester University and a master's degree in clinical trials nursing from Drexel University. She is a published author who has experience as a progressive care unit nurse with a special interest in cardiac nursing.

Susan L. Rubin has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Course overview

This program is intended to provide a hypertension treatment overview. Safe and effective prescribing decisions must be guided by an in-depth understanding of each agent: how it works, how to dose it, anticipated adverse events, drug interactions, etc. When combination drugs are included, there may be as many as 200 different pharmacological options (both individual agents as well as combination products) that are approved by FDA for the treatment of hypertension. As a result, this educational program is designed only to highlight the major categories of therapeutics by identifying key products and characterizing them as a class. To provide perspective, an effort was made to provide highlights of clinically meaningful outcomes studies for the various drug classes.

Learning objectives

On completion of this course, the reader should be able to:

- Interpret clinical findings in relation to the different stages of high blood pressure, including elevated blood pressure, Stage 1 hypertension, and Stage 2 hypertension.
- Describe social, environmental, and biological factors implicated in the development of hypertension.
- Explain the lifestyle changes recommended to prevent and manage hypertension.
- Differentiate between the classes of medications used to treat hypertension and their side effect profiles.
- Apply drug information to choose appropriate hypertension treatment regimens based on patient factors.
- Describe racial, ethnic, and age-related considerations in the treatment of hypertension.
- Discuss the treatment of gestational hypertension, preeclampsia, and hypertensive emergencies.

How to receive credit

- Read the entire course online or in print which requires a 4-hour commitment of time.
- Complete the self-assessment quiz questions which are at the end of the course or integrated throughout the course. These questions are NOT GRADED. The correct answer is shown after you answer the question. If the incorrect answer is selected, the rationale for the correct answer is provided. These questions help to affirm what you have learned from the course.
- Depending on your state requirements you will be asked to complete either:
  - An affirmation that you have completed the educational activity.
  - A mandatory test (a passing score of 70 percent is required). Test questions link content to learning objectives as a method to enhance individualized learning and material retention.
- If requested, provide required personal information and payment information.
- Complete the MANDATORY Course Evaluation.
- Print your Certificate of Completion.

CE Broker reporting

Colibri Healthcare, LLC, provider # 50-4007, reports course completion results within 1 business day to CE Broker. If you are licensed in Arkansas, District of Columbia, Florida, Georgia, Kentucky, Michigan, Mississippi, New Mexico, North Dakota, South Carolina, or West Virginia, your successful completion results will be automatically reported for you.

Accreditations and approvals

Colibri Healthcare, LLC is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation.

Individual state nursing approvals

Colibri Healthcare, LLC is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation. In addition to states that accept courses offered by ANCC Accredited Providers, Colibri Healthcare, LLC is an approved Provider of continuing education in nursing by: Alabama Board of Nursing, Provider #ABNP1418 (valid through February 5, 2025); Arkansas State Board of Nursing, Provider #50-4007; California Board of Registered Nursing, Provider #CEP17480 (valid through January 31, 2024); California Board of Vocational Nursing and Psychiatric Technicians (LVN Provider #V15058, PT Provider #V15020; valid through December 31, 2023); District of Columbia Board of Nursing, Provider #50-4007; Florida Board of Nursing, Provider #50-4007; Georgia Board of Nursing, Provider #50-4007; Kentucky Board of Nursing, Provider #7-0076 (valid through December 31, 2023; CE Broker Provider #50-4007); Michigan Board of Nursing, Provider #50-4007; Mississippi Board of Nursing, Provider #50-4007; New Mexico Board of Nursing, Provider #50-4007; North Dakota Board of Nursing, Provider #50-4007; South Carolina Board of Nursing, Provider #50-4007; and West Virginia Board of Registered Nurses, Provider #50-4007. This CE program satisfies the Massachusetts States Board's regulatory requirements as defined in 244 CMR5.00: Continuing Education.

Activity director

Shirley Aycock, DNP, RN, Executive Director of Quality and Accreditation

Disclosures

Resolution of conflict of interest

In accordance with the ANCC Standards for Commercial Support for continuing education, Colibri Healthcare, LLC implemented mechanisms prior to the planning and implementation of the continuing education activity, to identify and resolve conflicts of interest for all individuals in a position to control content of the course activity.

Sponsorship/commercial support and non-endorsement

It is the policy of Colibri Healthcare, LLC not to accept commercial support. Furthermore, commercial interests are prohibited from distributing or providing access to this activity to learners.

Disclaimer

The information provided in this activity is for continuing education purposes only and is not meant to substitute for the independent medical judgment of a healthcare provider relative to diagnostic and treatment options of a specific patient's medical condition.

Course verification

All individuals involved have disclosed that they have no significant financial or other conflicts of interest pertaining to this course. Likewise, and in compliance with California Assembly Bill No. 241, every reasonable effort has been made to ensure that the content in this course is balanced and unbiased.

INTRODUCTION

In clinical practice, blood pressure is a measure of the hydrostatic pressure of the blood against the walls of the arteries. Blood pressure is generally assessed with two distinct measurements, expressed as millimeters of mercury (mmHg) (National Heart, Lung, and Blood Institute [NHLBI], 2020):

- Systolic blood pressure: The pressure when the ventricles are pumping blood out of the heart.
- Diastolic blood pressure: The resting pressure measured between heartbeats when the heart is filling with blood.

For healthy adult patients, normal blood pressure is defined as a systolic blood pressure less than 120 mmHg and a diastolic blood pressure less than 80 mmHg (120/80 mmHg). Pressures fluctuate throughout the day and are dependent on a patient's activity. Typically, if a patient is excited, nervous, or exerting themselves, blood pressure will rise, falling back to normal when the exacerbating activity concludes. Blood pressure is also a function of age and body size. For example, compared to older teenage children or adults, newborn babies have lower blood pressure. Hypertension is a common pathologic condition describing higher than normal arterial blood pressure (NHLBI, 2020).

Abnormal blood pressure - Hypertension may be diagnosed based on increased systolic blood pressure, increased diastolic blood pressure, or increases of both. Hypertension can be categorized into distinct stages, as described in the following table (Whelton et al., 2018):

Stage	Systolic pressure (mmHg)		Diastolic pressure (mmHg)
Normal	<120	and	<80
Elevated Blood Pressure	120 – 129	and	< 80
Stage 1 Hypertension	130 – 139	or	80 – 89
Stage 2 Hypertension	≥ 140	or	≥ 90

It is critical to note that these stages of blood pressure are based on November 2017 guidelines issued by the American College of Cardiology (ACC) and the American Heart Association (AHA). These new definitions are at lower levels than those previously employed and remove the old designation of prehypertension. These levels are designed to identify a larger number of people with elevated blood pressure, estimated to include 46% of American adults, to facilitate earlier interventions. These changes

are expected to triple the prevalence of high blood pressure in men under the age of 45 while doubling the incidence in women in that same age group (Whelton et al., 2018).

Self-Assessment Quiz Question #1

Which of the following average blood pressures would fall into the category of stage 1 hypertension?

a. 138/78 mmHg.
b. 124/79 mmHg.
c. 145/85 mmHg.
d. 118/77 mmHg.

PRIMARY HYPERTENSION

Primary hypertension, also known as essential hypertension, refers to high blood pressure for which there is no identified cause. Nonetheless, its definition also implies that treatment of elevated blood pressure will result in significant clinical benefit. Because of differences in each individual's cardiovascular risk, that benefit will vary from patient to patient (Firth et al., 2020). A hypertension diagnosis can be made at such time that the average of two or more blood pressure assessments, on at least two subsequent patient encounters, is elevated (Whelton et al., 2018).

In cases where patients have consistent systolic blood pressure measurements of ≥ 140 mmHg accompanied by diastolic blood pressures < 90 mmHg, diagnosis can be made of isolated systolic hypertension. It is the most common form of hypertension in the elderly, often because of aging and modifiable risk factors, though it can also be seen in young and middle-aged adults. Since systolic blood pressure is a major determinant of cardiovascular risk, it is important to ensure these patients are treated appropriately (Bavishi et al., 2016).

SECONDARY HYPERTENSION

Secondary hypertension occurs in cases where high blood pressure stems from a different medical condition, which occurs in about 5-10% of cases. It can be caused by a variety of pathologies, including conditions impacting the health of the kidneys, arteries, heart, or endocrine system. In some cases, secondary hypertension can also occur as a result of pregnancy. In addition to efforts to reduce blood pressure, proper treatment of secondary hypertension also requires attention to the underlying condition to decrease the risk of developing serious complications (Charles et al., 2017).

SYMPTOMS

Hypertension has a unique pathology as it often has no overt symptoms. As a result, hypertension is referred to as the "silent killer." The only certain way to recognize hypertension is through a clinical diagnosis, largely based on blood pressure assessment (Centers for Disease Control and Prevention [CDC], 2021a).

Nursing Consideration: Up to 20% of adults experience higher readings when blood pressures are taken at their provider's office compared to blood pressure readings taken at home. This phenomenon, known as white coat hypertension, was once thought to be related to anxiety experienced in the medical setting. However, studies have shown that white coat hypertension can significantly increase the risk of heart disease, with patients experiencing a two-fold increase in the risk of cardiovascular-related death compared to patients with normal blood pressure. There was not an increased risk of heart disease in patients undergoing treatment of white coat hypertension with antihypertensive agents, highlighting the importance of treating all patients who have higher blood pressure readings in the medical setting (Cohen et al., 2019).

PREVALENCE

According to a recent report from the Centers for Disease Control and Prevention (2021b), hypertension is common in the United States, afflicting 116 million Americans, or nearly half of all American adults. Of those impacted, only 24% are managing their hypertension appropriately. Care for these patients is expensive, with total expenditures – including costs for healthcare services, missed work, and medications – equaling $131 billion each year. Over the course of a lifetime, the risk of developing hypertension is somewhat higher in men compared to women, affecting 50% of men and 44% of women. Racial disparities have long been noted with Black people experiencing higher rates of hypertension than people identifying with other racial or ethnic backgrounds. Hypertension appears to be closely linked to mortality; in 2019, more than half a million deaths in the United States included hypertension as a primary or related cause of death (CDC, 2021b).

PATHOPHYSIOLOGY

To maintain normal blood pressure, a proper balance must exist between cardiac output and peripheral resistance. Peripheral vascular resistance, or the resistance that blood flow encounters in the body, is caused by constriction of blood vessels, either because of smooth muscle constriction or buildup of plaque inside the blood vessels. Peripheral resistance is generally not a function of blood flow through large arteries or even capillaries; rather, the main driver of peripheral resistance is blood flow through smaller arterioles (Delong & Sharma, 2021).

Cardiac output, or the volume of blood pumped by the heart in a minute, is affected by the stroke volume and heart rate. The heart rate, or the number of times the heart beats in a minute, can be affected by physical activity and cardiac health. Increases in heart rate are common with increased activity such as exercise, but chronically increased heart rates can result in pathologic changes to the heart. Stroke volume, or the amount of blood pumped from the left ventricle with each contraction, is dependent on the heart's ability to fill with blood and contract strongly enough to pump it out. Both stroke volume and heart rate can be affected by a variety of pathologies, including heart conditions such as congenital disease, heart failure, and myocardial infarction, as well as genetic diseases, autonomic nervous system overactivation, and endocrine signaling issues (King & Lowery, 2021).

Although current knowledge does not allow a complete explanation for primary hypertension, a brief examination of some potential factors resulting in hypertension can be instructive. Possible factors contributing to hypertension include the following:

- *Renin-angiotensin system:* Also known as RAS, this system plays a critical role in regulating fluid balance and blood pressure in the body. If blood volumes or sodium levels become low or if potassium is elevated, the kidney releases an enzyme called renin. Renin converts angiotensinogen to create the hormone angiotensin I. Then angiotensin-converting enzyme (ACE) turns angiotensin I into angiotensin II. Angiotensin II causes blood vessels to constrict, leading to increases in blood pressure (University Kidney Research Organization [UKRO], 2020).
- *Autonomic nervous system:* The autonomic nervous system is made up of the sympathetic and parasympathetic nervous systems and regulates blood flow and cardiac output through signaling pathways and the release of hormones. Physiological models have long implicated the role of the autonomic nervous system in the control of various cardiovascular functions as they control blood pressure (often in response to environmental stimuli). Both observation and investigation have shown that abnormal activation of the sympathetic nervous system is related to dysfunctional cardiovascular control, including both the promotion and amplification of primary hypertension (Valensi, 2021).
- *Endothelial dysfunction:* The endothelium is a tissue formed as a single layer of cells that serve as a lining to a variety of organs and body cavities, including blood vessels. The endothelium plays a large role in determining the tone and structure of the vascular system. A key chemical that influences the endothelium is nitric oxide (NO), which serves as a potent vasodilator, among other functions. Dysfunction of the endothelium because of NO deficiency has been implicated in the development of hypertension (Konukoglu & Uzun, 2017).
- *Insulin resistance:* Insulin resistance can lead to elevated levels of insulin, which impact normal intracellular communication, and can create an imbalance in sodium and potassium (increasing blood volume) as well as calcium and magnesium (leading to vasoconstriction). The mechawwnisms linking insulin resistance and hypertension continue to be studied (Tarray et al., 2014).
- *Genetic factors:* Although hereditary predisposition to hypertension is well acknowledged, it is complex and, at times, difficult to understand. There is strong evidence supporting genetic influences on hypertension, with data showing that hypertension is 2.4 times more common in patients with two parents who have hypertension. At least a thousand genes have been identified that contribute to increases in the risk of hypertension. While family and twin studies have shown that the heritability of blood pressure is between 30% and 50%, it is difficult to isolate exact causes and separate these from social and environmental factors that also affect families (Ehret, 2021).
- *Intrauterine influences:* Evidence suggests that improper nutrition of pregnant women can negatively impact the vascular health of the child later in life. It is thought that proper levels of calories and protein are key determinants for fetal programming. A longitudinal study of mothers and children in India found that the use of protein-calorie food supplements to pregnant and lactating women and their offspring resulted in lower levels of cardiovascular risk factors in the offspring when they were young adults (Kinra et al., 2021).

Secondary hypertension has several underlying pathologies. Because the kidney plays a significant role in blood pressure management, kidney diseases such as renal artery stenosis can lead to the development of hypertension. Excessive aldosterone release from the adrenal gland, or hyperaldosteronism, can lead to hypertension through the effects of aldosterone on salt and water regulation. Benign tumors can also form in the adrenal glands, known as pheochromocytoma, affecting aldosterone production and blood pressures. Obstructive sleep apnea can over-activate the sympathetic nervous system, responsible for the 'fight or flight' response, which can increase blood pressure. Cushing syndrome, a disorder caused by the overproduction of cortisol, can be caused by corticosteroid medication use or genetic conditions and lead to hypertension. Thyroid hormone changes seen with thyroid disorders can also affect blood pressures (Charles et al., 2017).

RISK FACTORS FOR CARDIOVASCULAR DISEASE

Cardiovascular disease risk factors are common among hypertension patients and a higher percentage of adults with these risk factors have hypertension. As an example, 71% of adults in the United States diagnosed with diabetes have hypertension. The presence of multiple risk factors for cardiovascular disease creates a high risk of coronary heart disease and stroke in hypertension patients. Common risk factors for cardiovascular disease seen in patients with hypertension can be divided into two categories: modifiable risk factors and relatively fixed risk factors (Whelton et al., 2018).

Modifiable risk factors are those that patients can typically influence. These include current cigarette smoking, overweight or obesity, diabetes mellitus, physical inactivity, unhealthy diet, and dyslipidemia. Treatment of these risk factors can decrease blood pressure as well as cardiovascular risk (Whelton et al., 2018).

Relatively fixed risk factors are those that are difficult to change, cannot be changed, or may not reduce the risk of cardiovascular disease if changed through currently available interventions. These include family history, increased age, low educational or socioeconomic status, male sex, obstructive sleep apnea, psychosocial stress, and chronic kidney disease. It remains important to identify these risk factors to create a picture of a patient's total cardiovascular risk, but treatment should focus on modifiable risk factors (Whelton et al., 2018).

Case study #1

Marlene is a 67-year-old Black female presenting to the clinic for her biannual checkup. She has pre-existing mild chronic kidney disease as well as type 2 diabetes. The medical assistant checked her blood pressure, and it was 139/77 mmHg. Her previous blood pressure readings were 134/76 mmHg 6 months ago, and 136/74 mmHg a year ago. She weighs 210 pounds today and is 5'3" tall. She wants to speak to her nurse practitioner about tips on cutting back her cigarette smoking.

Self-Assessment Quiz Question #2

Which of the following is a relatively fixed risk factor for cardiovascular disease that Marlene has?

a. Current cigarette smoking.
b. Type 2 diabetes.
c. Chronic kidney disease.
d. Overweight.

HISTORY OF TREATMENTS FOR HYPERTENSION

Although assessment of blood pressure dates to ancient times in Chinese and Indian Ayurvedic medicine, conclusive evidence documenting "normal" blood pressure and potential treatment developments did not occur until the last half of the 20th century. Before the early 1970s, hypertension was not routinely treated in contemporary medical practice. Hypertension was considered an unavoidable component of the aging process, and the few drugs that were available to treat it often caused more misery and earlier demise than in patients who were left untreated. In the 1940s, President Franklin D Roosevelt's blood

pressure was documented as very high on several occasions; his doctor was not concerned when his blood pressure readings were approximately 220/120mmHg. When President Roosevelt died a few years later of a fatal hemorrhagic stroke, his death created more awareness of the potentially deadly effects of hypertension (Saklayen & Deshpande, 2016).

A study conducted by the Veterans Administration in the late 1960s established that diastolic blood pressures over 90 mmHg were treatable with available medications and that doing so reduced the risk of stroke, heart failure, and mortality. As a result, routine blood pressure monitoring began, taking place at medical facilities as well as at a variety of non-medical settings. Additional research by the Veterans Administration in the 1970s established a diastolic blood pressure target of less than 90 mmHg (Saklayen & Deshpande, 2016).

Additional studies demonstrated a decline in death caused by cardiac issues and stroke since the mass treatment of hypertension began. In 1991, new research suggested the benefit of treating patients with elevated systolic blood pressure over 160 mmHg, even if their diastolic pressure was within the normal range. These new interventions resulted in a decrease in cardiac issues and stroke rates, especially in older patients. Nationwide health surveys demonstrate that progress in managing hypertension continues to improve with ongoing research continuing to close gaps in knowledge and improving treatment (Saklayen & Deshpande, 2016).

NON-PHARMACOLOGIC TREATMENT OF HYPERTENSION

Prevention and management of hypertension through non-pharmacological approaches is the first step in reducing the risk of cardiovascular disease. Patients should be counseled and encouraged to make appropriate lifestyle changes that include healthy eating, ensuring an adequate level of physical exercise, and avoiding excessive consumption of alcohol. In cases where hypertension persists despite proper lifestyle changes, medication is typically indicated. Nonetheless, even if prescribed medication, patients must be encouraged to continue with healthy lifestyle choices as part of a comprehensive treatment plan (Whelton et al., 2018).

Guidelines recommend several critical lifestyle choices to help in the prevention and management of hypertension. These include the following (Whelton et al., 2018):

- Weight loss in the case of overweight or obese patients.
- Increasing physical activity with structured exercise programs for all adults. People should get at least 30 minutes of aerobic exercise at least five times a week.
- Consumption of a heart healthy diet, such as the DASH diet (Dietary Approaches to Stop Hypertension), including more vegetables, fruits, and low-fat dairy products, coupled with reductions in saturated and total fats. This helps facilitate achieving a desirable weight and is recommended for all adults with elevated blood pressure.
- Reducing sodium intake to less than 1,500 milligrams per day if hypertensive, or ideally less than 1000mg per day in most adults.
- Potassium supplementation of 3500 to 5000 mg per day, preferably through dietary modification, unless contraindicated by the use of potassium-retaining medications or the presence of chronic kidney disease.
- Limiting alcohol to less than 2 standard drinks per day for men or 1 drink per day for women.

Extensive research has determined the most useful behavioral interventions for the treatment of hypertension. Exercise has the potential to lower systolic blood pressure by 5 to 8 mmHg on average. Patients who follow diets high in low-fat dairy products, fruits, and vegetables can expect systolic blood pressure reductions of approximately 11 mmHg. Furthermore, weight loss is a reliable tool to reduce blood pressure. On average, patients can expect a blood pressure reduction of approximately 1 mmHg for every 1 kg reduction in body weight. The effects of non-pharmacological interventions are cumulative; patients who utilize multiple interventions may be able to meet blood pressure goals without the use of medications. Taken either alone or in combination, available data supports the benefit of positive behavioral modifications in treating hypertension (Whelton et al., 2018).

Evidence-based practice alert! To assess the impact of sodium in the diet on blood pressure, Sacks et al. (2001) conducted a study of 412 participants randomized to eat either a control diet typical of that consumed in the United States or a modified DASH diet. Within those cohorts, each participant ate foods with high, intermediate, and low levels of sodium for 30 consecutive days. In patients receiving the control diet, sodium reductions from the high to the intermediate level resulted in systolic blood pressure reductions of 2.1 mmHg. The same reductions in subjects receiving the DASH diet experienced reductions of 1.3 mmHg. Further reduction, from intermediate to low levels of sodium resulted in additional decreases of 4.6 mmHg in the control diet subjects and 1.7 mmHg in the DASH diet subjects. Similar results were observed irrespective of hypertensive diagnosis or ethnicity. In all cases, the DASH diet was associated with a significantly lower systolic blood pressure at each of the sodium intake levels. The most extreme difference was observed when comparing high sodium, control diet patients with hypertension to low sodium, and DASH diet subjects (11.5 mmHg). Investigators concluded that both the DASH diet and sodium reduction are effective mechanisms to lower blood pressure, with the greatest impacts observed when sodium reduction is combined with the DASH diet. To deliver meaningful clinical benefit, a lifelong commitment to these dietary changes is required (Sacks et al., 2001). This study continues to provide the foundation for recommendations today.

Nursing Consideration: Lifestyle changes are powerful tools, useful for both preventing and managing diagnosed hypertension. Nurse-led programs that guide lifestyle modifications have been shown to increase self-efficacy and improve the implementation of health-promoting behaviors. Nurses are recommended to apply lifestyle interventions as a part of routine care (Zheng et al., 2020).

Case study #2, continued

After finishing with the medical assistant, Marlene's nurse practitioner comes into the room to conduct her examination. The NP notes the trend of high blood pressure and calculates her average blood pressure to be approximately 136/76mmHg. The NP diagnoses her with stage I hypertension. They review many treatment considerations, including lifestyle modifications that would be helpful in reducing her blood pressure.

Self-Assessment Quiz Question #3

Which of the following lifestyle modifications would have the greatest impact on reducing Marlene's blood pressure?

a. A weight loss of 14 kg.
b. A diet high in low-fat dairy products, fruits, and vegetables.
c. At least 30 minutes of aerobic exercise at least five times a week.
d. Limiting alcohol to less than two drinks per day.

PHARMACOLOGIC TREATMENT OF HYPERTENSION

In cases where lifestyle modifications are not sufficient to manage hypertension, medications may be required. Providers managing patients with hypertension should focus on the overall health of the patient, while emphasizing a reduction in the risk of future cardiovascular disease development. A comprehensive treatment plan should be developed, utilizing both pharmacological and nonpharmacological strategies, depending on the severity of hypertension. Increases in blood pressure or in the risk of cardiovascular events should be met with intensified management of blood pressure.

There are several classes of medications available to treat hypertension. Medications that have been shown to reduce clinical cardiovascular events are preferred; these primary agents include angiotensin-converting enzyme (ACE) inhibitors, angiotensin II receptor blockers (ARBs), thiazide diuretics and calcium channel blockers. Many other drug classes are available to treat hypertension, but they are either lacking in confirmation that they decrease clinical cardiovascular disease outcomes, or their tolerability or safety profiles relegate them to use as secondary agents. Secondary antihypertensive agents include the following (Whelton et al., 2017):

- Loop diuretics.
- Potassium-sparing diuretics.
- Aldosterone antagonists.
- Beta blockers.
- Alpha-1 blockers.
- Alpha-2 agonists.
- Renin inhibitors.
- Direct vasodilators.

ANGIOTENSIN-CONVERTING ENZYME (ACE) INHIBITORS

Angiotensin-converting enzyme (ACE) inhibitors are useful in treating a variety of maladies in addition to hypertension, including chronic kidney disease and diabetes. ACE inhibitors work by blocking the angiotensin-converting enzyme from converting angiotensin I to angiotensin II. Angiotensin II is a protein that narrows blood vessels, increases the retention of sodium and water in the renal tubules, and stimulates the release of the hormone aldosterone from the adrenal gland. Decreasing the availability of this potent vasoconstrictor can improve vasodilation and lead to decreased blood pressure (Herman et al., 2021).

ACE inhibitors are recommended as first-line antihypertensive agents, particularly in patients with diabetes mellitus and cardiovascular disease. These medications have been shown to slow the progression of kidney disease in patients with diabetes, as well as reduce the risk of myocardial infarction and improve heart function in diabetic patients with hypertension. Chronic kidney disease patients also experience benefits in their disease management, with studies showing effectiveness in decreasing proteinuria and slowing the progression of kidney disease. In addition, ACE inhibitors have been proven beneficial in patients with heart failure by increasing cardiac output without increasing the heart rate. ACE inhibitors are generally less efficacious in Black patients than White (Herman et al., 2021; Whelton et al., 2017).

The U.S. Food & Drug Administration has approved several ACE inhibitors for marketing. Examples of ACE inhibitors include the following (GlobalRPh, 2017b):

- Benazepril (Lotensin) – available in tablets of 5 mg, 10 mg, 20 mg, and 40 mg.
- Captopril (Capoten) – available in tablets of 12.5, 25, 50, and 100 mg.
- Enalapril (Vasotec) – available in tablets of 2.5, 5, 10, and 20 mg; as a solution for intravenous (IV) injection of 1.25 mg/mL; and as an oral solution of 1 mg/mL.
- Fosinopril (Monopril) – available in tablets of 10, 20, and 40 mg.
- Lisinopril (Prinivil, Zestril) – available as 2.5, 5, 10, 20, and 40 mg tablets.
- Moexipril (Univasc) – available in tablets of 7.5 and 15 mg.
- Perindopril (Aceon) – available in tablets of 2, 4, and 8 mg.
- Quinapril (Accupril) – available in tablets of 5, 10, 20, and 40 mg.
- Ramipril (Altace) – available in capsules of 1.25, 2.5, 5, and 10 mg.
- Trandolapril (Mavik) – available in tablets of 1, 2, and 4 mg.

When initiating ACE inhibitors, lower initial doses should be used in the geriatric population. In addition, patients with heart failure, hyponatremia, or renal impairment should initiate doses at the lower end of the range to assess the effects of ACE inhibitors on these conditions (Herman et al., 2021).

ACE inhibitor class effects

ACE inhibitor use is fairly widespread in the treatment of hypertension as a result of the relatively benign adverse event profile. Approximately 1% to 10% of patients develop a dry cough while taking ACE inhibitors, for which there is no treatment – this side effect often requires therapy to be changed to an alternative medication class. Initiation of ACE inhibitors often causes a reversible decline in renal function, which may require increased monitoring of serum creatinine while the patient stabilizes. Renal function decline can be especially profound in patients with bilateral renal artery stenosis; these patients experience an increased risk of acute renal failure when taking ACE inhibitors (Herman et al., 2021).

Other side effects associated with ACE inhibitors include hyperkalemia, dizziness, headache, fatigue, and hypotension. Although rare, angioedema, a rapidly occurring form of edema, has been observed in patients taking ACE inhibitors. If angioedema occurs in the throat or tongue, this adverse event can be life-threatening and requires immediate medical attention. Angioedema has a higher rate of occurring in the Black population. Patients experiencing angioedema should have ACE inhibitors discontinued immediately (Herman et al, 2021).

Because of an increased risk of teratogenicity, ACE inhibitors are contraindicated for use during pregnancy. ACE inhibitors are known to cause numerous teratogenic effects on the fetus, including skeletal deformations, renal failure, hypotension, lung hypoplasia, and death (Herman et al., 2021).

ACE inhibitors are known to cross into breast milk. The appropriateness of nursing mothers using these medications is dependent on the age of the infant and the specific agent. Because of the potential risk of profound neonatal hypotension, these drugs should be avoided by nursing mothers in the first few weeks of life. Pre-term infants are at higher risk than full-term babies. In the case of mothers breastfeeding older infants, data exists supporting the use of quinapril, captopril, and enalapril. Babies should be monitored for signs of hypotension (UK Medicines and Healthcare Products Regulatory Agency, 2014).

Although ACE inhibitors are not largely susceptible to pharmacokinetic drug-drug interactions, clinicians should be aware of a number of potentially clinically significant pharmacodynamic drug interactions associated with the use of these medications. For example, in patients who are sodium and/or volume depleted from diuretic usage, excessive decreases in blood pressure – to the extent of symptomatic hypotension – are possible. If co-administered with potassium-sparing diuretics, hyperkalemia may occur, especially in cases of patients with renal insufficiency. When ACE inhibitors are

combined with nonsteroidal anti-inflammatory drugs (NSAIDs), the potential for acute renal failure should be considered. Lastly, clinicians should be vigilant for occurrences of severe hypersensitivity in patients also receiving allopurinol (Dipiro et al., 2019).

Self-Assessment Quiz Question #4

Which of the following side effects of ACE inhibitors has a higher rate of occurring in the Black population?

a. Dry cough.
b. Dizziness.
c. Hypotension.
d. Angioedema.

ANGIOTENSIN II RECEPTOR BLOCKERS (ARB)

Angiotensin II receptor blockers (ARBs) provide an alternative method of reducing the effects of angiotensin II to those provided by ACE inhibitors. ARBs work by blocking angiotensin II receptors to decrease the vasoconstriction caused by angiotensin II. This results in a decrease in blood pressure as well as a decrease in the production of aldosterone. ARBs are useful in patients who are intolerant to ACE inhibitors, since ARBs do not cause a dry cough (Hill & Vaidya, 2021).

ARBs are recommended as first-line therapy in hypertensive patients. The effects of ARBs have been shown to be roughly comparable to ACE inhibitors, and these two classes of medications are often used interchangeably. Similar to ACE inhibitors, ARBs are recommended for the treatment of heart failure and prevention of kidney disease progression in patients with diabetes or chronic kidney disease. The ACC/AHA guidelines recommend avoiding the combination of an ACE inhibitor with an ARB, because of the potential for harm related to hyperkalemia and decreased renal function (Hill & Vaidya, 2021; Whelton et al., 2017).

The U.S. Food & Drug Administration (FDA) has approved several ARBs for the treatment of heart failure and hypertension, including the following (GlobalRPh, 2017c):

- Azilsartan (Edarbi) – available in tablets of 40 and 80 mg.
- Candesartan (Atacand) – available in tablets of 4, 8, 16, and 32 mg.
- Eprosartan (Teveten) – available in tablets of 400, and 600 mg.
- Irbesartan (Avapro) – available in tablets of 75, 150, and 300 mg.
- Losartan (Cozaar) – available in tablets of 25, 50, and 100 mg.
- Olmesartan (Benicar) – available in tablets of 5, 20, and 40 mg.
- Telmisartan (Micardis) –available in tablets of 20, 40, and 80 mg.
- Valsartan (Diovan) – available in tablets of 40, 80, 160, and 320 mg.

ARB class effects

ARBs are generally safe and well-tolerated. They are associated with a lower incidence of cough and angioedema compared with ACE inhibitors, though these side effects are still possible in patients taking ARBs. ARBs are often useful in patients who have experienced angioedema while taking ACE inhibitors; patients with a history of angioedema on an ACE inhibitor can receive an ARB beginning 6 weeks after the ACE inhibitor was discontinued (Hill & Vaidya, 2021; Whelton et al., 2017).

Decline in renal function has been reported with ARBs, and these medications should be avoided in patients with severe bilateral renal artery stenosis because of the risk of acute renal failure. Other reported side effects of ARBs include dizziness, angioedema, hyperkalemia, and hypotension (Hill & Vaidya, 2021).

Like ACE inhibitors, ARBs are known to cause teratogenic effects when administered during pregnancy. They have been shown to reduce perfusion of the fetal kidneys, cause skeletal deformities, and even result in fetal death. Women of childbearing age should be counseled on the importance of birth control while taking ARBs and, if pregnancy occurs, ARB therapy should be stopped immediately (Hill & Vaidya, 2021).

Evidence-based practice alert! Moretti et al. (2012) conducted a study of 138 women receiving ACE inhibitors or ARBs (a total of 28 patients were administered ARB) during the first trimester of pregnancy. Infants of mothers who received ACE inhibitors and ARB exhibited lower birth weights and gestational age compared to the control group. Moreover, there was a significantly higher rate of miscarriage reported in mothers taking ACE inhibitors or ARBs. Investigators concluded that while these medications are not major human teratogens, they may be associated with an increased risk of miscarriage (Moretti et al., 2012). This study continues to be cited in current guidelines as rationale against the use of these products in pregnancy; the use of ACE inhibitors or ARB in women who are pregnant, or planning to become pregnant, is not recommended (Whelton et al., 2017).

Angiotensin receptor blockers are known to cross into breast milk. The appropriateness of nursing mothers using these medications is dependent on the age of the infant and the specific agent. Because of the potential risk of profound neonatal hypotension, these drugs should be avoided by nursing mothers in the first few weeks of life. Pre-term infants are at higher risk than full-term babies. If nursing mothers do receive an ARB, the baby's blood pressure should be monitored (Hill & Vaidya, 2021).

Although ARBs have a relatively low potential to interact with other drugs, the literature identifies a few possible pharmacokinetic and pharmacodynamic drug interactions. Since an ARB may increase serum potassium levels, combinations with other drugs that increase potassium levels may result in hyperkalemia; if uncontrolled, this can lead to cardiac arrhythmias. An ARB should not be used concomitantly with ACE inhibitors since these combinations increase the risk of hypotension, hyperkalemia, and renal impairment. Lastly, an ARB should not be combined with the direct renin inhibitor aliskiren (Tekturna) because of an increased risk of kidney failure, hyperkalemia, and excessive hypotension (Hill & Vaidya, 2021; Whelton et al., 2017).

DIURETICS

Diuretics work to lower blood pressure by providing their action in the kidney, inducing the body to excrete additional sodium and water, thereby reducing fluid volume. This reduction in the amount of fluid flowing through the blood vessels effectively reduces pressure on blood vessels, countering hypertension. Diuretics are grouped into three distinct categories: Thiazide, loop, and potassium-sparing. Each type acts on different sites in the kidney and thus has a different use, causing dissimilar adverse event profiles. As a result, each type of diuretic requires unique precautions. The type chosen can be specially tailored for each individual patient to meet their specific needs (DiPiro et al., 2019).

Thiazide diuretics

Thiazide diuretics are recommended by the ACC/AHA guidelines as a first-line agent in the treatment of hypertension because of their ability to reduce clinical cardiovascular disease events. Since ACE inhibitors and ARBs are less effective in Black patients, thiazide diuretics are highly recommended for the initial treatment of hypertension in this population (Whelton et al., 2017).

Thiazide diuretics work in the distal tubule of the nephron to decrease reabsorption of sodium and chloride, allowing for increased excretion of sodium and fluids. Thiazides are typically used in low doses to induce fluid loss and the antihypertensive response; higher doses have been shown to increase fluid loss but not produce an equivalent increase in antihypertensive effects. The increased fluid loss seen with higher doses has also been associated with increased electrolyte and metabolic complications (Mann & Hilgers, 2021a).

Side effects seen with thiazide diuretics are largely dose dependent. Effects related to the volume of fluid excreted include hyponatremia, hypokalemia, hyperuricemia, hyperglycemia, hypomagnesemia, and hypercalcemia (higher doses that increase the volume of fluid excretion have a higher risk of causing these side effects). Monitoring laboratory values for electrolytes is recommended within the first 1 to 2 weeks of initiating therapy and again after 6 to 12 months. Monitoring may need to be more frequent in patients who become symptomatic or if the dose is increased. Side effects that are not dose dependent include sleep disturbances, sexual dysfunction, and photosensitivity (Mann & Hilgers, 2021a).

Thiazide diuretics should be used with caution in patients taking other medications that cause electrolyte disturbances because of the risk of additive complications. Thiazide diuretics are contraindicated during pregnancy because of the risk of oligohydramnios, or too little amniotic fluid surrounding the baby (Youssef, 2019).

High doses of thiazide diuretics are known to suppress lactation, which may also occur at lower dose levels. Clinicians should monitor the weight of infants of nursing mothers receiving these medications to ensure adequate milk production. The levels of drugs in milk have not been largely assessed but are thought to be too low to be significant. Nonetheless, shorter-acting diuretics are the medication of choice and should be used at the lowest dose for the shortest duration to achieve benefit in the mother (Specialty Pharmacy Service, 2020).

Thiazide diuretics, readily available as generic drugs, are often the least expensive medications useful for the treatment of hypertension. Examples include the following (GlobalRPh, 2017g):

- Chlorothiazide (Diuril) – available in tablets of 250 and 500 mg; as powder for reconstitution for parenteral injection of 500 mg; and as an oral solution of 250 mg/500 mL.
- Chlorthalidone (Hygroton) – available in tablets of 25, 50, and 100 mg.
- Hydrochlorothiazide (Microzide) – available in tablets of 25, 50, and 100 mg, in capsules of 12.5 mg, and as an oral solution of 50 mg/5 mL.
- Indapamide (Lozol) – available in tablets of 1.25 and 2.5 mg.
- Metolazone (Zaroxolyn and Mykrox) – available in tablets of 2.5, 5, and 10 mg.

Evidence-based practice alert! A meta-analysis published in 2021 aimed to evaluate the safety and efficacy of chlorthalidone compared with hydrochlorothiazide. The clinical efficacy of chlorthalidone has been well established in landmark clinical trials, but hydrochlorothiazide remains a more commonly prescribed agent. This study evaluated data from 37 clinical trials and found a slight superiority for chlorthalidone in lowering systolic blood pressure, but no statistically significant difference in blood pressure lowering between the agents. Hydrochlorothiazide appeared to be a safer choice because of more significant serum potassium lowering seen with chlorthalidone. The authors concluded that the two diuretics can be used interchangeably (Dineva et al., 2021).

Loop diuretics

Loop diuretics are named for their action at the ascending limb of the loop of Henle in the nephron, where they act to decrease sodium and chloride reabsorption. They provide more potent diuresis than thiazide diuretics and are therefore frequently chosen for hypertensive patients with impaired kidney function. They are also commonly used in hypertensive patients who also have heart failure, as significant diuresis is often required in these patients (Agarwal, 2021). The ACC/AHA guidelines recommend loop diuretics as secondary agents for the treatment of hypertension because of the lack of data showing their effectiveness in reducing cardiovascular events. However, the guidelines do recommend these agents as the preferred diuretics in patients with symptomatic heart failure and state that loop diuretics are preferred over thiazides in patients with moderate to severe chronic kidney disease (Whelton et al., 2017).

Similar to thiazides, loop diuretics typically provide increasing diuresis as the dose is increased. However, a plateau is reached at which point increased doses do not provide an equivalent increase in diuresis. Increasing doses further beyond this point typically does not increase effectiveness but does increase the risk of side effects (Brater & Ellison, 2021).

Several side effects related to the use of loop diuretics are related to the extent of diuresis. These include hypokalemia, hypotension, hypovolemia, hyponatremia, hyperuricemia, and metabolic alkalosis. Higher doses are associated with more profound diuresis-related side effects (Brater & Ellison, 2021).

Loop diuretics are also associated with hypersensitivity reactions. Furosemide, bumetanide, and torsemide are considered sulfonamides, which can lead to the development of allergic reactions. These reactions often manifest with a rash, though they can rarely present with acute interstitial nephritis. There is minimal evidence that patients with a known allergy to sulfonamide antibiotics experience an allergic cross-reaction with loop diuretics; reactions that do occur in patients with a known allergy to sulfonamide antibiotics appear to be related to a predisposition to allergic reactions rather than a cross-reaction (Brater & Ellison, 2021).

Ototoxicity is associated with high doses of loop diuretics and can lead to transient or permanent deafness. It occurs primarily with high dose intravenous therapy. Cases have also been documented at lower doses in patients with impaired kidney function or those who are also taking other medications with ototoxic effects, such as aminoglycosides. Ethacrynic acid is thought to be more ototoxic than furosemide, bumetanide, or torsemide (Brater & Ellison, 2021).

Loop diuretics should be used with caution in patients taking other medications that cause electrolyte disturbances because of the risk of additive complications, particularly hypokalemia (Brater & Ellison, 2021). These medications are not contraindicated in pregnancy, but their use is not recommended unless there is a compelling indication for the use of diuretics, such as severe heart failure (Youssef, 2019). In lactation, loop diuretics may suppress breast milk production, though this is largely theoretical. Clinicians should monitor the weight of infants of nursing mothers receiving these medications to ensure adequate milk production. The levels of drugs in milk have not been largely assessed but are thought to be too low to be of significance. If loop diuretics are used in lactating women, furosemide is preferred because of its short half-life, low oral bioavailability, and most experience of use (Specialty Pharmacy Service, 2020).

Several loop diuretics are readily available as generic drugs, including the following (GlobalRPh, 2017g):

- Bumetanide (Bumex) – available in tablets of 0.5, 1 mg, and 2 mg, and as a solution for injection of 0.25 mg/mL.
- Ethacrynic acid (Edecrin) – available in tablets of 25 mg and 50 mg, and as powder for reconstitution for parenteral injection of 50 mg.
- Furosemide (Lasix) – available in tablets of 20 mg, 40 mg, 50 mg, and 80 mg; as a solution for injection of 10 mg/mL, and as an oral solution of 8 mg and 10 mg/mL.
- Torsemide (Demadex) – available in tablets of 5 mg, 10 mg, 20 mg, and 100 mg and as a solution for injection of 10 mg/mL.

Potassium-sparing diuretics

Potassium-sparing diuretics include agents in two broad categories: mineralocorticoid receptor antagonists and other potassium-sparing diuretics. The mineralocorticoid receptor antagonists, spironolactone and eplerenone, work by preventing aldosterone from binding to the mineralocorticoid receptor. This action inhibits the effects of aldosterone and cortisol, preventing sodium retention and its associated fluid retention, thereby reducing blood pressure (Alscher, 2021; DiPiro et al., 2019).

The effects of mineralocorticoid receptor antagonists are useful in the treatment of hypertension as well as heart failure. They are reserved as second-line agents in the ACC/AHA guidelines because of their lack of evidence showing effectiveness in reducing cardiovascular events (Whelton et al., 2017).

Since mineralocorticoid receptor blockers also bind to progesterone and androgen receptors, they create some undesirable side effects. These include breast tenderness, gynecomastia, and erectile dysfunction in men and menstrual abnormalities in pre-menopausal women. Eplerenone is more selective for mineralocorticoid receptors than spironolactone, resulting in reduced sexual side effects. Mineralocorticoid receptor antagonists can also increase potassium levels, which may require careful monitoring and dietary adjustments (Alscher, 2021; DiPiro et al., 2019).

The other potassium-sparing diuretics, amiloride and triamterene, produce weaker diuresis by blocking sodium transport channels to increase renal sodium excretion. They are less effective as monotherapy for hypertension, but they are frequently used with thiazide diuretics as combination therapy. Like the mineralocorticoid receptor antagonists, they are reserved as second-line agents for the treatment of hypertension. Potassium levels should be monitored in patients taking amiloride and triamterene because of the potential to cause hyperkalemia (Alscher, 2021; DiPiro et al., 2019).

Potassium-sparing diuretics include the following (GlobalRPh, 2017g):

- Amiloride (Midamor) – available in tablets of 5 mg.
- Eplerenone (Inspra) – available in tablets of 25 mg and 50 mg.
- Spironolactone (Aldactone) – available in tablets of 25 mg, 50 mg, and 100 mg.
- Triamterene (Dyrenium) – available in tablets of 50 mg and 100 mg.

Nursing Consideration: Nurses should emphasize the importance of monitoring potassium intake with patients receiving potassium-sparing diuretics because of the risk of hyperkalemia. Patients should be educated on foods to avoid or limit because of high potassium content, including commonly used salt substitutes. Many patients may be unaware of the potentially dangerous interaction between seemingly innocuous salt substitutes and these drugs.

Self-Assessment Quiz Question #5

Which of the following diuretics are recommended by the ACC/AHA guidelines as a first-line agent in the treatment of hypertension because of its ability to reduce clinical cardiovascular disease events?

a. Thiazide diuretics.
b. Loop diuretics.
c. Potassium-sparing diuretics.
d. Calcium channel blockers.

BETA-BLOCKERS

Beta-blocking agents are medications that block the B1 and/or B2 beta-adrenergic receptors to exhibit their action. Epinephrine and norepinephrine bind to B1 and B2 receptors; when bound to B1 receptors, these hormones lead to an increase in heart rate and conduction velocity. B2 receptor binding results in smooth muscle relaxation as well as increased metabolic effects. When beta blockers antagonize these receptors, it results in reductions of cardiac contractility (both rate and force) as well as reductions in cardiac output, leading to decreases in blood pressure and heart rate (DiPiro et al., 2019).

Evidence-based practice alert! Wiysonge et al., (2017) published results from a large meta-analysis that examined outcomes from a total of 13 randomized clinical trials. Of these studies, four, enrolling a total of 23,613 patients, compared beta blockers to placebo. Five studies, enrolling 18,241 patients, compared beta blockers to diuretics. Four studies designed to compare calcium channel blockers (CCB) to beta blockers enrolled 44,825 patients. The final three studies, with 10,828 patients, characterized the difference between beta blockers and drugs impacting the renin-angiotensin system (RAS). Across all these trials, a total of 40,245 participants received beta blockers, three-fourths of whom took atenolol. Results showed no difference in all-cause mortality between patients who received placebo and those who were administered beta blockers, diuretics, or RAS inhibitors. In the CCB comparison, risk of all-cause mortality was 7% higher in patients who received beta blockers. In the single study evaluating older patients at least 65 years old, the differences were more pronounced with atenolol usage associated with a 63% percent greater incidence of coronary heart disease compared to patients receiving a diuretic. Investigators concluded that current evidence suggests that in the treatment of hypertension, beta blockers are inferior to CCBs and RAS medications for prevention of stroke, as well as inferior to CCBs for all-cause mortality and total cardiovascular events (Wiysonge et al., 2017).

Beta-blockers are a diverse group of medications employing a host of pharmacologic properties. Their benefits on mortality and cardiovascular disease in patients with heart failure or acute myocardial infarction is well established. It was thought that beta blockers might provide similar benefit to patients as a first-line treatment for hypertension; however, this benefit is controversial as recent studies have shown little to no effect on mortality for the treatment of hypertension (Wiysonge et al., 2017). Contemporary practice appears to be in step with Wiysonge and colleagues' (2017) publication: Beta blockers are largely relegated to second-line therapy, as described the ACC/AHA guidelines (Whelton et al., 2017).

There are many beta-blockers available, with various levels of selectivity for B1 and B2. Comorbid conditions will influence the selection of a beta-blocker. For example, patients with angina pectoris and asthma should avoid using non-selective beta-blockers because of the presence of B2 in lung tissue and the potential for asthma exacerbation. B1 selective beta-blockers should be used in low doses for these patients, as B1 selectivity is lost at high doses. Examples of beta blockers include the following (GlobalRPh, 2017e):

Nonselective Beta Blockers:

- Propranolol (Inderal LA, InnoPran XL) –available in tablets and capsules of 10, 20, 40, 60, and 80 mg; as suspensions of 4 mg/mL; and as a solution for IV of 1 mg/mL.
- Carvedilol (Coreg) – available in tablets of 3.125, 6.25, 12.5, and 25mg, and extended-release capsules of 10, 20, 40, and 80mg.
- Sotalol (Betapace) – available in tablets of 80, 120, 160, and 240 mg.
- Labetalol (Normodyne) – available in tablets of 100, 200, and 300mg, as well as a solution for IV injection 5mg/mL.
- Nadolol (Corgard) – available in tablets of 20, 40, 80, 120, and 160mg.

Selective Beta Blockers:

- Atenolol (Tenormin) – available in tablets of 25, 50, and 100 mg, and as a solution for IV of 0.5 mg/mL.
- Betaxolol (Kerlone) – available in tablets of 10 and 20mg.
- Bisoprolol (Zebeta) –available in tablets of 5 and 10 mg.
- Metoprolol (Lopressor, Toprol-XL) – available in immediate release tablets of 25, 50, and 100, as a solution for IV of 01 mg/mL, and extended-release tablets of 25 mg, 50 mg, 100 mg, and 200 mg.
- Nebivolol (Bystolic) – available in tablets of 2.5, 5, 10, and 20 mg.

Beta blocker class effects

Since beta receptors are found all over the body, several side effects can result. Common side effects associated with the use of beta blockers include fatigue, dizziness, nausea, constipation, bradycardia, and hypotension. Beta blockers, particularly nonselective agents, can hypothetically trigger asthma attacks and mask signs of hypoglycemia in diabetics, as well as increase serum lipid levels. Patients with acute or chronic hypotension or bradycardia should avoid the use of beta blockers (DiPiro et al., 2019).

Beta blockers are the most commonly used medication class for treating cardiac conditions during pregnancy. However, data supporting their safety are limited. Beta blockers can cross the placenta, which can potentially result in physiologic fetal changes such as bradycardia and hypoglycemia. A large population-based study published in 2017 found that beta blocker exposure was not associated with an increase in fetal cardiac anomalies (Duan et al., 2017).

The concentration of beta blockers that partition into breastmilk varies between agents. Some data suggests that atenolol and nadolol may have high affinities to enter breast milk. As a result, other beta blockers, such as metoprolol, propranolol, or labetalol, may be preferred in these patients (MotherToBaby.org, 2019).

Each beta blocker has a unique pharmacologic profile, leaving it susceptible to agent-specific drug interactions. While in general, symptomatic interactions with these medications are infrequent, prescribers still need to be familiar with the interaction potential of each agent that they prescribe relative to existing medications and supplements. Beta blockers should be given cautiously with other medications that slow the heart rate or cardiac activity, such as digoxin or other antiarrhythmic medications, because of the risk of profound bradycardia (DiPiro et al., 2019).

CALCIUM CHANNEL BLOCKERS

Calcium channel blockers work by antagonizing calcium channels, which decreases the entry of calcium into cardiac and blood vessel tissue. The resulting vascular smooth muscle relaxation decreases vascular resistance, reducing blood pressure. The effects on calcium also allow for an increase in coronary blood flow, increasing the oxygen supply to the heart (Bloch & Basile, 2021).

Calcium channel blockers can be divided into two categories: dihydropyridines and non-dihydropyridines. Dihydropyridine calcium channel blockers are more selective for vascular smooth muscle tissue, making them drugs of choice in the treatment of hypertension. Non- dihydropyridines are more selective for cardiac smooth muscle tissue, allowing for more significant effects on decreasing heart rate and contractility and making them preferred agents in patients with angina or arrhythmias (Bloch & Basile, 2021).

According to the ACC/AHA guidelines, calcium channel blockers play a critical role as first-line agents in the treatment of hypertension. Calcium channel blockers have been shown to be more effective at preventing stroke and heart failure in Black patients when compared to ACE inhibitors, making them one of the best initial choices for hypertension monotherapy in this population (Whelton et al., 2017).

Several calcium channel blockers are available; some are short-acting, while others rely on sustained-release formulations to provide a longer effect on blood pressure. Examples include the following (GlobalRPh, 2017f):

Dihydropyridine calcium channel blockers:

- Amlodipine (Norvasc) – available in tablets of 2.5, 5, and 10 mg.
- Felodipine (Plendil) – available in extended-release tablets of 2.5, 5, and 10 mg.
- Isradipine (Dynacirc) – available in immediate release capsules of 2.5 and 5 mg, and controlled release tablets of 5 and 10 mg.
- Nicardipine (Cardene) – available in immediate release capsules of 20 and 30 mg; sustained release capsules of 30, 45 and 60 mg; and as a solution for IV of 2.5 mg/mL.
- Nifedipine (Adalat and Procardia) – available as immediate release capsules of 10 and 20 mg and extended-release tablets of 30, 60, and 90 mg.
- Nisoldipine (Sular) – available as extended-release tablets of 10, 20, 30, and 40 mg.

Non-dihydropyridine calcium channel blockers:

- Diltiazem (Cardizem) – available in immediate release tablets of 30, 60, 90, and 120 mg; extended/sustained release capsules of 60, 90, 120, 180, 240, 300, and 360 mg; and as a solution for IV of 5 mg/mL.
- Verapamil (Isoptin) – available as immediate release tablets of 40, 80 and 120 mg and sustained release tablets of 120, 180, and 240 mg.

Side effects associated with calcium channel blockers vary significantly with the subclass and dose. The dihydropyridines are associated with headache, lightheadedness, flushing, and dose-dependent peripheral edema. The edema caused by calcium channel blockers is caused by a fluid redistribution from the vascular space into the interstitium, which typically does not respond to diuretic therapy. Patients experiencing edema with calcium channel blockers can try reducing the dose or switching to a non-dihydropyridine agent (Bloch & Basile, 2021).

The non-dihydropyridines are associated with dose-dependent constipation, bradycardia, and worsening cardiac output. This results in a relative contraindication for patients taking beta blockers and those who have heart failure with a reduced ejection fraction, sick sinus syndrome, and second- or third-degree atrioventricular block. However, it appears that these agents can be taken by patients who have heart failure with preserved ejection fraction, as well as those with chronic stable angina or those who have suffered a myocardial infarction (Bloch & Basile, 2021).

Calcium channel blockers have been used during pregnancy for over 30 years. Most of the published literature focuses on using extended release nifedipine. The extended-release formulation is preferred because abrupt decreases in blood pressure seen with immediate-release formulations can potentially be more problematic for placental perfusion. Nifedipine has not been associated with teratogenic effects (Malha & August, 2019).

Limited published evidence and clinical experience suggest that nifedipine and verapamil are compatible with breastfeeding. While nicardipine usage is also considered to be appropriate, less clinical experience has been documented. Interestingly, nifedipine is sometimes employed as an off-label remedy for painful nipple spasm in breastfeeding mothers (SPS, 2020b).

In addition to the additive effects of calcium channel blockers on other drugs impacting blood pressure, calcium channel blockers are prolific inhibitors of the Cytochrome P450 (CYP) family of isozymes. All calcium channel blockers inhibit CYP2D6 and CYP2C9 to varying degrees. These findings are critical, as some of these drug interactions may be clinically significant. Prescribers must be familiar with the interaction potential of each agent that they prescribe relative to existing medications and supplements (Ma et al., 2000).

Evidence-based practice alert! Brown et al. (2000) conducted a randomized trial enrolling 6,321 hypertensive patients between the ages of 55 and 80. Patients received either nifedipine (3,157 patients) or a hydrochlorothiazide/amiloride combination diuretic product (3,164 patients). Titration was accomplished by doubling the starting dose and the addition of atenolol or enalapril. The primary outcomes of interest were cardiovascular death, myocardial infarction, heart failure, or stroke. The average follow-up time for each group was about 11 years. Primary outcomes were recorded in 6.3 percent of patients receiving nifedipine and 5.8 percent in the diuretic cohort of patients. While the overall risk of a primary outcome was 10 percent higher, on average, in the nifedipine group, the difference was not statistically significant (p=0.35). While the impact on blood pressure was similar between treatments (173/99 mmHg at baseline compared to 138/82 mmHg at the end of the study for both groups), there was an 8 percent higher study withdrawal rate because of peripheral edema in the nifedipine group compared to the patients receiving the diuretic (p<0·0001). Serious adverse events were more frequent in the diuretic group than in the nifedipine patients (880 versus 796, p=0.02). Investigators concluded that nifedipine and diuretic treatment were equally effective in preventing cardiovascular and cerebrovascular complications of hypertension, and that drug choice should be based on tolerability and/or blood pressure response (Brown et al., 2000).

ALPHA BLOCKERS

Alpha blockers antagonize the alpha-1 receptors, primarily located in the smooth muscle. This reduces the effect of the hormone norepinephrine, allowing for relaxation of the smooth muscles of small blood vessels, resulting in less restrictive blood flow and ultimately decreases in blood pressure. There are two main categories of alpha-1 receptors: alpha 1a and alpha 1b. Alpha 1a receptors are found in the bladder neck and prostate, while alpha 1b receptors are found in the arterioles. Nonselective agents and those selective for alpha 1a are commonly used to treat urinary obstruction associated with symptomatic benign prostatic hypertrophy (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2018).

Alpha blockers are reserved for second line treatment, as recommended by the ACC/AHA guidelines because of the limited evidence on their efficacy in reducing cardiovascular events (Whelton et al., 2017). Long term therapy with alpha blockers has not been associated with improved survival; studies have shown an increase in stroke, cardiovascular disease, and heart failure with long term use (NIDDK, 2018).

A variety of nonselective alpha blockers (sometimes called alpha-adrenergic blockers/antagonists, adrenergic blockers, or alpha-blockers) are available for the treatment of hypertension and can be short- or long-acting agents. Examples include the following (GlobalRPh, 2017a):

- Doxazosin (Cardura) – available as tablets of 1, 2, 4, and 8 mg.
- Prazosin (Minipress) – available as tablets of 1, 2, and 5 mg.
- Terazosin (Hytrin) – available as tablets of 1, 2, 5, and 10 mg.

Alpha blocker class effects

A "first-dose effect" is peculiar to some alpha blockers and results in symptomatic orthostatic hypotension and tachycardia when the dosing of these agents is started. As a result, patients experience an increased risk of dizziness, falls, and fracture when initiating therapy (Hiremath et al., 2019).

Nursing Consideration: It is critical that nurses make patients aware of the risk of first dose effects when initiating alpha blockers, since this can significantly increase a patient's risk of falling. This effect is potentially heightened in elderly patients and those taking multiple antihypertensive agents. Proper education should include directions for patients to rise slowly when getting up and employing judicious caution, as well as assistance and supervision when available (Hiremath et al., 2019).

Potential adverse events associated with the use of alpha blockers include headache, tachycardia, orthostatic hypotension, and dizziness. Taking alpha blockers at night can reduce the risk of daytime falls related to orthostatic hypotension (DiPiro et al., 2019; NIDDK, 2018).

Although alpha blockers have not been adequately studied in pregnant women, their use in this population is common. Moreover, these agents have been demonstrated to be safe in examinations of pregnant animals. All drugs carry some degree of risk, and use in women who are pregnant or trying to become pregnant should be evaluated on a patient-specific basis (Thakur et al., 2020).

Alpha blockers should be used cautiously in women with essential hypertension who are breastfeeding, especially in the cases of premature infants and newborns. Other anti-hypertensives are generally better choices than alpha blockers

for breastfeeding women. If no other option is available, infants should be monitored for hypotension (SPS, 2020b).

Although clinically significant drug interactions with alpha blockers are not common, there are some combinations that healthcare professionals should be wary of, in addition to the additive effects of combining antihypertensive medications. When used in combination with beta blockers, alpha blocker-mediated first dose hypotensive effects can be exaggerated. Cimetidine has been shown to enhance the hypotensive effects of tamsulosin because of decreases in its metabolism (DiPiro et al., 2019; Hiremath et al., 2019).

Evidence-based practice alert! The Antihypertensive and Lipid-Lowering treatment to prevent Heart Attack Trial (ALLHAT) was a landmark trial that enrolled 42,418 hypertensive patients 55 and older with at least one additional risk factor for cardiovascular disease. Patients received a variety of antihypertensive regimens to assess the long-term effect of developing heart failure in high-risk patients. A total of 9,061 patients were assigned to receive doxazosin and 15,256 patients were administered chlorthalidone for a median duration of 3.3 years. Results obtained demonstrated that patients treated with doxazosin, overall (monotherapy + add-on rescue therapy) had twice the risk of developing heart failure than patients randomized to receive chlorthalidone (monotherapy + add-on rescue therapy). Moreover, 68 percent of the doxazosin patients required an additional medication to achieve their target blood pressure, while 59 percent of the chlorthalidone patients needed the extra intervention. Investigators concluded that the diuretic chlorthalidone was significantly more effective than doxazosin at preventing heart failure in high-risk hypertensive patients (Davis et al., 2002).

ALPHA-AGONISTS

Through stimulation of the alpha-2 adrenoceptors in the central brainstem, alpha agonists reduce sympathetic nervous system activity. This results in decreased peripheral resistance, heart rate, and blood pressure. In general, these medications carry relatively high potential risks of side effects. As a result, their usage is limited (Brown et al, 2018). The ACC/AHA guidelines reserve alpha agonists as second-line agents, used as adjunctive treatment (Whelton et al., 2017).

Examples of alpha agonists used in the treatment of hypertension include the following (GlobalRPh, 2017d):

- Clonidine (Catapres) – available as tablets of 0.1, 0.2, and 0.3 mg.
- Methyldopa (Aldomet) – available as tablets of 250 and 500 mg and as a solution for injection of 50 mg/mL.

Alpha agonists class effects

Side effects associated with the use of alpha agonists include hypotension, bradycardia, and orthostatic hypotension. Heart rate and blood pressure should be monitored closely when initiating medication and with dosage changes. Other side effects associated with alpha agonists include dry mouth, sedation, dizziness, headache, and constipation. Abruptly stopping alpha agonists may result in sudden, dangerously high elevations in blood pressure. As a result, discontinuation of these medications must be accomplished through tapering (Brown et al., 2018).

Nursing Consideration: Because of the potential for sudden, unsafe increases in blood pressure upon abrupt discontinuation of alpha agonists, nurses should educate their patients not to abruptly discontinue their medications and to employ a conservative tapering approach when medical practice requires discontinuation (Brown et al., 2018).

Of all antihypertensive drugs, methyldopa has the longest safety record in pregnant women; it has been used for more than 40 years without serious side effects on the mother or fetus. Methyldopa is thus considered the agent of choice for lowering blood pressure in this population without significantly impacting fetal health (Youssef, 2019). While methyldopa is compatible with breastfeeding, other medications in this class such as clonidine should be used with caution and should include infant monitoring for hypotension (SPS, 2020b).

When used with other anti-hypertensives, a potentiation of effect should be expected. In addition, patients receiving methyldopa and lithium should be closely monitored for lithium toxicities. Iron supplements have been shown to reduce the bioavailability of methyldopa, which can adversely affect blood pressure control in patients taking both products at the same time. As such, patients receiving methyldopa should not be given iron supplementation with ferrous sulfate or ferrous gluconate at the same time. Clonidine is known to potentiate the CNS-depressive impact of alcohol and other sedating drugs. Further, its hypotensive effects can be reduced by tricyclic antidepressant agents. Lastly, clonidine carries the potential for additive cardiac effects including AV block and bradycardia. As a result, caution is warranted if used concomitantly with drugs known to impact sinus node function (DiPiro et al., 2019).

Nursing Consideration: Because of the reduction in the bioavailability of methyldopa, nurses must educate those receiving methyldopa to avoid using ferrous sulfate or ferrous gluconate. Since methyldopa is frequently used in pregnant women, who are also at a higher risk of anemia, this drug combination may be seen more frequently in this population. Patients should be counseled to separate iron products from methyldopa by at least 2 hours, and blood pressure should be carefully monitored to ensure effectiveness of methyldopa (DiPiro et al., 2019).

RENIN INHIBITORS

Renin inhibitors offer a novel approach to treating hypertension and were first approved in the United States in 2007. They work by directly inhibiting renin, the initial and rate-limiting step in the renin-angiotensin system, reducing the creation of the vasodilator angiotensin II. As a result, blood vessels relax and dilate, reducing blood pressure. Renin inhibitors offer a more complete blockade of this system than any other known modality, possibly offering greater protection from hypertensive complications with a relatively benign side effect profile. It is important to note that renin inhibitors, ARB, and ACE inhibitors all target different points of the same metabolic process, so they should not be administered together (Mann & Hilgers, 2021b). Currently, only one renin inhibitor, aliskiren (Tekturna), has received FDA authorization for marketing in the United States. It is available as 150 and 300 mg tablets (GlobalRPh, 2017d).

Adverse events associated with aliskiren

Side effects commonly observed with aliskiren include hypotension, dizziness, diarrhea, and cough. Rarely, but more seriously, allergic reactions have occurred leading to hives, difficulty breathing, and swelling of the face, lips, tongue and/or throat (Novartis, 2017).

Nursing Consideration: All healthcare professionals caring for patients receiving aliskiren should be aware of the potential allergic reactions associated with its use. Nurses should advise their patients to be vigilant in monitoring for these potentially serious adverse events, with instructions to immediately contact their prescriber or call 911, as appropriate, should they occur.

Although there is no clinical experience with aliskiren in pregnant women, it is known that agents acting on the renin-angiotensin system can lead to fetal morbidity and mortality. If a woman taking aliskiren becomes pregnant, the drug should be discontinued as soon as possible (Mann & Hilgers, 2021b). Furthermore, it is not known if aliskiren is partitioned into human breast milk. Since the potential for adverse effects on a nursing infant is not known, prescribing this agent in nursing mothers is not recommended (Novartis, 2017).

Aliskiren depends on the CYP3A isoenzyme system for metabolism. Further, aliskiren employs the p-glycoprotein efflux system. These two properties, then, subject aliskiren to several drug-drug interactions with concomitant medications. Interactions with ketoconazole, cyclosporin, verapamil, and atorvastatin all result in clinically significant increases in patient exposure to aliskiren, potentially resulting in excessive hypotensive effects. Although aliskiren does not modulate major CYP isoenzymes, a clinically significant drug-drug interaction was demonstrated with furosemide (furosemide levels decreased by 30 to 50 percent) (Novartis, 2017).

Evidence-based practice alert! McMurray et al. (2016) accomplished a clinical evaluation in patients with heart failure and a reduced ejection fraction (ATMOSPHERE). A total of 2,236 patients were assigned to receive enalapril, alone, 5-10 mg, once daily; 2,340 received aliskirin 300 mg once daily; and 2,340 received combination therapy (both medications). On average, treatment persisted for 36.6 months. The primary outcome of interest in the study was death because of a cardiovascular event or hospitalization for heart failure. The primary outcome occurred in 770, 791, and 808 patients in the combination, aliskirin, and enalapril groups, respectively. These observed differences were not statistically significant. Nonetheless, higher frequencies of hypotension and elevated creatine and potassium levels were observed in the combination group. Investigators concluded that the addition of aliskirin to ACE inhibition therapy in heart failure patients with reduced ejection fraction led to an increased rate of adverse events without providing significant increases in efficacy (McMurray et al., 2016).

DIRECT VASODILATORS

Vasodilators have a role in many clinical conditions, including hypertension, heart failure, and preeclampsia. They work by dilating blood vessels, increasing blood flow to the organs, and decreasing the workload on the heart (DiPiro et al., 2017). There are two vasodilators used in the treatment of hypertension that are typically reserved for resistant hypertension or pregnant patients (Whelton et al., 2017). These include the following (GlobalRPh, 2017d):

- Hydralazine (Apresoline): available in 10, 25, 50 and 100 mg oral tablets, as well as a solution for injection 20mg/mL.
- Minoxidil (Loniten): available in 2.5, 5, and 10 mg tablets.

Hydralazine and minoxidil are both associated with sodium and water retention, as well as reflex tachycardia. It is recommended that they be added to treatment with a diuretic and beta blocker to minimize these effects (Whelton et al, 2017).

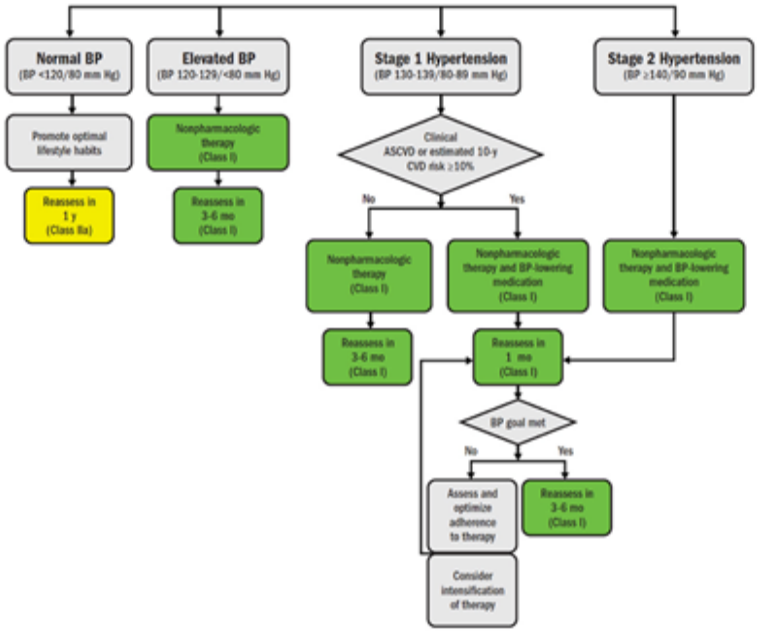
Hydralazine is frequently used in the treatment of resistant hypertension, preeclampsia, and hypertensive emergencies (Whelton et al., 2017). Its safety and efficacy in pregnant patients are well established, and it is considered compatible with breastfeeding (SPS, 2020b). Hydralazine is associated with drug-induced lupus-like syndrome at higher doses and can also cause headache and compensatory tachycardia. The use of minoxidil is uncommon. It can induce pericardial effusion and is associated with hirsutism (Whelton et al., 2017).

CHOOSING AN INITIAL HYPERTENSION TREATMENT AGENT

In addition to lifestyle modification, medications are a cornerstone of treatment in patients with high blood pressure. The overall treatment goal should be managing the patient's overall health, with an emphasis on reducing the risk of cardiovascular events. Initial therapy should consist of one of the four first-line medication classes: thiazide diuretics, calcium channel blockers, ACE inhibitors, or ARBs. When choosing an initial antihypertensive agent for newly diagnosed patients, consideration should be given to the patient's comorbid conditions that may benefit from antihypertensive agents, such as heart failure or chronic kidney disease (Whelton et al., 2017).

Patients who have stage 2 hypertension and an average blood pressure 20/10 mmHg above their blood pressure target should initiate drug therapy with two first-line agents from different medication classes. In stage 1 hypertension patients, it is reasonable to initiate a single agent, with the plan to titrate the dose and/or add other agents as needed to achieve their blood pressure goals. The most current ACC treatment and follow-up guidelines are shown in Figure 1 (Whelton et al., 2017).

Figure 1. Hypertensive Treatment and Follow-up, as Described in the 2017 ACC Treatment Guidelines



American College of Cardiology. (2017). The 2017 High Blood Pressure Guideline: Risk Reduction Through Better Management. Retrieved from http://www.acc.org/latest-in-cardiology/articles/2017/11/14/14/42/the-2017-high-blood-pressure-guideline-risk-reduction-through-better-management

Evidence-based practice alert! MThe Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) was a large, randomized trial designed to characterize the impact first-line drugs have on preventing fatal coronary heart disease (CHD) or myocardial infarction (MI) in high-risk hypertensive patients. Sponsored by the National Heart, Lung and Blood Institute (NHLBI), the study enrolled 9,000 to 15,000 subjects per treatment cohort, with a follow-up period of 4 to 8 years. Subjects were randomized to receive antihypertensive treatment with a calcium channel blocker (amlodipine), an ACE inhibitor (lisinopril), an alpha-blocker (doxazosin), or a diuretic (chlorthalidone) (Furburg et al., 2002). Interim analysis demonstrated that treatment with chlorthalidone was significantly superior to doxazosin. As a result, the doxazosin treatment cohort was terminated early (Davis et al. 2002).

Excluding patients randomized to receive doxazosin, the study enrolled 33,357 hypertensive patients 55 and older with at least one other risk factor for CHD. A total of 15,255 patients were randomized to receive chlorthalidone 12.5-25 mg/day; 9,048 patients were assigned to the amlodipine 2.5-10 mg/day group; and 9,054 patients were administered lisinopril 10-40 mg/day. The primary outcome of interest was fatal CHD or non-fatal MI. Outcomes of secondary interest included stroke, all-cause mortality, non-fatal CHD, and a variety of events related to cardiovascular disease. On average, patients were followed for 4.9 years, with primary outcomes occurring in 2,956 patients with no significant differences recorded between treatment groups. The 6-year risk rate was 11.5%, 11.3%, and 11.4%, for chlorthalidone, amlodipine, and lisinopril, respectively. Similarly, there was no difference in all-cause mortality across treatment groups. Regarding secondary outcomes, results were similar with the exception of heart failure. For this outcome, the 6-year risk rates of occurrence for the amlodipine and chlorthalidone were 10.2% and 7.7%, respectively. Examination of 6-year risks for combined cardiovascular disease, stroke, and heart failure also showed significant advantage to chlorthalidone compared to lisinopril. ALLHAT investigators concluded that thiazide diuretics are superior to ACE inhibitors, calcium channel blockers, and alpha blockers. Further, they are generally less expensive and, thus, should receive preference as the first-step agent for antihypertensive therapy (Furburg et al., 2002).

Case study #1, continued

After reviewing lifestyle modifications with Marlene, her provider decides to prescribe an antihypertensive agent to help lower her blood pressure to the goal of less than 130/80 mmHg. Her provider reviews her chart and notes that her chronic kidney disease is stable, and her diabetes is relatively well-controlled.

Self-Assessment Quiz Question #6

Which of the following medications would be most appropriate to initiate to treat Marlene's high blood pressure at this time?

a. Furosemide.
b. Lisinopril.
c. Hydralazine.
d. Amlodipine.

Case study #1, continued

Marlene calls her provider's office 3 weeks after her checkup appointment. She thought she had a cold and wasn't sure if she needed to be seen. She has a bad dry cough for the past 2 weeks and isn't sure what she should take to treat it now that she has high blood pressure. She says many of the over-the-counter cold medications at the pharmacy state not to take them if you have high blood pressure.

Self-Assessment Quiz Question #7

Which of the following would be an appropriate next step to take based on Marlene's recent development?

a. Tell her to take over the counter dextromethorphan for the cough.
b. Discontinue her lisinopril and switch her to losartan.
c. Tell her the cough is likely residual from a cold and will resolve within the next couple of weeks.
d. Discontinue her lisinopril and switch her to furosemide.

COMBINATION THERAPY

Most patients will require more than one medication in order to obtain their blood pressure targets. When creating a multidrug regimen, knowledge of the pharmacological mechanisms of each agent is important. Medications with complimentary activity, where a second agent is added to block compensatory responses of the initial agent or act on a different mechanism of antihypertension, can result in additive blood pressure lowering. For example, thiazide diuretics can stimulate the renin-angiotensin-aldosterone system. Adding an ACE inhibitor or ARB to thiazide therapy can create an additive blood pressure lowering effect (Whelton et al, 2017).

Combinations of medications that have similar mechanisms of action or clinical effects should be avoided. Two medications from the same class should not be given together, and two medications from classes that target the same blood pressure control system, such as ACE inhibitors and ARBs, are less effective and potentially harmful. Exceptions to this rule include the use of diuretics from differing classes, or the use of dihydropyridine and non-dihydropyridine calcium channel blockers (Whelton et al., 2017).

There is some evidence that utilizing a fixed dose combination drug product to treat hypertension confers certain advantages, to include enhanced efficacy, improved patient compliance, cost, convenience, safety, and even patient perceptions of wellness (Whelton et al., 2017).

Evidence-based practice alert! A 2018 population-based study conducted in Canada aimed to assess the difference in clinical outcomes between combination therapy with multiple pills or a single-pill, fixed-dose combination. A retrospective cohort of 13,350 patients over the age of 65 was evaluated with up to 5 years of follow up. Individuals who were newly initiated on an ACE inhibitor or ARB with a thiazide diuretic were included. The primary outcome was a composite of hospitalization or death from acute myocardial infarction, heart failure, or stroke. Researchers found that there was a significantly lower risk of composite clinical outcomes in patients taking fixed dose combination therapy, which may be associated with improved medication adherence (Verma et al., 2018).

Case study #1, continued

At Marlene's next checkup appointment 6 months later, the medical assistant checks her blood pressure and notes it is elevated, with a reading of 146/83 mmHg. Upon further discussion, Marlene states that she has checked it a few times at the pharmacy while waiting for her prescriptions and presents a record card with several recorded several systolic blood pressure values in the high 130s and low 140s. Marlene's provider determines that her blood pressure is not yet controlled with one medication and is considering adding an additional agent. Her provider also notes mild edema around Marlene's ankles.

Self-Assessment Quiz Question #8

Which of the following medications would be most appropriate to add on to Marlene's high blood pressure treatment regimen?

a. Valsartan.
b. Metoprolol.
c. Chlorthalidone.
d. Amlodipine.

RESISTANT HYPERTENSION

Resistant hypertension is diagnosed when a patient does not achieve blood pressure control despite taking 3 antihypertensive medications. Approximately 13% of American adults are diagnosed with resistant hypertension, which can be difficult to control and can significantly increase the risk of poor cardiovascular outcomes, including myocardial infarction, stroke, end-stage kidney disease, and death. The development of resistant hypertension is more common in patients who are obese, elderly, or Black, as well as those with chronic kidney disease and diabetes (Whelton et al., 2017).

When evaluating patients who may have resistant hypertension, it is important to consider the potential for pseudoresistant hypertension. This occurs when blood pressure levels appear to be uncontrolled when they actually may be falsely elevated. Common causes of pseudoresistant hypertension include poor technique in measuring blood pressure, white coat syndrome, or medication noncompliance. Up to 50% of patients with resistant hypertension are experiencing pseudoresistance, so it is critical to evaluate potential cases of resistant hypertension carefully (Bhatt et al., 2016; Whelton et al., 2017).

The treatment of resistant hypertension is multifactorial. Medication adherence should be evaluated and improved and contributing lifestyle factors should be reevaluated and addressed. Weight loss and the importance of physical exercise should be reiterated, excessive alcohol consumption should be reduced, and a low salt, high fiber diet should be encouraged. Other medications or substances that can contribute to increased blood pressure or interact with blood pressure medications should be discontinued or minimized, including stimulants, licorice, NSAIDs, and oral contraceptives (Whelton et al., 2017).

Pharmacologic treatment of resistant hypertension involves ensuring the treatment regimen combines medications that work in different but complimentary ways and preventing adverse effects from occurring. A highly recommended regimen of complimentary medications consists of a calcium channel blocker, chlorthalidone, and an ACE inhibitor or ARB. To build on this regimen, prescribers should ensure the patient's diuretic is at the maximum effective dose and, if another agent is necessary, they should consider the addition of spironolactone to provide substantial blood pressure reduction. Studies also support the addition of hydralazine to resistant hypertension regimens

because of its effectiveness in controlling blood pressure in resistant hypertension patients. Patients receiving hydralazine or minoxidil should ensure they have a loop diuretic on board to combat fluid retention and reflex tachycardia. Patients whose blood pressure remains uncontrolled after 6 months of therapy or who may have secondary hypertension should be referred to a specialist (Whelton et al., 2017).

Self-Assessment Quiz Question #9

Which of the following medications is recommended for add-on therapy in cases of resistant hypertension in a non-pregnant patient, after maximizing the recommended three-drug regimen of a calcium channel blocker, chlorthalidone, and an ACE inhibitor or ARB?

a. Methyldopa.
b. Hydrochlorothiazide.
c. Aliskiren.
d. Spironolactone.

TREATMENT CONSIDERATIONS

Patients should be strongly encouraged to make lifestyle modifications, including dietary adjustments, weight loss, and increased exercise. These lifestyle changes can be effective in preventing hypertension and are also useful as first line and adjunctive hypertension therapy. However, implementing lifestyle modifications can be difficult because of lack of social support, decreased access to healthy foods, fewer opportunities for exercise, and cost burdens. Lower socioeconomic status may make it difficult to access basic living needs, including medications and healthcare. In addition, clinicians must consider differences in values, personal beliefs, learning styles, and culture when developing treatment plans (Whelton et al., 2017).

Prevalence of blood pressure control is higher in non-Hispanic White patients than non-White patients, likely because of a wide range of factors. Accordingly, Black and Hispanic patients have higher morbidity and mortality related to uncontrolled hypertension than White patients. When it comes to medication selection, guidelines recommend that Black patients experience more effective blood pressure lowering when given thiazide diuretics or calcium channel blockers as first-line therapy. The thiazide diuretic chlorthalidone is an optimal starting drug in this population because it has shown more robust effectiveness in preventing heart failure in Black patients. In addition, Black patients experience reduced effectiveness of ACE inhibitors when compared to calcium channel blockers in preventing heart failure. Angioedema caused by ACE inhibitors occurs with a higher frequency in Black patients, and ACE inhibitor-induced cough occurs with a higher frequency in Asian Americans. Despite these considerations, ACE inhibitors can still offer significant benefits to patients of all ethnicities who have hypertension in conjunction with diabetes or nephropathy, so considerations should be made on a patient-specific basis (Whelton et al., 2017).

Combination products that contain two medications in a single tablet are an effective tool for achieving blood pressure control in certain situations, as these products help to decrease pill burden and reduce costs. Racial and ethnic factors should be considered when choosing medication therapy but should not be used as a sole reason to exclude any class of medications in combination therapy (Whelton et al, 2017).

AGE-RELATED CONSIDERATIONS

Hypertension is particularly common in older adults and is a common, preventable cause of premature disability, morbidity, and mortality. Systolic and diastolic blood pressures increase slowly from birth until around age 60, at which point the diastolic blood pressure slowly decreases while systolic blood pressure continues to rise. Hypertension that only affects systolic blood pressure, known as isolated systolic hypertension, is a common form of hypertension in older adults. Reducing blood pressure remains important in isolated systolic hypertension; studies have shown that these patients can experience a reduced risk of stroke, cardiovascular events, and death when treated appropriately (Whelton et al., 2017).

The intensity of blood pressure management in older adults can be difficult to determine because of the significant relationship between reductions in blood pressure and the risk of falls. In addition, comorbidities, polypharmacy, frailty, cognitive impairment, and variable life expectancy can complicate treatment decisions further. Regardless, lowering blood pressure has been shown to reduce mortality risk even in frail, older adults, and should be implemented as tolerated, on a patient-specific basis. Patients over the age of 65 who are not institutionalized should be treated to a goal systolic blood pressure of less than 130 mmHg. Those with a high burden of comorbidities and limited life expectancy should be treated on a patient-specific basis using a team-based approach to assess the risks and benefits regarding the intensity of blood pressure lowering and medication choices (Whelton et al., 2017).

Lifestyle modifications remain important in the older population. Dietary sodium restriction is particularly important because the beneficial effects of sodium restriction on blood pressure increase with age. Dietary sodium intake of 2300 to 2800 mg/day is recommended for older adults. Sodium restriction can be more difficult for older adults to comply with, since they may utilize more salt to compensate for decreased taste sensitivity and may depend more on processed, prepared foods that are high in sodium rather than fresh foods (Egan, 2021).

Several studies have shown a clear benefit of treating hypertension in older adult patients, including those over 80 years of age. When initiating antihypertensive therapy in older adults, lower initial doses should be used to minimize side effects. Blood pressure should be lowered slowly in older adults to minimize the risk of ischemic symptoms and orthostatic hypotension, with plans to meet blood pressure goals over the course of 2 to 4 months, or even longer in very old patients. Up to 20% of older adults experience orthostatic hypotension, and antihypertensive treatment is associated with an increased risk of hip fracture within the first 1 to 2 months of therapy. Before the initiation of therapy, supine and standing pressures should be measured to assess for pre-existing orthostatic hypotension (Egan, 2021).

When choosing an agent for older adults, comorbidities must be considered. Older adults frequently have a number of comorbidities that could benefit from specific antihypertensive classes. ACE inhibitors or ARBs, calcium channel blockers, and thiazide diuretics are considered to be first-line therapy in older adults. ACE inhibitors or ARBs should be considered in patients with heart failure, prior myocardial infarction, and chronic kidney disease with proteinuria. Calcium channel blockers, particularly long-acting dihydropyridines, have proven safety and efficacy in older adults with isolated systolic hypertension. Low to moderate doses of thiazide diuretics, particularly chlorthalidone, are also beneficial in older adults. Beta blockers should be avoided because of their lack of benefit in preventing stroke, though they are mainstays of the treatment of heart failure and myocardial infarction, so their use may already be necessary (Egan, 2021).

GESTATIONAL HYPERTENSION

During pregnancy, blood pressures typically decline during the first trimester and slowly rise over the remainder of the pregnancy. The development of hypertension during pregnancy is a risk factor for the development of future hypertension and cardiovascular disease. Blood pressure management during pregnancy is complicated by the fact that many antihypertensives are contraindicated for use during pregnancy. These include ACE inhibitors, ARBs, and direct renin inhibitors. The goal of blood pressure management in pregnant women is preventing the development of severe hypertension and its potential adverse outcomes, as well as ensuring gestation can be long enough to allow the fetus to mature before delivery (Whelton et al., 2017).

Gestational hypertension is diagnosed in pregnant women who develop high blood pressure after 20 weeks of gestation and do not meet other criteria for preeclampsia (Leeman et al., 2016). Patients with mild to moderate hypertension during pregnancy or those with a systolic blood pressure of 140-169 or diastolic blood pressure of 90-109 mmHg are recommended to receive antihypertensive treatment. Medication treatment can decrease the risk of developing severe hypertension by 50% compared to placebo. However, efficacy has not been proven in the prevention of preterm birth, preeclampsia, low birth weight, or infant mortality, and more stringent blood pressure goals of less than 130/80 mmHg did not improve these outcomes (Whelton et al., 2017).

Hypertensive pregnant women without severe symptoms can have their blood pressure managed with several oral medications that are relatively safe and used frequently in pregnancy. These include labetalol, nifedipine, methyldopa, and hydralazine. Studies have not shown sufficient evidence in favor of a specific agent. The choice of medication is dependent on the patient's blood pressure, pre-existing conditions, side effect profile, medication availability, and clinician experience. Careful monitoring of blood pressure and fetal health is recommended for all hypertensive pregnant women to prevent progression to more severe conditions (Leeman et al., 2016; Whelton et al., 2017).

PREECLAMPSIA

Gestational hypertension can be a preliminary diagnosis for women who ultimately develop preeclampsia, or high blood pressure with signs of damage to another organ system, such as proteinuria or thrombocytopenia. Patients with preeclampsia can develop severe symptoms of maternal organ damage, including high blood pressure over 160/110 mmHg, low platelet count, high liver transaminase levels, increased serum creatinine, severe right upper quadrant pain, pulmonary edema, or new onset visual or cerebral disturbances. Preeclampsia can progress to eclamptic seizures, a life-threatening emergency (Leeman et al., 2016). Preeclampsia occurs in approximately 3.8% of pregnancies, and preeclampsia and eclampsia are responsible for 9% of maternal deaths in the United States (Whelton et al., 2017).

Management of gestational hypertension and preeclampsia are similar, with frequent blood pressure and fetal monitoring as well as labor induction at 37 weeks of gestation. Patients who develop severe features require immediate inpatient stabilization. Intravenous magnesium sulfate is used to prevent eclamptic seizures and placental abruption in women with severe features. An initial loading dose of 4 to 6 grams/100 mL is recommended to be given over 15 to 20 minutes, followed by a continuous infusion of 2 grams per hour. Patients receiving magnesium sulfate should have magnesium levels monitored, as well as reflexes, mental status, respiratory status, and urine output (Leeman et al., 2016).

The goal blood pressure of women with severe preeclampsia is unknown, but it is commonly recommended to ensure systolic blood pressure remains below 160 mmHg and diastolic blood pressure less than 110 mmHg to reduce the risk of stroke. If intravenous agents are required, labetalol and hydralazine are commonly used and equally effective. Hydralazine is a vasodilator that is typically reserved for add-on therapy in cases of severe hypertension. It can be given in bolus doses of 5 to 10 mg over 2 minutes, or as a continuous infusion at a rate of 0.5 to 10 mg per hour. Labetalol, a beta blocker, is initiated at 20 mg given intravenously and can be doubled at 10-minute intervals up to 80 mg until the target blood pressure has been reached, or a maximum of 220 to 300 mg has been met within 24 hours. Oral nifedipine is also commonly used in the acute setting, particularly when IV access has not been achieved, and 10 to 20 mg can be given every 4 to 6 hours as needed (Leeman et al., 2016).

Low dose aspirin has shown some benefit in the prevention of preeclampsia, particularly in women who are already at the highest risk of developing preeclampsia, such as those with a prior history. The American College of Obstetricians and Gynecologists recommends starting low dose aspirin 81 mg daily late in the first trimester in women with a previous preeclampsia history. The US Preventative Services Task Force expands this recommendation to include women with chronic hypertension, diabetes, renal disease, autoimmune disease, multifetal pregnancies, or those with several moderate risk factors (Leeman et al., 2016).

Self-Assessment Quiz Question #10

Which of the following medications has shown some benefit in the prevention of preeclampsia?

a. Low dose aspirin.
b. Labetalol.
c. Hydralazine.
d. Methyldopa.

HYPERTENSIVE EMERGENCY

A hypertensive emergency is an acute, significant rise in blood pressure that is accompanied by signs of organ damage. Specific organ damage may include neurologic deficits, encephalopathy, left ventricular failure, pulmonary edema, myocardial ischemia, aortic dissection, and acute renal failure. Damage to organs can progress rapidly and can lead to death. It is critical to note that while some patients suffering from stroke or intracranial hemorrhage present with elevated blood pressure, these increases are often a consequence of the condition rather than a cause (Bakris, 2021).

Possible signs and symptoms of hypertensive emergencies can affect many organ systems. Central nervous system (CNS) symptoms include rapidly changing neurologic abnormalities, such as confusion, blindness, and seizures. Cardiovascular symptoms include chest pain and dyspnea. Renal damage can be asymptomatic or can include signs of severe azotemia, such as lethargy or nausea. Hypertensive emergencies are diagnosed when target organ damage is identified, often through an electrocardiogram, urinalysis, blood urea nitrogen, creatinine, or head CT (Bakris, 2021).

Ideally, hypertensive emergencies are treated in an intensive care setting. Blood pressure should be progressively reduced because abrupt lowering of blood pressure may be detrimental. Typical agents for blood pressure reduction vary, depending on the target organ for treatment. Goals for blood pressure reduction are generally on the order of 20-25% per hour, with titration based on symptoms. The medication chosen should be a short-acting, intravenous drug that can be easily titrated; oral

medications are not recommended for hypertensive emergency management because of their variable onset and difficult titration (Bakris, 2021). Typical first-line drugs are listed below (Globalrph, 2017a):

- Sodium nitroprusside (Nipride) – Nipride, available as a solution for IV of 25 mg/mL, is the most effective parenteral agent for the majority of hypertensive emergencies. It is extremely fast acting (within seconds) and lasts for only 2 to 3 minutes, making it an ideal candidate for titration. The typical dose is 3 µg/kg/minute, and the maximum dose is 10 µg/kg/minute. A downside of Nipride is its associated risk of cyanide and thiocyanate toxicity, especially in renally impaired patients or after prolonged treatment.
- Fenoldopam mesylate (Corlopam) – Corlopam, available as a solution for IV of 10 mg/mL, is a vasodilator that is as effective as nitroprusside, with the additional advantage that it also increases renal blood flow six times as potently as dopamine and is not associated with the accumulation of toxic metabolites. While Corlopam can be used in all hypertensive emergencies, it is of particular benefit in patients suffering from renal insufficiency. Its onset of action is 5-10 minutes, and its duration is approximately 1 hour. A typical starting dose is 0.1 to 0.3 µg/kg/minute, with a maximum dose of 1.6 µg/kg/minute.
- Labetalol (Trandate) – Trandate, available as a solution for IV of 5 mg/mL, is the only beta blocker useful in treating hypertensive emergencies. It does not increase heart rate, so it is also safe to use in patients with active coronary disease. Trandate should typically be avoided in patients with asthma, COPD, CHF, bradycardia, or heart block. Its onset of action is 5-10 minutes, with a duration of 2to 6 hours, and peak effects in about 30 minutes. The initial infusion rate is 0.5 – 2 mg/min.

Conclusion

According to current guidelines, whenever sustained blood pressures exceed 120/80 mmHg, an awareness of blood pressure is warranted, and lifestyle changes are required to prevent becoming hypertensive. When blood pressures exceed 129/80 mmHg, patients are diagnosed with stage 1 hypertension. In these patients, clinicians should act to lower their blood pressure to a safer level. Depending on other risk factors and the patient's lifestyle, this may include the use of medications. Although nearly half of American adults are hypertensive, only 24% are managing their hypertension appropriately. Although positive lifestyle changes should be the cornerstone of all hypertension treatment regimens, many patients will eventually require medication therapy. All patients and medications must be considered individually in order to make optimal treatment choices. Prescribers should also consider the results of large outcome-based clinical investigations. It appears that there is relative parity between some medication classes' ability to manage blood pressure and their impact on meaningful outcomes. Although both alpha blockers and beta blockers are effective at lowering blood pressure, there is a lack of long-term outcome data to support the use of these medications as first-line therapy. Each patient must be considered individually to make optimum medication choices in order to reduce the risk of cardiovascular events.

References

- Agarwal, R. (2021). *Thiazides versus loop diuretics in the treatment of hypertension*. https://www.uptodate.com/contents/thiazides-versus-loop-diuretics-in-the-treatment-of-hypertension
- Alscher, M.D. (2021). Diuretics as a problem – pharmacokinetics and dynamics, use in edema or hypertension. *Internist, 62*, 215-220. https://doi.org/10.1007/s00108-021-00945-x
- Bakris, G.L. (2021). Merck Manual. *Hypertensive Emergencies*.
- www.merckmanuals.com/professional/cardiovascular-disorders/hypertension/hypertensive-emergencies
- Bavishi, C., Goel, S., & Messerli, F. H. (2016). Isolated systolic hypertension: An update after SPRINT. *The American Journal of Medicine, 129*(12), 1251–1258. https://doi.org/10.1016/j.amjmed.2016.08.032
- Bhatt, H., Siddiqui, M., Judd, E., Oparil, S., & Calhoun, D. (2016). Prevalence of pseudoresistant hypertension due to inaccurate blood pressure measurement. *Journal of the American Society of Hypertension: JASH*, 10(6), 493–499. https://doi.org/10.1016/j.jash.2016.03.186
- Bloch, M.J. & Basile, J. (2021). *Major side effects and safety of calcium channel blockers*. https://www.uptodate.com/contents/major-side-effects-and-safety-of-calcium-channel-blockers
- Brater, D.C. & Ellison, D.H. (2021). *Loop diuretics: Dosing and major side effects*. https://www.uptodate.com/contents/loop-diuretics-dosing-and-major-side-effects
- Brown, K. A., Samuel, S., & Patel, D. R. (2018). Pharmacologic management of attention deficit hyperactivity disorder in children and adolescents: A review for practitioners. *Translational Pediatrics, 7*(1), 36–47. https://doi.org/10.21037/tp.2017.08.02
- Brown, M.J., Palmer, C.R., Castaigne, A., deLeeuw, P.W., Mancia, G., Rosenthal, T., & Ruilope, L.M. (2000). Morbidity and mortality in patients randomised to double-blind treatment with a long-acting calcium-channel blocker or diuretic in the International Nifedipine GITS study. Intervention as a goal in hypertension treatment. *Lancet. 356*, 366–72
- Centers for Disease Control and Prevention (CDC). (2021a). *About high blood pressure*. https://www.cdc.gov/bloodpressure/about.htm
- Charles, L., Triscott, J., & Dobbs, B. (2017). Secondary hypertension: Discovering the underlying cause. *American Family Physician, 96*(7), 453–461.
- Cohen, J. B., Lotito, M. J., Trivedi, U. K., Denker, M. G., Cohen, D. L., & Townsend, R. R. (2019). Cardiovascular events and mortality in white coat hypertension: A systematic review and meta-analysis. *Annals of Internal Medicine, 170*(12), 853–862. https://doi.org/10.7326/M19-0223
- Davis, B.R., Cutler, J.A., Furberg, C.D., Wright, J.T., Farber, M.A., & Stokes, J.D. (2002). Relationship of antihypertensive treatment regimens and change in blood pressure to risk for heart failure in hypertensive patients randomly assigned to doxazosin or chlorthalidone: Further analyses from the Antihypertensive and Lipid-lowering treatment to prevent Heart Attack Trial. *Annals of Internal Medicine. 137*313-320.
- Delong, C. & Sharma, S. (2021). Physiology, Peripheral Vascular Resistance. *StatPearls*. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK538308/
- Dineva, S., Uzunova, K., Pavlova, V., Filipova, E., Kalinov, K., & Vekov, T. (2021). Network meta-analysis of efficacy and safety of chlorthalidone and hydrochlorothiazide in hypertensive patients. *Blood pressure monitoring, 26*(2), 160–168. https://doi.org/10.1097/MBP.0000000000000486
- DiPiro, J., Yee, G., Posey, L. M., Haines, S. T., Nolin, T. D., & Ellingrod, V. (2019). *Pharmacotherapy: A pathophysiologic approach* (8th ed.) McGraw-Hill.
- Duan, L., Ng, A., Chen, W., Spencer, H.T., Nguyen, J., Shen, A.Y.J., & Lee, M.S. (2017). ?-Blocker exposure in pregnancy and risk of fetal cardiac anomalies. *JAMA Intern Med. 177*(6):885–887. https://doi.org/10.1001/jamainternmed.2017.0608
- Egan, B.M. (2021). *Treatment of hypertension in older adults, particularly isolated systolic hypertension*. https://www.uptodate.com/contents/treatment-of-hypertension-in-older-adults-particularly-isolated-systolic-hypertension
- Ehret, G. (2021). *Genetic factors in the pathogenesis of hypertension*. https://www.uptodate.com/contents/genetic-factors-in-the-pathogenesis-of-hypertension
- Firth, J., Conlon, C., & Cox, T. (2020). *Oxford Textbook of Medicine*. Oxford University Press. https://oxfordmedicine.com/view/10.1093/med/9780198746690.001.0001/med-9780198746690
- Furburg, C.D., Wright, J.T., Davis, B.R., Cutler, J.A., Alderman, M., Black, H., . . . Pelosi, J. (2002). Major outcomes in high-risk hypertensive patients randomized to angiotensin-converting enzyme inhibitor or calcium channel blocker vs diuretic. *JAMA, 288*,2981-2997. https://doi.org/10.1001/jama.288.23.2981
- GlobalRPh. (2017a). *Alpha-1 adrenergic blockers*. https://globalrph.com/drugs/alpha-blockers/
- GlobalRPh. (2017b). *Angiotensin converting enzyme (ACE) inhibitors*. www.globalrph.com/ace.htm
- GlobalRPh. (2017c). *Angiotensin II inhibitors*. https://globalrph.com/drugs/angiotensin-ii-inhibitors/
- GlobalRPh. (2017d). *Anti-hypertensive (other)*. https://globalrph.com/drugs/anti-hypertensive-other
- GlobalRPh. (2017e). *Beta blockers*. https://globalrph.com/drugs/beta-blockers/
- GlobalRPh. (2017f). *Calcium channel blockers*. https://globalrph.com/drugs/calcium-channel-blockers/
- GlobalRPh. (2017g). *Diuretics*. https://globalrph.com/drugs/diuretics/
- Globalrph. (2017h). *Hypertensive emergency – IV agents*. https://globalrph.com/drugs/hypertensive-emergency-iv/
- Herman, L.L., Padala, S.A., Ahmed, I., & Bashir, K. (2021). Angiotensin converting enzyme inhibitors (ACEI). *StatPearls*. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK431051/
- Hill, R.D. & Vaidya, P.N. (2021). Angiotensin II Receptor Blockers (ARB). *StatPearls*. https://www.ncbi.nlm.nih.gov/books/NBK537027/
- Hiremath, S., Ruzicka, M., Petrcich, W., McCallum, M. K., Hundemer, G. L., Tanuseputro, P., Manuel, D., Burns, K., Edwards, C., Bugeja, A., Magner, P., McCormick, B., Garg, A. X., Rhodes, E., & Sood, M. M. (2019). Alpha-blocker use and the risk of hypotension and hypotension-related clinical events in women of advanced age. *Hypertension, 74*(3), 645–651. https://doi.org/10.1161/HYPERTENSIONAHA.119.13289
- King, J. & Lowery, D.R. (2021). Physiology, Cardiac Output. *StatPearls*. StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK470455/
- Kinra, S., Gregson, J., Prabhakaran, P., Gupta, V., Walia, G. K., Bhogadi, S., Gupta, R., Aggarwal, A., Mallinson, P., Kulkarni, B., Prabhakaran, D., Davey Smith, G., Radha Krishna, K. V., Ebrahim, S., Kuper, H., & Ben-Shlomo, Y. (2020). Effect of supplemental nutrition in pregnancy on offspring's risk of cardiovascular disease in young adulthood: Long-term follow-up of a cluster trial from India. *PloS Medicine, 17*(7), e1003183. https://doi.org/10.1371/journal.pmed.1003183
- Konukoglu, D. & Uzun, H. (2017). Endothelial dysfunction and hypertension. *Advances in Experimental Medicine and Biology, 956*, 511–540. https://doi.org/10.1007/5584_2016_90
- Leeman, L., Dresang, L. T., & Fontaine, P. (2016). Hypertensive disorders of pregnancy. *American Family Physician, 93*(2), 121–127.
- Ma, B., Prueksaritanont, T., & Lin, J.H. (2000). Drug interactions with calcium channel blockers: Possible involvement of metabolite-intermediate complexation with CYP3A. *Drug Met Dis. 28*, 125-130.
- Malha, L. & August, P. (2019). Safety of antihypertensive medications in pregnancy: Living with uncertainty. *Journal of the American Heart Association, 8*, e013495. https://doi.org/10.1161/JAHA.119.013495
- Mann, J.F.E. & Hilgers, K.F. (2021a). *Use of thiazide diuretics in patients with primary (essential) hypertension*. https://www.uptodate.com/contents/use-of-thiazide-diuretics-in-patients-with-primary-essential-hypertension
- Mann, J.F.E. Hilgers, K.F. (2021b). *Renin-angiotensin system inhibition in the treatment of hypertension*. https://www.uptodate.com/contents/renin-angiotensin-system-inhibition-in-the-treatment-of-hypertension
- McMurray, J.J.V., Krum, H., Abraham, W.T., Dickstein, K., Køber, L., Desai, A., . . . Massie, B. (2016). Aliskiren, enalapril, or aliskiren and enalapril in heart failure. *New England Journal of Medicine, 374,* 1521-1532.
- Moretti, M.E., Caprara, D., Drehuta, I., Yeung, E., Cheung, S., Federico, L., & Koren, G. (2012). *The fetal safety of angiotensin converting enzyme inhibitors and angiotensin ii receptor blockers*. www.hindawi.com/journals/ogi/2012/658310/
- MotherToBaby.org. (2019). *Beta blockers*. https://mothertobaby.org/fact-sheets/beta-blockers/
- National Heart, Lung and Blood Institute (NHLBI). (2020). *Description of high blood pressure*.
- www.nhlbi.nih.gov/health/health-topics/topics/hbp
-
- Novartis. (2017). *Package insert for Tekturna*.
- https://www.accessdata.fda.gov/drugsatfda_docs/label/2017/210709s000lbl.pdf
- Sacks, F.M., Svekey, L.P., Vollmer, W.M., . . . Lin, P.H. (2001). Effects on blood pressure of reduced dietary sodium and the dietary approaches to stop hypertension

(DASH) diet. *New England Journal of Medicine, 344*, 3-10. https://doi.org/10.1056/NEJM200101043440101
- Saklayen, M. G. & Deshpande, N. V. (2016). Timeline of history of hypertension treatment. *Frontiers in Cardiovascular Medicine, 3*, 3. https://doi.org/10.3389/fcvm.2016.00003
- Tarray, R. Saleem, S., Afroze, D., Yousuf, I., Gulnar, A., Laway, B., & Verma, S., (2014). Role of insulin resistance in essential hypertension. *Cardiovascular Endocrinology.3*(4), 129-133 DOI: 10.1097/XCE.0000000000000032
- Thakur, A.P.S., Sharma, V., Ramasamy, V., Choudhary, A., Patel, P., Singh, S., & Parol, S. (2020). Management of ureteric stone in pregnancy: A review. *African Journal of Urology, 26*, 60. https://doi.org/10.1186/s12301-020-00070-5
- Tumlin, J.A., Dunbar, L.M., Oparil, S., Buckalew, V., Ram, C.V., Mathur, V., . . . Luther, R.R. (2000). Fenoldopam, a dopamine agonist, for hypertensive emergency: A multicenter randomized trial. Academy of Emergency Medicine, 7, 653-662.
- UK Medicines and Healthcare Products Regulatory Agency. (2014). *ACE inhibitors and angiotensin II receptor antagonists: Recommendations on how to use for breastfeeding.* https://www.gov.uk/drug-safety-update/ace-inhibitors-and-angiotensin-ii-receptor-antagonists-recommendations-on-how-to-use-for-breastfeeding
- University Kidney Research Organization (UKRO). (2020). *The renin-angiotensin system and blood pressure control.* http://ukrocharity.org/kidney-disease/the-renin-angiotensin-system-and-blood-pressure-control/
- Valensi, P. (2021). Autonomic nervous system activity changes in patients with hypertension and overweight: role and therapeutic implications. *Cardiovascular Diabetology, 20*, 170. https://cardiab.biomedcentral.com/articles/10.1186/s12933-021-01356-w
- Verma, A. A., Khuu, W., Tadrous, M., Gomes, T., & Mamdani, M. M. (2018). Fixed-dose combination antihypertensive medications, adherence, and clinical outcomes: A population-based retrospective cohort study. *PLoS Medicine, 15*(6), e1002584. https://doi.org/10.1371/journal.pmed.1002584
- Whitaker, J. (2021). *Hypertension and insulin resistance.* http://whitakerwellness.com/health-concerns/high-blood-pressure-treatment/what-is-insulin-resistance
- Whelton, P. K., Carey, R. M., Aronow, W. S., Casey, D. E., Jr, Collins, K. J., Dennison Himmelfarb, C., DePalma, S. M., Gidding, S., Jamerson, K. A., Jones, D. W., MacLaughlin, E. J., Muntner, P., Ovbiagele, B., Smith, S. C., Jr, Spencer, C. C., Stafford, R. S., Taler, S. J., Thomas, R. J., Williams, K. A., Sr, Williamson, J. D., … Wright, J. T., Jr. (2018). 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: A report of the American College of Cardiology/American Heart Association task force on clinical practice guidelines. *Journal of the American College of Cardiology, 71*(19), e127–e248. https://doi.org/10.1016/j.jacc.2017.11.006
- Wiysonge, C.S., Bradley, H.A., Volmink, J., Mayosi, B.M., & Opie, L.H. (2017*). Beta-blockers for hypertension.* Cochrane Database of Systematic Reviews. http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD002003.pub5/epdf
- Youssef, G.S. (2019). *Hypertension in pregnancy.* European Society of Cardiology. https://www.escardio.org/Journals/E-Journal-of-Cardiology-Practice/Volume-17/hypertension-in-pregnancy
- Zheng, X., Yu, H., Qiu, X., Chair, S. Y., Wong, E. M., & Wang, Q. (2020). The effects of a nurse-led lifestyle intervention program on cardiovascular risk, self-efficacy and health promoting behaviours among patients with metabolic syndrome: Randomized controlled trial. International Journal of Nursing Studies, 109, 103638. https://doi.org/10.1016/j.ijnurstu.2020.103638

HYPERTENSION MANAGEMENT: EVIDENCE-BASED GUIDELINES

Self-Assessment Answers and Rationales

1. The correct answer is A.
Rationale: Stage 1 hypertension includes average systolic blood pressures between 130-139 mmHg or diastolic blood pressures between 80-89 mmHg. The highest applicable category should be used when categorizing, therefore the blood pressure of 138/78 mmHg would be considered Stage 1 hypertension.

2. The correct answer is C.
Rationale: Marlene has chronic kidney disease, a relatively fixed risk factor that may not be possible for her to change. Cigarette smoking, type 2 diabetes, and overweight status are all modifiable risk factors that Marlene may have some influence over changing. Addressing these risk factors can decrease blood pressure as well as cardiovascular risk.

3. The correct answer is A.
Rationale: The ACC/AHA guidelines state that patients can expect a blood pressure reduction of approximately 1 mmHg for every 1 kg reduction in body weight, so 14 kg of weight loss would lead to a reduction in blood pressure of approximately 14mmHg. Exercise has the potential to lower systolic blood pressure by about 5 to 8 mmHg on average. Patients who follow diets high in low-fat dairy products, fruits, and vegetables can expect systolic blood pressure reductions of approximately 11 mmHg.

4. The correct answer is D.
Rationale: Angioedema, a potentially life-threatening medical condition, has a higher rate of occurring in the Black population. Patients experiencing angioedema require immediate medical attention and should have ACE inhibitors discontinued immediately.

5. The correct answer is A.
Rationale: Thiazide diuretics are recommended by the ACC/AHA guidelines as a first-line agent in the treatment of hypertension because of their ability to reduce clinical cardiovascular disease events. Loop diuretics and potassium-sparing diuretics are reserved for second-line or add-on therapy. Calcium channel blockers are not a type of diuretic.

6. The correct answer is B.
Rationale: Despite the clear benefits of calcium channel blockers in Black patients, lisinopril would be the most appropriate antihypertensive starting agent for Marlene. The benefits of ACE inhibitors in patients with chronic kidney disease and diabetes are numerous. ACE inhibitors have been shown to slow the progression of kidney disease in patients with diabetes, as well as reduce the risk of myocardial infarction and improve heart function in diabetic patients with hypertension. Chronic kidney disease patients also experience benefits in their disease management, with studies showing effectiveness in decreasing proteinuria and slowing the progression of kidney disease. Therefore, lisinopril would be the most appropriate starting agent for Marlene.

7. The correct answer is B.
Rationale: The most appropriate next step would be to discontinue Marlene's lisinopril and switch her to losartan. Losartan, an ARB, is significantly less likely to cause a dry cough and will still provide Marlene with the beneficial effects on her kidneys. Dry cough is a common side effect of ACE inhibitors and should not be ignored or dismissed, as it can lead to medication non-adherence and inadequately treated hypertension.

8. The correct answer is C.
Rationale: Chlorthalidone is a thiazide diuretic, which are recommended by the ACC/AHA guidelines for first line treatment of hypertension because of their ability to reduce clinical cardiovascular disease events. Amlodipine, a calcium channel blocker, is also recommended as first line therapy, but since Marlene is exhibiting mild symptoms of edema, a diuretic would be more appropriate to add on at this time to address both her edema and high blood pressure. Valsartan is an ARB and, since Marlene is already taking an ARB, a second agent in the same class should not be added. Metoprolol is a beta blocker, reserved for second line therapy, and would not be the most appropriate agent to add on at this time.

9. The correct answer is D.
Rationale: After the three-drug regimen of a calcium channel blocker, chlorthalidone, and an ACE inhibitor or ARB has been maximized, the addition of spironolactone should be considered to provide substantial blood pressure reduction. Hydrochlorothiazide is a thiazide diuretic, so another thiazide diuretic should not be added if a patient is already taking one. Aliskiren is a direct renin inhibitor, which should not be added on if a patient is already taking an ACE inhibitor or ARB. Methyldopa is used infrequently in non-pregnant patients and would not be the best medication to add at this time.

10. The correct answer is A.
Rationale: Low dose aspirin has shown some benefit in the prevention of preeclampsia, particularly in women who are already at the highest risk of developing preeclampsia, such as those with a prior history. The American College of Obstetricians and Gynecologists recommends starting low dose aspirin 81 mg daily late in the first trimester in women with a previous preeclampsia history. Labetalol, hydralazine, and methyldopa are all utilized in the treatment of preeclampsia, not prevention.

Course Code: ANCCOH04HT

Stroke Management in the Acute Care Setting

5 Contact Hours

Release Date: May 3, 2022

Expiration Date: May 3, 2025

Faculty

Norma D. McNair, PhD, RN, CNRN, SCRN, ACNS-BC, FAHA, is an accomplished clinical nurse specialist with a focus in brain injury, including traumatic brain injury and stroke. She earned her bachelor's degree from California State University, Sacramento; a certificate in neuroscience nursing from the National Hospital for Nervous Diseases in London, England; her master's degree from Yale University School of Nursing; a post-master's nurse practitioner certificate from California State University, Long Beach; and her PhD from UCLA School of Nursing. She has held a variety of positions including staff nurse, charge nurse, interim director of evidence-based practice, and clinical nurse specialist. She has published in peer reviewed journals and is a frequent presenter at local, national, and international conferences that focus on the care of neuroscience patients.

Norma D. McNair has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Reviewer: Jennifer L. Bauman, RN, BSN, CCRN, MSN, AGACNP-BC, has devoted her nursing career to specializing in critical care medicine. She spent 6 years as a medical intensive care unit nurse, completed her master's degree, and is practicing as a nurse practitioner in multiple ICU settings including cardiac, medical, surgical, and neurological intensive care units. In addition to receiving her educational degrees from Marquette University in Milwaukee, Wisconsin, she currently works at her alma mater as part time faculty for their Adult-Gerontology Acute Care Nurse Practitioner program.

Jennifer L. Bauman has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Course overview

The purpose of this educational offering is to provide nurses and other healthcare providers with the latest information about stroke including updates in anatomy, assessment, and management of the patient with a stroke who is in the acute care setting.

Learning objectives

Upon completion of the course, the learner should be able to:

- Describe stroke epidemiology, demographics, and risk factors.
- Review anatomy and physiology related to stroke.
- Recognize stroke signs and symptoms.
- Explain the management of acute stroke from prehospital to acute care up until discharge.
- Describe the trajectory of care for patients with stroke.
- Understand the social determinants of health and the risk of bias in the care of the patient with a stroke.
- Implement a stroke plan of care appropriate for location of care.
- Understand end-of-life/supportive care for those with catastrophic strokes.
- Describe the requirements for stroke center certification by The Joint Commission.

How to receive credit

- Read the entire course online or in print which requires a 5-hour commitment of time.
- Complete the self-assessment quiz questions which are at the end of the course or integrated throughout the course. These questions are NOT GRADED. The correct answer is shown after you answer the question. If the incorrect answer is selected, the rationale for the correct answer is provided. These questions help to affirm what you have learned from the course.
- Depending on your state requirements you will be asked to complete either:
  - An affirmation that you have completed the educational activity.
  - A mandatory test (a passing score of 70 percent is required). Test questions link content to learning objectives as a method to enhance individualized learning and material retention.
- If requested, provide required personal information and payment information.
- Complete the MANDATORY Course Evaluation.
- Print your Certificate of Completion.

CE Broker reporting

Colibri Healthcare, LLC, provider # 50-4007, reports course completion results within 1 business day to CE Broker. If you are licensed in Arkansas, District of Columbia, Florida, Georgia, Kentucky, Michigan, Mississippi, New Mexico, North Dakota, South Carolina, or West Virginia, your successful completion results will be automatically reported for you.

Accreditations and approvals

Colibri Healthcare, LLC is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation.

Individual state nursing approvals

Colibri Healthcare, LLC is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation. In addition to states that accept courses offered by ANCC Accredited Providers, Colibri Healthcare, LLC is an approved Provider of continuing education in nursing by: Alabama Board of Nursing, Provider #ABNP1418 (valid through February 5, 2025); Arkansas State Board of Nursing, Provider #50-4007; California Board of Registered Nursing, Provider #CEP17480 (valid through January 31, 2024); California Board of Vocational Nursing and Psychiatric Technicians (LVN Provider #V15058, PT Provider #V15020; valid through December 31, 2023); District of Columbia Board of Nursing, Provider #50-4007; Florida Board of Nursing, Provider #50-4007; Georgia Board of Nursing, Provider #50-4007; Kentucky

Board of Nursing, Provider #7-0076 (valid through December 31, 2023; CE Broker Provider #50-4007); Michigan Board of Nursing, Provider #50-4007; Mississippi Board of Nursing, Provider #50-4007; New Mexico Board of Nursing, Provider #50-4007; North Dakota Board of Nursing, Provider #50-4007; South Carolina Board of Nursing, Provider #50-4007; and West Virginia Board of Registered Nurses, Provider #50-4007. This CE program satisfies the Massachusetts States Board's regulatory requirements as defined in 244 CMR5.00: Continuing Education.

Activity director

Shirley Aycock, DNP, RN, Executive Director of Quality and Accreditation

Disclosures

Resolution of conflict of interest
In accordance with the ANCC Standards for Commercial Support for continuing education, Colibri Healthcare, LLC implemented mechanisms prior to the planning and implementation of the continuing education activity, to identify and resolve conflicts of interest for all individuals in a position to control content of the course activity.

Sponsorship/commercial support and non-endorsement
It is the policy of Colibri Healthcare, LLC not to accept commercial support. Furthermore, commercial interests are prohibited from distributing or providing access to this activity to learners.

Disclaimer

The information provided in this activity is for continuing education purposes only and is not meant to substitute for the independent medical judgment of a healthcare provider relative to diagnostic and treatment options of a specific patient's medical condition.

Course verification

All individuals involved have disclosed that they have no significant financial or other conflicts of interest pertaining to this course. Likewise, and in compliance with California Assembly Bill No. 241, every reasonable effort has been made to ensure that the content in this course is balanced and unbiased.

INTRODUCTION

Stroke is described as neurological dysfunction caused by a focal event (Sacco et al., 2013). In addition, stroke is more broadly described as pathological, radiological evidence of clinical ischemic injury in a defined vascular distribution that lasts greater than 24 hours (Morgenstern et al., 2021; Sacco et al., 2013). The focus of this definition of stroke is on the injury to the tissue of the central nervous system and not solely on clinical symptoms (Morgenstern et al., 2021).

According to the American Heart Association/American Stroke Association (AHA/ASA), stroke is the fifth leading cause of death in the United States (US). It is estimated that someone experiences a stroke every 40 seconds, and every 4 minutes someone dies as a result of a stroke. Each year, approximately 795,000 individuals in the United States will suffer a stroke (Virani et al., 2021). Approximately 610,000 are new strokes and 185,000 are recurrent (Center for Disease Control and Prevention, n.d.). Of all strokes, ischemic strokes are the most common (87%) and hemorrhagic strokes are least common (10%). The financial burden of stroke on the healthcare system, medication costs, and missed days of work is significant, at approximately $48 billion each year (Center for Disease Control and Prevention, n.d.).

There are also important cultural considerations related to stroke care. For example, African Americans have a higher risk of stroke and also a higher mortality rate because of strokes. Additionally, the Hispanic population currently is an at-risk population, with a trend of increased mortality rates from 2013 to the present time. In 2009, 34% of patients hospitalized for stroke were less than 65 years of age (Center for Disease Control and Prevention, n.d.). The geographic distribution of stroke in the United States shows that several southern states (North Carolina, South Carolina, Georgia, Tennessee, Mississippi, Alabama, Louisiana, and Arkansas) have higher incidences of stroke than the rest of the country, so much so that it has become known as the "stroke belt." The overall mortality for these states is at least 30% higher than other regions of the US, and the states of North Carolina, South Carolina, and Georgia have mortality rates that are 40% higher (Virani et al., 2021).

Globally, stroke is the second leading cause of death and there are 10.3 million new strokes annually with higher disability rates in the lower- and middle-income countries. Disparities between high- and low-income countries have increased in both the incidence and burden of the costs of care and disability associated with stroke (Katan & Luft, 2018; Pandian et al., 2018).

Nursing Consideration: Because of the number of strokes that occur every minute in the United States, nurses need to educate the public on prevention strategies and the early recognition and treatment of stroke symptoms (Wilson & McPeak, 2020).

Mrs. Rodriguez and her granddaughter Liliana were having breakfast and enjoying a conversation about how Liliana was doing in high school and what her plans were for college. Liliana asked her grandmother a question and her grandmother was unable to respond. Liliana noticed that her grandmother had a right sided facial droop and she had dropped her utensil from her right hand. Liliana had received training at school about how to recognize a stroke and she knew that she needed to call 911 immediately. Emergency services arrived within minutes, performed an assessment, recognized that Mrs. Rodriguez was having a stroke, and quickly took her to the nearest stroke center.

Evidence-based practice alert! Research has shown that patients have better outcomes with early recognition of symptoms and transfer to a facility that can provide care to stroke patients, such as a certified primary or comprehensive stroke center (Man et al., 2018; Shkirkova et al., 2019).

Mr. Smith is a 65-year-old male admitted to the hospital after a motor vehicle crash. He sustained multiple rib fractures and a left femur fracture. The femur fracture has not yet been repaired and the patient is in traction. He has had an uneventful hospital course and has been having coherent conversations with the healthcare team and with visitors. On a routine assessment, Mr. Smith has an altered mental status and left sided weakness. The nurse recognizes that Mr. Smith may have had a stroke (because of a fat embolus) and initiates a Code Stroke. The stroke team arrives within minutes and Mr. Smith is taken to the computed tomography (CT) scanner emergently.

Evidence-based practice alert! Between 4% and 17% of strokes occur in the hospital. Research has shown that there may be delays in recognition of stroke, lower use of thrombolytics, and a greater risk for death and disability for those who have an in-hospital stroke (Del Brutto et al., 2019; Jasne et al., 2020). Patients may have strokes in patient care areas that are not stroke related and thus nurses may not readily recognize stroke symptoms. Education of nursing staff throughout the hospital is necessary as is the development of a rapid response team to treat stroke (Del Brutto et al., 2019; Jasne et al., 2020).

Table 1: Signs and Symptoms of Stroke

Anatomical Location	Symptoms	
Left hemisphere (dominant)	• Right hemiparesis. • Right hemisensory deficits. • Right visual field deficit. • Acalculia (loss of ability to perform simple calculations).	• Agraphia (inability to communicate through writing). • Aphasia (expressive, receptive, or global). • Apraxia of left limbs (inability to perform purposeful actions such as dressing). • Left gaze preference.
Right cerebral hemisphere	• Left hemiparesis. • Left hemisensory deficits. • Left visual field deficit. • Neglect of left side (lack of awareness to the left).	• Dysarthria (difficult or unclear articulation of speech). • Flat affect. • Right gaze preference.
Brain stem/cerebellum	• Diplopia (double vision). • Hemiparesis or quadriparesis. • Hemisensory deficits or sensory deficits in all four limbs or face. • Dysmetria (lack of coordination of movement; may over- or under-shoot intended position).	• Locked-in syndrome (patient is aware but unable to communicate because of paralysis of nearly all voluntary muscles; able to move eyes and blink). • Nausea and vomiting. • Oralpharyngeal weakness. • Vertigo and tinnitus.
Anterior cerebral artery	• Contralateral sensory and motor deficits with deficits greater in the leg or foot than arm or face. • Urinary incontinence. • Rigidity. • Abulia (slow to react). • Lack of initiative.	• Perseveration. • Cognitive impairment. • Distractibility. • Personality changes. • Apraxia (inability to perform purposeful actions).

Middle cerebral artery	• Contralateral motor and sensory deficits with deficits greater in the arm than the leg.
	• Contralateral motor deficits in the face.
	• Contralateral visual field deficits.
	• Dominant hemisphere:
	  ○ Aphasia.
	  ○ Agraphia.
	  ○ Acalculia.
	  ○ Dyslexia (difficulty reading or interpreting words).
		• Nondominant hemisphere:
		  ○ Deficits of spatial relationships.
		  ○ Apraxia (dressing and constructional).
		  ○ Autotopagnosia (inability to localize body parts on a person or in a picture).
		• Decrease in level of consciousness or coma in large infarcts.

Posterior cerebral artery	• Visual changes (ipsilateral visual field deficit). • Contralateral paralysis if motor tracts involved. • Hemisensory deficits.	
Vertebral-Basilar syndrome	• Ataxia. • Vertigo. • Nausea. • Dysarthria. • Dysphagia. • Dysmetria. • Diplopia.	• Nystagmus. • Facial weakness. • Tinnitus. • Deafness. • Syncope. • Drop attacks. • Transient global amnesia.

Note. Livesay & Keigher, 2020.

Risk factors

There are two categories of risk factors for stroke: modifiable and non-modifiable. Addressing the modifiable risk factors may lead to decreased risk for stroke.

Non-Modifiable Risk Factors:

- **Age**: Those older than 55 are at higher risk for stroke. Stroke can occur at any age, but the risk grows higher with age. It is anticipated that stroke will increase in women, especially in the elderly, as women tend to live longer than men (Virani et al., 2021). Children and young adults also experience stroke (Felling et al., 2017).
- **Gender**: 55,000 more women than men have a stroke each year. The lifetime risk for stroke in women is 27% compared to 17% for men. More than 50% of deaths from stroke occur in women. Early menopause (age < 42) leads to twice the risk

for stroke. In addition, preeclampsia, pregnancy, and the use of oral contraceptives put women at a higher risk (Kapral & Bushnell, 2021; Virani et al., 2021).

- **Race**: When compared to Whites, African Americans have a two to three times higher risk of death and disability. Hispanics are likely to have a stroke at a younger age (< 67) compared to age ≥ 80 in Whites. American Indians and Alaska Natives are two times more likely to have a stroke (Virani et al., 2021).
- **History of a prior stroke**: Recurrence of stroke is 3%–10% in the first 30 days after the initial stroke. The recurrence rate in the first year is 4%–14% (Kolmos et al., 2021).
- **Family history of a stroke and/or a prior transient ischemic attack (TIA)**: Those who have had a stroke are at a higher risk for a second event. In a meta-analysis, the annual stroke risk was 0.77% (95% CI, 0.45%–1.10%) for fatal stroke and 2.92% (95% CI, 2.22%–3.62%) for nonfatal stroke (Hickey & Livesay, 2020).

Modifiable risk factors

Modifiable risk factors can be sub-divided into physiological and behavioral. Physiological factors include the following:

- **Hypertension (HTN)**: Elevated blood pressure is associated with 77% of strokes and is present in 60%–70% of those age 60 and older. Hypertension is defined as systolic blood pressure (SBP) > 140 mmHg and diastolic blood pressure (DBP) > 90 mmHg. It is suggested by some research that an SBP of < 130 mmHg is beneficial in decreasing the risk of stroke by as much as 20% (Virani et al., 2021; Whelton et al., 2018).
- **Hypercholesterolemia**: Total cholesterol (TC) has been implicated in stroke but seems to be a risk factor for those between the ages of 40 and 59 (Virani et al., 2021). It appears that a higher high-density lipoprotein (HDL) has a protective effect for stroke whereas a higher low-density lipoprotein (LDL) is a risk factor for stroke (ischemic and hemorrhagic; Virani et al., 2021).
- **Diabetes**: Diabetes, both types I and II, doubles the risk for stroke. Elevated blood glucose accelerates large artery stenosis. Those with asymptomatic elevated glucose have a 1.5–2.5 times higher risk for stroke. Females with diabetes mellitus (DM) have a 27% greater relative risk for stroke when baseline differences in other major cardiovascular risk factors are taken into account. Diabetes is an independent risk factor for recurrent stroke and may lead to death more frequently, especially in women and young adults (Virani et al., 2021).
- **Hypercoagulopathy**: Hypercoagulopathy occurs with sickle cell disease, high red blood cell count, cancer, and pregnancy (Kleindorfer et al., 2021). Hypercoagulability changes the viscosity of blood, making it more difficult to freely circulate without causing an occlusion.
- **Cardiac disease**: Atrial fibrillation is an independent risk factor and increases the risk of stroke five-fold in all age groups. The percentage of strokes that are due to atrial fibrillation increases significantly as individuals age, with approximately 23% occurring in 80 to 89-year-old individuals (Virani et al., 2021). Heart failure leads to stroke in about 9% of patients and there is higher mortality, longer hospital length of stay, and more severe neurological deficits in these cases (Kim & Kim, 2018). A history of myocardial infarction (MI) also increases the risk of stroke with a 30-fold increase in ischemic stroke within the first 30 days (Merkler et al., 2018).

Behavioral risk factors are those that may be more easily modified with interventions and include the following:

- **Cigarette smoking**: Smoking is an independent risk factor for stroke, doubling the risk for ischemic stroke and it has a two to four times risk for subarachnoid hemorrhage. It is believed that cigarette smoking increases mortality by 12%– 14% and leads to the development of atherosclerosis (Pandian et al., 2018).
- **Alcohol intake**: Heavy drinkers (> 21 drinks/week or > 60 g of alcohol/day) are at higher risk for stroke, whereas light to moderate drinkers (1–6 drinks/week or < 12 g of alcohol/day) may be protected from stroke (Pandian et al., 2018). Alcohol may be protective only in acute ischemic stroke (AIS) and may contribute to hemorrhagic stroke. Alcohol contributes to hypertension and atrial fibrillation, thus increasing alcohol intake in an effort to prevent stroke is not recommended.
- **Oral contraceptive use (especially when combined with smoking)**: Current oral contraceptives (low dose) alone do not appear to add an increased stroke risk but when combined with smoking and other risk factors, the risk for stroke increases (Pandian et al., 2018).
- **Physical inactivity**: Physical inactivity is associated with the development of HTN, diabetes, cardiac disease, and stroke. Active men and women have a 25%–30% decrease in the risk of stroke when compared to less active people (Pandian et al., 2018).
- **Obesity**: Persons with a body mass index (BMI) of 25–29.9 kg/m2 are classified as overweight, and those with a BMI ≥ 30 kg/m2 are classified as obese. Abdominal obesity is increasingly being recognized as a risk factor for stroke. Abdominal obesity is defined by a waist circumference ≥ 102 cm (40 in.) in men and 88 cm (35 in.) in women. Weight reduction is recommended to decrease this risk (Pandian et al., 2018).
- **Soda intake**: An increased intake of sweetened drinks can lead to a 13% increased risk of stroke; low-calorie or diet soda is associated with a 7% increase in ischemic stroke and a 27% increased risk of hemorrhagic stroke (Mossavar-Rahmani et al., 2019).
- **Illicit drug use**: Cocaine, amphetamines, and heroin are risk factors for ischemic and hemorrhagic stroke because they cause an increase in blood pressure, vasoconstriction, increased blood viscosity, and platelet aggregation (Pandian et al., 2018).

To prevent stroke, it is important to address these modifiable risk factors, as each one that is untreated increases the risk for stroke (Hickey & Livesay, 2020).

ANATOMY AND PHYSIOLOGY

In order to identify and localize the symptoms of a stroke, a working knowledge of anatomy is important. The brain is composed of the cerebrum, cerebellum, deep brain structures, and the brain stem.

Nursing Consideration: Patients and family members may be confused when it is explained that the patient had a right or left hemisphere stroke. The symptoms that they observe are opposite to what they have been told. Be sure to explain how the right side of the brain affects the left side of the body and vice versa (Littlejohns & Slazinski, 2016; Livesay & Keigher, 2020).

The cerebrum

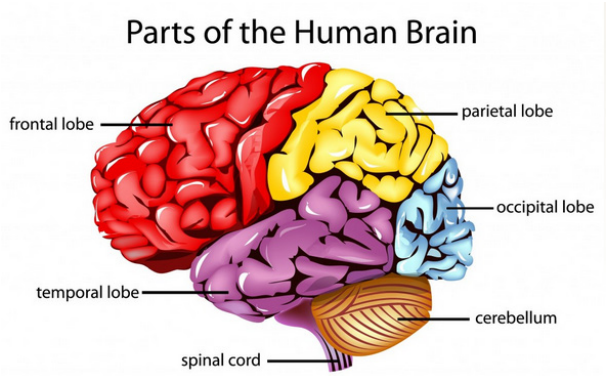
The two cerebral hemispheres consist of gyri and sulci, white and gray matter. The cerebral cortex is responsible for language, reasoning, learning, and memory. There are six lobes in each hemisphere:

- The **frontal lobe** provides regulation of personality, affect, judgment, tact, abstract thinking, and the ability to plan for the future. In addition, the precentral gyrus (motor strip) and motor speech occur here.
- The **temporal lobe** provides hearing, memory, learning, and receptive language.
- The **parietal lobe** contains the sensory strip on the post-central gyrus. Interpretation of pain, temperature, light touch, vibration, and proprioception occur here.

- The **occipital lobe** is responsible for vision and interpretation of visual information including macular and peripheral vision.
- The **limbic lobe/system** is connected to other structures and includes the cingulate gyrus and parahippocampal gyrus. The functions of this area are learning, forming new memories, and expressing emotions. The limbic system is responsible for initiating basic drives such as hunger, sleep, aggression, and emotional and sexual arousal. If the limbic system is not controlled and moderated by other cortical areas of the brain, a person may experience periods of uncontrollable rage.
- The **insular lobe** is considered the fifth lobe of the brain; it is situated under the frontal, temporal, and parietal lobes and surrounded by a dense vascular system. The insular lobe is implicated in motivation and reward, and cognitive, emotional, and executive function. Perception of bodily states such as heart rate, blood pressure, and the gastric system integrate in the insular cortex. The insular cortex is thought to control autonomic function (Evrard, 2019).

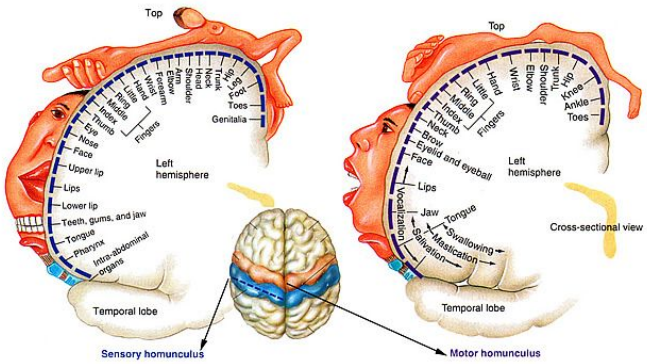
The figures below show the hemispheres and lobes and the distribution of the sensory and motor strips over the cortex. The homunculus is a visual tool to assist in identification of the location of an injury, such as a stroke. Knowledge of the hemispheres and their functions will assist the clinician in localizing symptoms (Livesay & Keigher, 2020).

Figure 1: The Cerebral Hemispheres



Source: Human+Brain.png - Wikimedia Commons

Figure 2: The Homunculus



Source: The Homunculus - Wikimedia Commons

The cerebellum

- The cerebellum has three parts: two hemispheres with the vermis (or midline) connecting them. The three lobes of the cerebellum are the anterior lobe (muscle tone), the posterior lobe (coordination of voluntary movement), and the flocculonodular lobe (vestibular regulation of posture and eye movement; Livesay & Keigher, 2020).

The brain stem

- The brain stem consists of the midbrain, the pons, and the medulla oblongata. The midbrain contains cranial nerves III (oculomotor) and IV (trochlear), motor and sensory tracts, and the reticular formation (regulates consciousness and processes visual and auditory data).
- The pons contains cranial nerves V (trigeminal), VI (abducens), VII (facial), and VIII (vestibulocochlear). Motor and sensory tracts and the reticular formation are in this area. In addition to the above, the reticular formation and pons relay information to the cerebellum and regulate sleep, chewing, swallowing, bladder function, and wakefulness.
- The medulla oblongata has the nuclei for cranial nerves IX (glossopharyngeal), X (vagus), XI (spinal accessory), and XII (hypoglossal). The control of ventilation, chemoreceptors, and the reticular formation are also in the medulla (Livesay & Keigher, 2020). Autonomic functions of blood pressure, heart rate, and respiratory rate are also regulated by the medulla.

Basal ganglia

- The basal ganglia consist of multiple areas of gray matter deep within the brain. The basal ganglia modulates the motor tracts and assists with movement and emotional regulation. The basal ganglia are made up of nuclei (caudate, putamen, globus pallidus, substantia nigra, and the subthalamic nucleus). The basal ganglia are often affected when the patient has an intracerebral hemorrhage because of high blood pressure.

The thalamus and hypothalamus

- The thalamus is the "relay station" of the brain. Impulses travel through the thalamus and the thalamus works to fine- tune information received including sensory and motor signals and sleep and wakefulness.
- The hypothalamus controls visceral activity and emotions and plays an important role in hormone release. The hypothalamus has neurological and endocrine components and thus exerts influence through the circulatory system and the nervous system (Livesay & Keigher, 2020).

Nursing Consideration: Knowledge of the cerebral vasculature is important to understanding the deficits that a patient presents with. For example, knowing that the middle cerebral artery (MCA) distribution covers half of the hemisphere on the outside of the brain, the nurse will know that the patient will have motor and sensory deficits primarily in the arm, face, and hand (Livesay & Keigher, 2020).

Vascular supply to the brain

The brain is perfused by four arteries (two internal carotid and two vertebral arteries). They travel through the neck and the base of the skull to reach the brain structures. The Circle of Willis is the anastomotic system that supplies the blood to various locations.

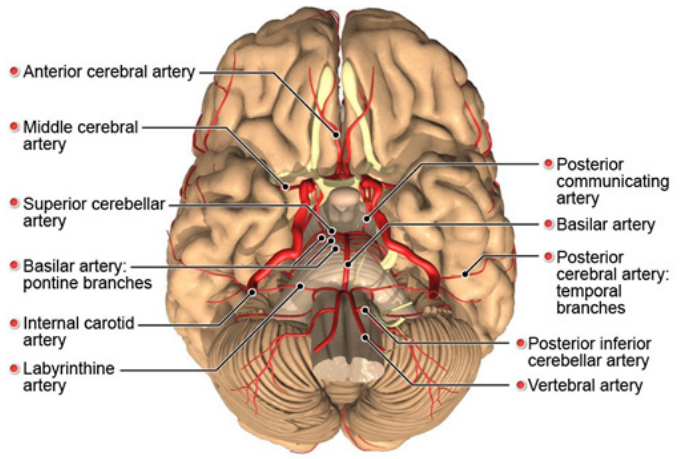
Anterior circulation

- The anterior cerebral artery (ACA) branches from the internal carotid artery (ICA) and supplies the corpus callosum and the medial surfaces of the frontal and parietal lobes.
- The MCA supplies the bulk of the cerebral hemispheres and is derived directly from the ICA. There are several segments that supply blood to the basal ganglia, insula, and the lateral cortical surface of the brain.

Posterior circulation

- The vertebral arteries enter through the base of the skull and join at the pons to become the basilar artery. Figure 3 identifies the major arteries and their distribution.

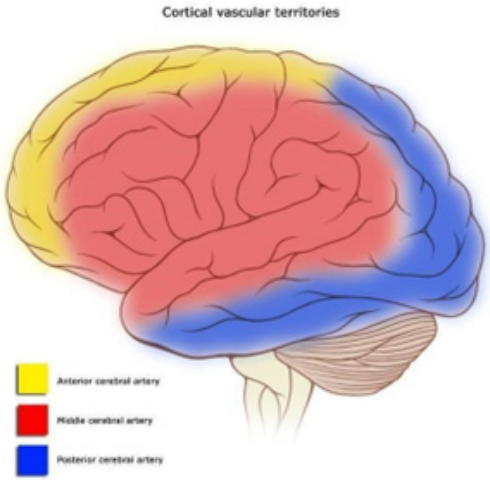
Figure 3: Major Arteries and Distribution



Source: Primal Pictures, licensed by Colibrigroup.

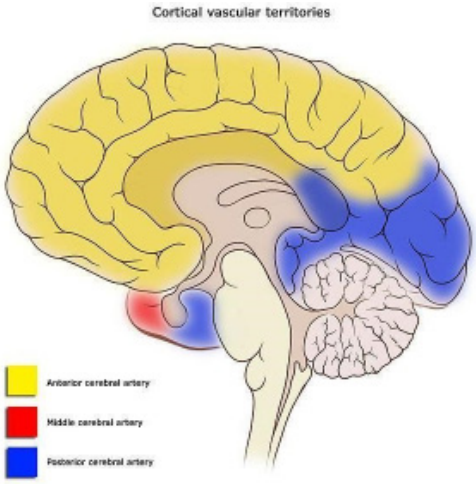
Figure 4 shows the distribution of the major arteries to the brain and the areas that they supply. Knowledge of the vascular distribution will assist in identifying the location of a stroke.

Figure 4: Distribution of Major Arteries of the Brain



Source: Creative Commons Attribution-Share Alike 3.0. Open source. https://creativecommons.org/licenses/by-sa/3.0/deed.en

Figure 4: Distribution of Major Arteries of the Brain

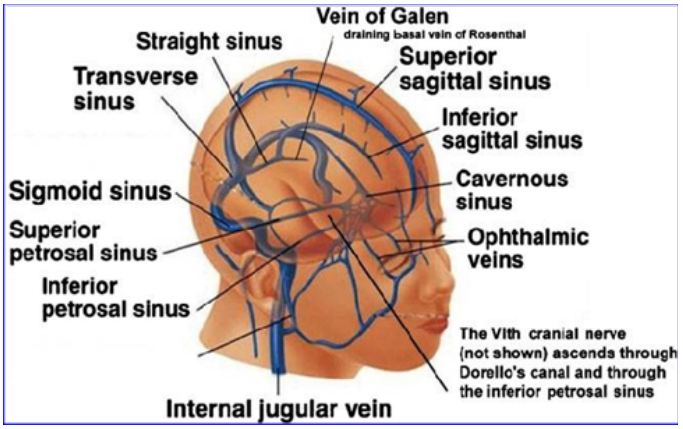


Source: Creative Commons Attribution-Share Alike 3.0. Open source. https://creativecommons.org/licenses/by-sa/3.0/deed.en

The venous system

- Drainage of blood from the brain is through the venous system. See Figure 5.

Figure 5: Venous System of the Brain



Source: The venous system of the brain – Wikimedia common

PATHOPHYSIOLOGY

Nursing Consideration: TIAs can lead to a higher risk of stroke over the ensuing months to a year. Patients and families need to be educated that any further symptoms require an immediate emergency department (ED) visit (Amarenco et al., 2016).

Transient Ischemic Attack

- Transient Ischemic Attack (TIA) is seen as a precursor to a stroke. Individuals who have a TIA are at a higher risk of stroke at 1 year (Amarenco et al., 2016). TIAs are defined as ". . . a brief episode of neurologic dysfunction caused by focal brain or retinal ischemia, with clinical symptoms typically lasting less than one hour, and without evidence of acute infarction" (Albers et al., 2002; Clissold et al., 2020).
- Symptoms correlate with the affected blood vessel and the territory of the brain that the vessel supplies.

Ischemic stroke

- An acute ischemic stroke (AIS) is defined as "an abrupt and dramatic development of a focal neurological deficit caused by an interruption of blood flow to the brain" (Hinkle et al., 2016; Phipps & Cronin, 2020).
- Etiologies of AIS
  - Thrombus formation: The thrombus can be a result of atherosclerosis, inflammation of vessel walls, mechanical constriction of a blood vessel, hypotension, or hypercoagulability.
  - Embolic: Emboli break off from other areas of the body and travel to the cerebral vessels where they lodge and cause blockage of blood flow. Sources of emboli include cardiac (atrial fibrillation, patent foramen ovale, valvular disease), carotid plaque, fat emboli, and air emboli.
  - Lacunar: These strokes are caused by HTN and affect the arm, leg, and face equally.
- Pathophysiology of AIS
  - Once the blood flow to an area of the brain stops, a dense ischemic core develops and is surrounded by tissue that may be marginally perfused (penumbra). In addition, there is a decrease in energy supply that leads to sodium and potassium pump failure, anaerobic metabolism and lactic acid production, promotion of free radicals, and cell death.

- Clinical Features of AIS
  - Left hemisphere stroke: aphasia, right visual field cut, right hemiparesis, and right sensory deficits.
  - Right hemisphere stroke: extinction (neglect of the left), left visual field deficit, left hemiparesis, and left sensory deficits.
  - Brain stem: hemiparesis or quadriparesis, sensory deficits, hearing changes, movement difficulties in all four limbs and the face, diplopia, dysarthria, and oropharyngeal weakness, dizziness, vertigo, and changes in eye movement.
- Proximal Large Vessel Occlusion (PLVO)
  - Carotid artery: contralateral hemiparesis, facial asymmetry, sensory deficits, visual field cuts, and aphasia (dominant hemisphere).
  - ACA: contralateral sensory and motor loss in the leg and foot greater than arm or face, urinary incontinence, lack of initiative, distractibility, cognitive impairment, and personality changes.
  - MCA: contralateral motor or sensory deficits greater in the arm than the leg, contralateral weakness in the lower face, and visual field deficits. Large infarctions may lead to coma or death.
  - Posterior cerebral artery: ipsilateral field deficits, cortical blindness, and contralateral paralysis.
  - Vertebral–basilar syndrome: ataxia, nausea, vertigo, dysarthria, dysphagia, visual disturbances, and cranial nerve palsies (Hickey & Livesay, 2020; Hinkle et al., 2016; Seagraves & Livesay, 2016).
- Distal, Medium Artery Occlusion (DMVO)
  - Affects smaller vessels off of the main cerebral arteries.
  - Vessels are more distant, tortuous, and smaller than the main arteries.
  - Common cause of AIS (25% to 40%).
  - Substantial cause of morbidity and mortality.
  - Can occur because of emboli and fragmentation of the clot during endovascular therapy (EVT; Saver et al., 2020).
- Hemorrhagic Stroke
  - Intracerebral hemorrhage (ICH),
    - The primary cause of ICH is HTN. Chronic HTN is thought to contribute to deterioration of blood vessels. Another cause is cerebral amyloid angiopathy (amyloid deposits weaken the vessels) and occurs mainly in those over 70 years of age.
    - ICH is classified based on etiology, location, or hematoma size. The primary lesion is the hematoma. The hematoma causes mass effect, which irritates surrounding brain tissue and compresses adjacent structures.
  - Subarachnoid Hemorrhage (SAH)
    - SAH is the result of the rupture of a blood vessel causing blood to leak out into the brain tissue. The hemorrhage extends into the subarachnoid space. SAH is a medical emergency as delay in treatment could lead to poor outcomes.
    - SAH can be caused by trauma (dissection of an artery) or a ruptured aneurysm.
    - The risk of rupture of an unsecured aneurysm is 0% to 2.3% per year. The risk of rupture varies based onage, gender, location, size, and previous history (Neifert et al., 2021).
    - Patients present with the sudden onset of the "worst headache of my life," which may also be described as a thunderclap headache. Symptoms include altered mental status, focal neurological deficits (cranial nerves or hemiplegia/paresis), stiff neck, or coma.
    - Vascular malformations also lead to ICH but are less common. Typical malformations are arteriovenous malformations (AVMs), and patients present with hemorrhage, seizure, or headache (Derdeyn et al., 2017; Hickey & Livesay, 2020; King, 2016; Neifert et al., 2021).
    - Other causes include oral anticoagulant use, hemorrhage into a tumor, hemorrhagic conversion after alteplase or tenecteplase administration, vasculitis, and Moya-Moya disease (Casper & Graves, 2016).

Nursing Consideration: One of the main mimics of stroke is hypo/hyperglycemia. A quick blood glucose at point of care testing will provide information regarding glucose levels and appropriate treatment can begin (Moulin & Leys, 2019).

- Stroke mimics
  - It is important in the evaluation of stroke to rule out conditions that may mimic a stroke. These include psychogenic causes, seizures, migraine, infectious processes, drug toxicity, hypo/hyperglycemia, tumors, and encephalopathy (Moulin & Leys, 2019). Additional mimics include peripheral neuropathy, neuromuscular disorder, and syncope.

ASSESSMENT

The nurse should undertake a thorough neurological assessment at the time of admission and at designated periods depending on the designated level of care of the patient and interventions received. The purpose of the assessment is to establish a baseline examination, follow trends, and detect abnormalities as soon as possible. Assessment is also used to identify location of lesions such as a stroke, direct patient management, and identify patient and family teaching needs. Types of assessment include comprehensive, focused, and limited. The comprehensive assessment is not realistic in the acute care setting as it is time consuming and bedside clinicians may not be trained in a comprehensive examination, so it is often only seen in neurology consultation notes. The focused assessment examines a particular function or anatomical location, such as coma assessment, whereas the limited assessment (also known as a screening assessment) provides an overview of the neurological system but is not detailed or focused (Baumann et al., 2016).

Careful documentation of the patient's medical history is an important part of the assessment. For those with a stroke or TIA, the assessment would include past medical history, medications, family history, and history of the present problem (what brought them to the hospital). For patients with a stroke, assessment should also include history of any risk factors including HTN, previous stroke, and any medications taken such as anticoagulants, antihypertensives, or insulin. Information on the time symptoms began is vital in determining eligibility for interventions.

Nursing Consideration: The National Institutes of Health Stroke Scale (NIHSS) is routinely used during emergency care and on stroke units to assess the severity of the stroke. Nurses have to be trained and certified to be able to perform this examination correctly. (National Institutes of Health, n.d.)

The neurological assessment consists of level of consciousness (LOC), mental status, cranial nerve function, motor and sensory examination, muscle tone, and reflexes (Casper & Graves, 2016).

National Institutes of Health Stroke Scale

The NIHSS was developed to measure function and correlate that to stroke severity and is used in the assessment of AIS. The NIHSS is scored 0–42 with higher numbers indicating more severe stroke. One of the limitations of the NIHSS is that providers need to be trained in the exam. There are specific questions that need to be asked and tasks that need to be performed in order to obtain an accurate assessment. The NIHSS should be performed on admission and at time intervals per unit

protocol. At a minimum, the scoring should be performed every shift. Use of the NIHSS can be tapered as the patient stabilizes. Table 2 shows the components of the NIHSS.

Table 2: National Institutes of Health Stroke Scale		
Item Tested	**Response**	**Score**
1a. LOC	0 = Alert. 1 = Drowsy. 2 = Obtunded. 3 = Coma/unresponsive.	
1b. Orientation	0 = Answers both correctly. 1 = Answers one correctly. 2 = Answers none correctly.	
1c. Response/ commands	0 = Performs both correctly. 1 = Performs one correctly. 2 = Performs none correctly.	
2. Gaze	0 = Normal horizontal movements. 1 = Partial palsy. 2 = Complete gaze palsy.	
3. Visual fields	0 = No visual field defect. 1 = Partial hemianopia. 2 = Complete hemianopia. 3 = Bilateral hemianopia.	
4. Facial movement	0 = Normal. 1 = Minor facial weakness. 2 = Partial facial weakness.	
5. Motor function (arm) a. Left arm b. Right arm	0 = No drift. 1 = Drift before 5 seconds. 2 = Falls before 10 seconds. 3 = No effort against gravity. 4 = No movement	
6. Motor function (leg) a. Left leg b. Right leg	0 = No drift. 1 = Drift before 5 seconds. 2 = Falls before 10 seconds. 3 = No effort against gravity. 4 = No movement	
7. Limb ataxia	0 = No ataxia. 1 = Ataxia in one limb. 2 = Ataxia in two limbs.	
8. Sensory	0 = No sensory loss. 1 = Mild sensory loss. 2 = Severe sensory loss.	
9. Best language	0 = Normal. 1 = Mild aphasia. 2 = Severe aphasia. 3 = Mute or global aphasia.	
10. Articulation	0 = Normal. 1 = Mild dysarthria. 2 = Severe dysarthria.	
11. Extinction or inattention	0 = Absent. 1 = Mild (loss of one sensory modality). 2 = Severe (loss of two modalities).	
Total NIH Score		0-42
Source: National Institutes of Health, n.d.		

Glasgow Coma Scale (GCS)

The Glasgow Coma Scale (GCS) has evolved from a tool that provides an objective measure of coma status in traumatic brain injury to an assessment that is used on all patients at all levels of care. While it is a valid and reliable assessment tool (Teasdale & Jennett, 1974), it may not be the best tool for scoring all neurological assessments. The tool assesses eye opening, motor response, and verbal response. It has been recommended that scoring each area separately and then adding them together may provide more information about the patient's status rather than just a summed score. For example, E2V3M2 = 7. Scores range from 0–15 with 15 being the best score and 0 the worst. Table 3 shows the components of the GCS.

Table 3: Glasgow Coma Scale		
		Score
Eye opening (best response)	1 = No eye opening. 2 = Eye opening to pain. 3 = Eye opening to sound. 4 = Eye opening spontaneously.	
Verbal response (best response)	1 = No verbal. 2 = Incomprehensible sounds. 3 = Inappropriate words. 4 = Confused. 5 = Oriented.	
Motor response (best response)	1 = No motor response. 2 = Abnormal extension to pain. 3 = Abnormal flexion to pain. 4 = Withdrawal to pain. 5 = Localizing pain. 6 = Obeys commands.	
Total Score		0-15
Source: Jain et al., 2019; Teasdale & Jennett, 1974.		

The Modified Rankin Score

The Modified Rankin Score (mRS; Table 4) is used to assess the level of disability or dependence in activities of daily living (ADLs) in a patient after a stroke or other neurological disorder. It is more commonly used to assess the patient for placement after the acute care hospital stay and is routinely used in rehabilitation assessments (Broderick et al, 2017).

Table 4: The Modified Rankin Score	Score
0 = No symptoms at all.	
1 = No significant disability despite symptoms; able to carry out all usual duties and activities.	
2 = Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance.	
3 = Moderate disability; requiring some help, but able to walk without assistance.	
4 = Moderately severe disability; unable to walk and attend to bodily needs without assistance.	
5 = Severe disability; bedridden, incontinent, and requiring constant nursing care and attention.	
6 = Dead	
Source: Broderick et al., 2017	

Hemorrhage scales

Scales that assess hemorrhagic stroke are used to classify the hemorrhage and not the neurological status of the patient. Table 5 outlines the components of the ICH score.

Table 5: Intracerebral Hemorrhage (ICH) Score

Components	ICH Score
GCS score:	
3–4	2
5–12	1
13–15	0
ICH volume (ml):	
≥ 30	1
< 30	0
Infratentorial origin:	
Yes	1
No	0
Age:	
≥ 80	1
< 80	0
Total ICH score	0-6

Source: Hemphill et al., 2001.

Additional scales for SAH severity include the Hunt and Hess scale and the modified Fisher scale. A scale used for assessing severity of AVMs is the Spetzler-Martin scale (Censullo et al., 2016). See Tables 6 through 8.

Table 6: Hunt and Hess Grading Scale for Subarachnoid Hemorrhage

Grade 1 • Asymptomatic or minimal headache and slight neck stiffness.	70% survival.
Grade 2 • Moderate to severe headache; neck stiffness; no neurologic deficit except cranial nerve palsy.	60% survival.
Grade 3 • Drowsy; minimal neurologic deficit.	50% survival.
Grade 4 • Stuporous; moderate to severe hemiparesis; possibly early decerebrate rigidity and vegetative disturbances.	20% survival.
Grade 5 • Deep coma; decerebrate rigidity; moribund.	10% survival.

Source. Roland & Gaillard, n.d.

Table 7: Modified Fisher Scale

Grade 0 • No subarachnoid hemorrhage (SAH). • No intraventricular hemorrhage (IVH). • Incidence of symptomatic vasospasm: 0%.
Grade 1 • Focal or diffuse, thin SAH. • No IVH. • Incidence of symptomatic vasospasm: 24%.
Grade 2 • Thin focal or diffuse SAH. • IVH present. • Incidence of symptomatic vasospasm: 33%.
Grade 3 • Thick focal or diffuse SAH. • No IVH. • Incidence of symptomatic vasospasm: 33%.
Grade 4 • Thick focal or diffuse SAH. • IVH present. • Incidence of symptomatic vasospasm: 40%.
Note: Thin SAH is < 1 mm thick and thick SAH is > 1 mm in depth.
Source. Carroll & Gaillard, n.d.; Roland & Gaillard, n.d.

Table 8: Spetzler-Martin Scale for Classifying Arteriovenous Malformations

Components	ICH Score
Size of lesion or nidus	1—Small (less than 3 cm). 2—Medium (3–6 cm). 3—Large (more than 6 cm).
Eloquence of adjacent tissue	0—Non-eloquent. 1—Eloquent.
Venous drainage	0—Superficial. 1—Deep venous.

Source: Bell & Gaillard, n.d.

Nursing Consideration: Patients may have never had a procedure of any kind before admission to the hospital. It is important to educate the patient and family regarding what to expect for each examination, especially examinations that are loud (MRI) or invasive (angiography, transesophageal echocardiogram; Keiser & Wilkerson, 2020).

DIAGNOSTICS

Diagnostic tests for stroke evaluation include the following:

- **Computerized Tomography (CT) scan**: Non-contrast CT is a noninvasive test that is fast and provides quick information to the healthcare team to assist in decision-making. Hemorrhage is readily identifiable on the CT scan but ischemia is not. Edema, loss of differentiation of grey/white matter, and herniation of brain tissue are easily identified on the non-contrast CT.
- **CT angiogram (CTA)**: CTA is a CT scan with the addition of intravenous (IV) contrast. This noninvasive test provides information about the cerebral vessels including occlusions of large vessels. With 3D reconstruction, information about aneurysms, turbulent flow, and occlusions of medium sized vessels may also be identified.
- **CT perfusion**: The CT perfusion scan uses contrast and calculates cerebral blood flow, blood volume, mean transit time, and time to peak. These values identify ischemic stroke or other vascular abnormalities.
- **Magnetic resonance imaging (MRI)**: MRI is a noninvasive examination that uses radiofrequency waves and magnetic fields. These waves and fields determine the hydrogen protons in tissue and images of tissue densities are produced. Gadolinium is the contrast medium used in MRI and it enhances images and identifies blood-brain

barrier disruption. Multi-modal MRI examinations provide a thorough evaluation of the cerebral structures.

- **Magnetic resonance angiography (MRA)**: MRA is used to detect arterial dissection, vasculitis, arterial flow, and high-grade atherosclerotic lesions. MR venograms are used to assess venous flow and to evaluate the presence of thrombosis or malformations.
- **Cerebral angiography (CA)**: Angiography is an invasive procedure that assesses the cerebral vasculature. A catheter is inserted into the femoral artery and radiopaque contrast is injected. The femoral artery or the brachial artery may be used. There are risks with CA because of its invasive nature. Damage to blood vessels through a puncture or clot formation at the injection site can occur. Assessment of the extremity is necessary to identify early compromise. Patients are sedated or receive general anesthesia for the procedure and thus require monitoring of airway and blood pressure during and after the procedure.
- **Transthoracic echocardiogram (TTE)**: TTE is a noninvasive ultrasound procedure to detect cardiac abnormalities that may have caused a stroke, such as thrombus, myxoma, patent foramen ovale (PFO), or vegetation on valves.
- **Transesophageal echocardiogram (TEE)**: This test is an invasive test where a probe is placed in the esophagus. The TEE provides better information than the TTE as there is direct visualization of the cardiac structures without obstruction by other organs. It is also possible to visualize the back of the heart with a TEE. A TEE is often performed when suspicion for embolic stroke is high and the TTE is unrevealing of a disease process that would cause the vascular distribution pattern found.
- **Carotid duplex/Doppler ultrasound**: This noninvasive test is used to evaluate the carotid arteries for stenosis or dissection. This test can be used for screening for stenosis but may overestimate the stenosis, so confirmatory angiography is needed.
- **Transcranial Doppler (TCD)**: TCD is a noninvasive test that evaluates blood flow velocity through the cerebral arteries. It is mainly used for assessment of vasospasm after SAH. Routine TCD provides information about worsening or improvement of vasospasm.

(Keiser & Wilkerson, 2020)

Diagnostic testing is critical in the care of the patient admitted with a stroke. Knowledge of these test results will allow the nurse to educate the patient and family and to provide post-procedure care.

Nursing Consideration: Administration of thrombolytic therapy is the responsibility of the bedside nurse with assistance from the pharmacist. Nurses need to be aware of the dosing and administration of IV alteplase or tenecteplase. There are multiple situations where IV thrombolytics cannot be given (explained below) and the nurse needs to have ready access to this information in order to prevent giving a patient IV alteplase inappropriately (Powers et al., 2018).

INTERVENTIONS

Thrombolytic therapy

Thrombolytic therapy has changed the care of patients admitted with stroke. Currently, tissue plasminogen activator (t-PA) is the only drug approved by the Food and Drug Administration (FDA) for the treatment of stroke. There are two medications currently used: alteplase and tenecteplase. It is recommended that IV alteplase be administered within 3 hours of the onset of symptoms or when the patient was last known to be well. Some studies have indicated that alteplase is safe up to 4.5 hours after the onset of symptoms in certain patients. There are multiple exclusions (See Table 9) for the use of IV alteplase and the physician/health team members must review these before administration (Powers et al., 2018).

IV alteplase is dosed at 0.9 mg/kg with a 10% bolus given over 1 minute, with the rest infused over 60 minutes. The maximum dose is 90 mg. Patients receiving thrombolysis need to be monitored for bleeding. Any invasive devices such as IVs or catheters should be inserted before the administration of IV alteplase to decrease the risk of bleeding (Rodgers et al., 2021). IV tenecteplase is given in a single dose of 0.4 mg/kg (Powers et al., 2018). Studies have shown that tenecteplase is not inferior to alteplase and its use is increasing, likely because of ease of use.

After thrombolytic therapy the patient will be admitted to the neurological intensive care unit (ICU) or designated stroke unit for monitoring. Symptoms such as headache, change in LOC, or worsening neurological examination warrant an immediate notification of the stroke team. Blood pressure should be maintained at SBP < 180 mmHg or DBP < 105 mmHg. Patients may require antihypertensive medication to support this goal (Rodgers et al., 2021).

Table 9: Exclusion Criteria For Thrombolytic Therapy

Medication	Exclusion Criteria
Alteplase (Powers et al., 2019)	**Absolute Exclusion Criteria:** • CT scan demonstrating intracranial hemorrhage. • CT exhibits extensive regions (>1/3 MCA Territory on CT) of clear hypoattenuation. • Unable to maintain BP. • Severe head trauma within last 3 months. • Active internal bleeding. • Arterial puncture at non-compressible site within last 7 days. • Infective endocarditis. • Gastrointestinal or genitourinary bleeding within last 21 days or structural GI malignancy. • Intracranial or spinal surgery within last 3 months. • Blood glucose < 50 mg/dL. • INR >1.7. • Platelet count < 100,000/mm3, PT > 15 sec, aPTT >40 sec. • Full dose low molecular weight heparin (LMWH) within last 24 hours (patients on prophylactic dose of LMWH should NOT be excluded). Received novel oral anticoagulant (DOAC) within last 48 hours (assuming normal renal metabolizing function). • Commonly prescribed DOACs: apixaban (Eliquis), dabigatran (Pradaxa), rivaroxaban (Xarelto), edoxaban (Savaysa).

Table 9: Exclusion Criteria For Thrombolytic Therapy	
Medication	**Exclusion Criteria**

Alteplase
 	
(Powers et al., 2019)
	Consideration for Exclusion:
	• Mild stroke with non-disabling symptoms.
	• Pregnancy.
	• Major surgery or major trauma within 14 days.
	• Seizure at onset and postictal impairment without evidence of stroke.
	• Myocardial infarction within last 3 months.
	• Acute pericarditis.
	• Lumbar puncture within 7 days.
	• Ischemic stroke within last 3 months.
	• Any other condition or history of bleeding diathesis that would pose significant bleeding risk to patient.
	• History of intracranial hemorrhage.
	• Presence of known intracranial conditions that may increase risk of bleeding (arteriovenous malformation, aneurysms >10mm, intracranial neoplasm).
	• High likelihood of left heart thrombus (e.g., mitral stenosis with atrial fibrillation).
	• Blood glucose > 400 mg/dL (however should treat with IV alteplase if stroke symptoms persist after glucose normalized).
	• Improvement to a mild stroke such that any remaining deficits seem nondisabling. The following typically should be considered disabling deficits:
	  ○ Complete hemianopsia (≥2 on NIHSS question 3) or severe aphasia (≥2 on NIHSS question 9).
	  ○ Visual or sensory extinction (≥1 on NIHSS question 11).
	  ○ Any weakness limiting sustained effort against gravity (≥2 on NIHSS question 6 or 7).
	  ○ Any deficits that lead to a total NIHSS score >5.
	  ○ Any remaining deficit considered potentially disabling in the view of the patient and the treating practitioner. Clinical judgment is required.

Tenecteplase (Warach et al., 2020)	**Absolute Exclusion Criteria:** • Ischemic stroke or severe head trauma in the previous 3 months. • Previous intracranial hemorrhage. • Intra-axial intracranial neoplasm. • Gastrointestinal malignancy or hemorrhage in the previous 21 days. • Intracranial or intraspinal surgery within the prior 3 months. • Symptoms suggestive of subarachnoid hemorrhage. • Persistent blood pressure elevation (systolic ≥ 185 mmHg or diastolic ≥ 110 mmHg). • Active internal bleeding. • Presentation consistent with infective endocarditis. • Stroke known or suspected to be associated with aortic arch dissection. • Acute bleeding diathesis. • Platelet count < 100,000/mm^3. • Current anticoagulant use with INR > 1.7 or PT > 15 seconds or aPTT > 40 seconds.Therapeutic doses of low molecular weight heparin received within 24 hours (e.g., to treat VTE and ACS); this exclusion does not apply to prophylactic doses (e.g., to prevent VTE).

Endovascular treatment/mechanical thrombectomy

Patients should receive IV thrombolysis even if thrombectomy is being considered. Patients who are considered for thrombectomy need to meet the following criteria:

- A mRS of 0–2.
- Occlusion of the internal carotid or the first segment of the MCA.
- Age ≥ 18 years.
- NIHSS ≥ 6.
- Can be treated within 6 hours of onset of symptoms.

The goal is to reestablish blood flow to the affected area. There are several options for this including intra-arterial alteplase, stent retrieval, and angioplasty. A study published in 2013 showed that use of a stent retriever had better outcomes than a clot retrieval device (Broussalis, 2013). Stent retrievers have improved over the years and trials have included the Solitaire and the Trevo stent retrievers. The Trevo stent retriever is currently the only device that is FDA approved for use up to 24 hours after a stroke. The retrievers are meant for large vessel occlusions but improvements in technology may allow use in smaller vessels in the future (Rodgers et al., 2021).

Reversal of anticoagulation

Patients who are fully anticoagulated are at higher risk for hematoma expansion. Any patient with an international normalized ratio (INR) over 1.4 should receive emergent treatment to reverse the effects. Vitamin K antagonists such as warfarin can be reversed with the administration of fresh frozen plasma or vitamin K (Kuramatsu et al., 2019). More recently, prothrombin complex concentrates (PCCs) have been used. PCCs are plasma-derived factors; have a high concentration of factors II, VII, IX, and X; and quickly normalize INR (Casper & Graves, 2016). Immediate reversal with PCCs is recommended to normalize INR < 1.3 within 4 hours, reducing SBP to < 140 mmHg and avoiding hypotension (Dhakal et al., 2017; Kuramatsu et al., 2019). There is no laboratory test available to identify efficacy for patients taking direct oral anticoagulants (DOAC) that inhibit factor-Xa (apixaban, edoxaban, rivaroxaban) and the direct thrombin-inhibitor dabigatran.

One drug, Ciraparantag, is currently in phase II trials to determine its effectiveness in ICH but it has not advanced to FDA approval. To reverse dabigatran, studies have shown that idarucizumab has been effective. The combination of the two drugs is nonreversible thus anticoagulation is reversed (Kuramatsu et al., 2019). The drug is administered in two

IV doses (2 × 2.5 g) within 15 minutes and has been FDA approved. Andexanet alfa was FDA approved in 2018 to reverse anticoagulant activity of both direct and indirect factor-Xa-inhibitors (apixaban, edoxaban, rivaroxaban). The drug is very expensive per dose ($24,000–$48,000) and may be less likely to be used because of cost.

Glucose management

Elevated glucose increases the infarction size related to edema in acute and chronic hyperglycemia. Persistent hyperglycemia (> 200 mg/dl) within the first 24 hours is an independent predictor of expansion of the volume of stroke and poorer outcomes. Elevated glucose is common after stroke and may be caused by unrecognized diabetes or influence of stress hormones (cortisol and norepinephrine) released at the time of the event. The goal is to achieve a blood glucose between 140 and 180 mg/dl while avoiding hypoglycemia (< 60 mg/dl; Powers et al., 2018). Studies have also shown that hyperglycemia leads to increased length of stay (LOS), increased cost, and increased mortality at 30 days (Green et al., 2021). Frequent monitoring of blood glucose (every 1–4 hours) and institution of IV insulin therapy may be warranted. Patients who have received thrombolysis may require more frequent monitoring because of increased risk for ICH. It is recommended that nurses follow their institutional protocol for IV insulin (Green et al., 2021).

Blood pressure management

Nursing Consideration: Management of blood pressure at the time of a stroke can be difficult. While the goal is to bring blood pressure down, it is imperative not to allow the blood pressure to drop too low. Decreased blood flow to the affected area will lead to further ischemia that may become irreversible. At the time of the stroke, autoregulation in the brain is lost, thus the brain relies on the blood pressure for delivery of blood flow to the affected area.

Patients admitted with AIS or ICH are prone to elevated blood pressure. This may be a compensatory state in order to assure that blood flow reaches the ischemic area because of the loss of autoregulation where blood flow is dependent on blood pressure. Current guidelines recommend treating blood pressure until it reaches 180/105 mmHg or lower without causing hypotension. In order to administer IV thrombolytics, the blood pressure goal is less than 185/110 mmHg. This can be achieved with antihypertensives such as IV labetalol, IV nicardipine, IV clevidipine, or IV hydralazine. If this goal cannot be met, IV thrombolytics should not be given. For patients who receive reperfusion therapy, blood pressure (BP) should be monitored every 15 min for 2 hours from the start of thrombolytic therapy, then every 30 min for 6 hours, and then every hour for 16 hours (Powers et al., 2018). If BP is refractive to treatment IV nitroprusside can be considered. Ongoing BP management can be undertaken using the same medications as for initial BP control and according to institutional protocols. In situations where the patient is hypotensive, careful evaluation of neurological and volume status is needed. Patients may receive colloids or crystalloids to improve volume status. Hypotension can lead to worsening neurological deficits because of decreased perfusion to the ischemic area (Powers et al., 2018; Rodgers et al., 2021).

Temperature management

Fever has been associated with worse outcomes after stroke. Patients with temperatures < 37° C or > 39° C (<98.6° F or >102.2° F) have poorer outcomes including in-hospital death. Patients with temperature > 38° C (>100.4°F) should be treated with antipyretics to normalize temperature. Physical cooling measures such as ice packs, cooling blankets, or cooling sleeves should be implemented after the shivering phase of fever. Shivering increases metabolism and oxygen consumption and these interventions also induce shivering (Green et al., 2021). Induced hypothermia treatment has not been shown to improve outcomes in patients with stroke, so it is not recommended except in the context of a clinical trial. Moreover, induced hypothermia can lead to pneumonia and other infections (Green et al., 2021; Kuczynski et al., 2019; Powers et al., 2018).

Surgical intervention

Patients with SAH or ICH are likely to require surgical intervention. There are several options for each. In SAH, clipping of the aneurysm is considered the standard of care but interventions such as coil embolization are gaining favor. Surgical treatment requires a craniotomy and insertion of a titanium clip at the neck of the aneurysm. Endovascular treatment of aneurysms involves placing an intra-arterial catheter and directing the catheter to the opening of the aneurysm. Coils are introduced into the aneurysm until the blood flow is obliterated. This method is especially successful in larger aneurysms. In smaller aneurysms, there may not be complete obliteration of blood flow, thus there is a risk of further hemorrhage (Chung et al., 2021). Patients with AVMs require endovascular, stereotactic radiation, or surgical intervention. Endovascular procedures introduce a glue-like material into the malformation in an effort to decrease blood flow. Endovascular interventions may also assist in decreasing the blood flow through the AVM before surgery. Stereotactic radiation is directed toward the AVM. The intent is to cause sclerosis of the AVM and its thrombus over time. One of the disadvantages of stereotactic radiation is the delay in the results, which may be 2–4 years after treatment (Solomon & Connolly, 2017). Resection of the AVM requires microsurgery and careful surgical technique to remove the AVM en bloc. This may be difficult and there may be residual neurological deficits. Research has shown that patients with unruptured AVMs have a better outcome than those with ruptured AVMs. Any of these interventions should be performed by competent physicians at centers that perform a large volume of these procedures (Solomon & Connolly, 2017).

MANAGEMENT OF COMPLICATIONS

Nursing Consideration: Infections can lead to a change in neurological status and may be confused with a new onset stroke, especially in the elderly. Nurses need to be vigilant in assessing for infection, especially pneumonia and urinary tract infections (UTIs). Pneumonia can be caused by aspiration or immobility. Monitoring the patient for swallowing ability and getting the patient out of bed and active are important components of pulmonary hygiene (Green et al., 2021; Marin et al., 2018). Urinary tract infections can be caused by indwelling urinary catheters. It is important to remove catheters as soon as possible or avoid inserting them at all. Urinals exist for men and women and external devices have been developed for women who are incontinent (Green et al., 2021; Saint et al., 2016).

Pneumonia/respiratory failure

Patients with stroke are at risk for pneumonia or respiratory failure because of decreased LOC, dysphagia, or dysarthria. The patient is unable to clear the airway and may present with cough, abnormal breath sounds, and cognitive or perceptual impairment (Hinkle et al., 2016). Nursing interventions include the following:

- Assessment of oxygenation status and maintaining oxygen saturation > 94%. For patients who are not hypoxic, oxygen therapy is not recommended (Green et al., 2021).
- Chest physiotherapy may be required to maintain a clear airway.
- Maintain head of bed > 30° to prevent aspiration which may lead to pneumonia.
- Nothing by mouth (NPO) until swallow assessment has been completed. A swallow screen may be performed on admission by the bedside nurse. If the patient fails the bedside screen, the patient will need a thorough swallow assessment by a speech-language pathologist (SLP).
- Mobilize the patient out of bed as soon as possible (Hinkle et al., 2016).
- Oral care per hospital protocols.

Urinary tract infection (UTI)

Patients with stroke are at risk for UTI. Women seem to be more susceptible to UTI because of their urinary tract anatomy. In a meta-analysis, it was found that UTI is a common complication post-stroke; factors that predicted UTI were being female, older age, and higher mRS and post-void residual (PVR) ≥ 100 ml (Yan et al., 2018). Guidelines recommend that routine urinary catheterization should not be performed (Powers et al., 2018). A study that was conducted in 2016 found that the majority of UTIs were present on admission rather than hospital acquired (Bogason et al., 2017). These results indicated that the patient was likely to be older (> 81 years) and admitted from a nursing home (Bogason et al., 2017). Guidelines for the care of patients to prevent UTI include the following:

- Clear indication for the insertion of an indwelling catheter: acute obstruction, need for accurate intake and output in a critically ill patient, certain selected surgeries including urological/gynecological, comfort care, continuous bladder irrigation, immobilization required because of a medical condition, management of urinary tract blood clots, management of neurogenic bladder, prevention of worsening of pressure injury (Bogason et al., 2017; Galiczewski & Shurpin, 2017).
- Strict aseptic technique at the time of insertion.
- Assess for voiding 4–6 hours after removal of the catheter.
- Check PVR using a bladder scanner. If < 300 ml, monitor voiding. If PVR > 500 ml, perform intermittent catheterization and continue to monitor with the bladder scanner.
- In women, evaluate alternatives to urinary catheterization using devices such as PrimaFit or PureWick external urinary devices. For men, an external device such as a condom catheter should be considered as an alternative to an indwelling catheter.

For additional information visit:

- American Nurses Association: ANA CAUTI Prevention Tool: https://www.nursingworld.org/practice-policy/work-environment/health-safety/infection-prevention/ana-cauti-prevention-tool/
- Centers for Disease Control and Prevention: Catheter-Associated Urinary Tract Infections: https://www.cdc.gov/infectioncontrol/guidelines/cauti/index.html
- Society of Urologic Nurses and Associates https://www.suna.org/resource/suna-supported-ana-catheter-associated-urinary-tract-infection-prevention-tool

Cerebral edema and increased intracranial pressure

Patients who have experienced an acute stroke may develop cerebral edema and associated increased intracranial pressure (ICP). All patients with stroke are at risk for cerebral edema but patients with large hemisphere strokes or posterior fossa strokes may be even more at risk. Patients with hemorrhagic strokes may develop peri-hematoma edema. Patients with SAH are at risk for acute and delayed edema. Cerebral edema can lead to increased ICP, pressure on brain structures, and herniation of brain tissue. Cerebral edema is an abnormal accumulation of intracellular and/or extracellular water, which causes an increase in intracranial volume. Cerebral edema peaks within 2–4 days after insult and astute monitoring of the patient's neurological status is needed to identify subtle changes (Rodgers et al., 2021).

ICP monitoring may be used in patients with cerebellar stroke and those with hemorrhagic stroke. Generally, patients with AIS do not require ICP monitoring. Treatment of cerebral edema is with osmotic diuresis using mannitol or hypertonic saline (2%–23.5%) (Guhwe et al., 2016). Any patient receiving osmotic therapy needs to be monitored for changes in electrolytes and fluid status. Fluid restriction is not recommended, nor is hyperventilation.

Surgical interventions include suboccipital craniotomy for hemorrhage in the posterior fossa or decompressive hemicraniectomy for large MCA infarcts or hemorrhage. Even with decompressive hemicraniectomy, patients often have residual neurological deficits as their stroke is usually severe (Guhwe et al., 2016).

Venous thromboembolism (VTE) prevention

Immobility of patients with stroke is a known risk factor for development of VTE. Intermittent compression devices and subcutaneous heparin or low molecular weight heparin (LMWH) may be ordered. VTE is associated with increased mortality and morbidity. Patients with ICH have a higher risk than patients with AIS. One of the major concerns with VTE is the risk of pulmonary embolism, especially in patients who are asymptomatic. Patients should be started on prophylaxis upon admission. Patients who receive thrombolytic therapy should not be started on heparin or LMWH for a full 24 hours after administration. Patients with hemorrhagic stroke should be started on prophylaxis 3–4 days after the event as long as bleeding has stopped. Research indicates that a combination of mechanical and pharmacological intervention provides better outcomes (Green et al., 2021). VTE is treated with IV unfractionated heparin and bridged to warfarin. LMWH dosing is weight-based for 5–7 days with bridging to warfarin. Disadvantages of warfarin are the required regular laboratory studies to assure that the INR is within range. An advantage of warfarin is its low cost. Direct acting oral anticoagulants (DAOC), such as rivaroxaban, do not require ongoing laboratory monitoring but only certain medications can reverse the effects and the cost is high (Green et al., 2021; Guhwe et al., 2016).

Fall prevention

Patients with stroke need a multi-factorial and individualized approach to fall prevention, with particular focus on the patient's neurological deficits (Quigley, 2016). The prevention of falls is an interdisciplinary responsibility. General risk factors for falls include age, lower extremity weakness, orthostasis, neuropathy, anemia, medications, or other chronic medical disorders. Stroke-

specific risk factors include neglect, cognitive deficits (judgment and impulsivity), visual field cuts, balance problems, hemiparesis/plegia, or hemisensory loss. Standard fall risk assessment tools do not take into consideration the deficits that may be present with stroke (Quigley, 2016). Assessment of the patient with stroke should include the three types of falls: anticipated physiological, unanticipated physiological, and accidental. Anticipated physiological falls are those caused by known intrinsic (neurological deficits) and extrinsic (medication or difficulty with mobility equipment) factors. Unanticipated physiological falls result from a sudden change in the patient's condition such as a new stroke, cardiac event, or seizure. Accidental falls are usually caused by a trip hazard in a cluttered bedside environment or inadequate adaptive equipment (Quigley, 2016).

The interdisciplinary team needs to be aware of the type of stroke, its location, and the patient's current deficits. The nurse should know what type of deficits are to be expected based on the location of the stroke. This knowledge will assist the nurse and the team in developing a fall prevention strategy that is individualized to the patient (Quigley, 2016). Areas of attention should focus on the potential deficit that the patient may have. In addition, patients with stroke do not want to give up their independence and may believe that they are able to do more than they can. Education of the patient and family in this area is an important strategy in fall prevention (Guhwe et al., 2016).

Seizures

Seizures may be a presenting symptom in hemorrhagic stroke, especially in patients with AVMs. Seizures may also be a complication after stroke. Approximately 10% of patients with stroke will have seizures, more commonly after hemorrhagic stroke. Post-stroke seizures are associated with longer LOS, increased hospitalization costs, and poorer functional outcomes. Risk factors for post-stroke seizures include large lesions, lesions from cardioembolic events, cortical lesions, and dementia before ICH (Biffi et al., 2016). Early onset seizures are thought to be caused by altered brain metabolism rather than a change in brain tissue. Later onset of seizures after stroke may lead to epilepsy (Guhwe et al., 2016). Treatment of early onset seizures is likely to be preventative and short-term (7 days). Should patients have late onset seizures, evaluation will be performed to assess the need for long-term anti-epileptic drugs (AEDs). It is not recommended to place patients with stroke on prophylactic AEDs (Censullo et al., 2016; Powers et al., 2018).

Nursing Consideration: Patients with SAH are at risk for vasospasm and delayed cerebral ischemia. Astute nursing assessment will identify changes in neurological exam early and allow for early intervention, which may limit any further neurological deficits (Francoeur & Mayer, 2016).

Delayed cerebral ischemia (DCI)

A serious complication of subarachnoid hemorrhage is vasospasm, which may or may not lead to DCI. Delayed cerebral ischemia affects up to 30% of patients with SAH, leaving patients with neurological deficits and a poor quality of life. The extent of hemorrhage in the ventricles and cisterns is a risk factor for DCI. Additionally, a poor neurological status after full resuscitation (fluid, BP management, etc.) is an indicator of a poor prognosis. It was thought that vasospasm in large arteries leads to DCI, but current thought is that DCI develops from a number of complex factors such as microthrombus, cortical spreading depression, early brain injury, and microcirculatory dysfunction that leads to loss of autoregulation (Francoeur & Mayer, 2016).

In order to prevent or detect DCI, nurses must have astute neurologic assessment skills. In patients who are of a lower grade (good neurological status) and can follow commands, simple assessment based on the GCS and number counting may identify early DCI. In patients with higher grade SAH (poor neurological status), other assessments must be undertaken.

Treatment of DCI has three levels. The initial level is induced HTN with a bolus of saline and vasopressors. Nimodipine is also administered at the dose of 60 mg every 4 hours for 21 days. Hypotension can be a problem with nimodipine so the dosage can be adjusted in an effort to prevent it. The second level moves to endovascular therapy with balloon angioplasty or the administration of intra-arterial vasodilators. Additional interventions include augmentation of cardiac output and hemoglobin. The third level includes therapeutic hypothermia, IV vasodilators, and use of the intra-aortic balloon pump. Multi-modality monitoring including ICP monitoring, brain tissue oxygenation, and continuous electroencephalogram (EEG) monitoring can provide early warning of pending DCI, which can then be treated before neurological deficits are present (Censullo et al., 2016).

Hydrocephalus

Hydrocephalus can occur after hemorrhagic stroke, especially SAH or intraventricular hemorrhage (IVH). Hydrocephalus results from blood in the subarachnoid space blocking reabsorption of cerebrospinal fluid (CSF) by the arachnoid villi (King, 2016). Evidence of hydrocephalus may be seen in a change in LOC or observed on a brain CT scan. Initial treatment requires placement of an intraventricular catheter to drain CSF. Hydrocephalus may persist, requiring the placement of a ventriculo-peritoneal (VP) shunt. Generally, hydrocephalus develops in patients with a higher grade (poor neurological status) SAH and the patient will likely require multi-modality monitoring (King, 2016). Nursing care requires careful attention to neurological status and avoiding infection at the insertion site of the intraventricular catheter.

Hyponatremia

Low sodium commonly occurs after SAH. Cerebral salt wasting (CSW) and syndrome of inappropriate antidiuretic hormone (SIADH) may occur. Hyponatremia occurs in up to 35% of patients after hemorrhage. Hyponatremia is defined as a serum sodium < 135 mEq/L. Severe hyponatremia is a serum sodium of < 131 mEq/L (Censullo et al., 2016). Identification of the cause of hyponatremia is important as the treatments differ. CSW is a loss of sodium that leads to a loss of free water, leading to hypovolemic hyponatremia. Syndrome of inappropriate antidiuretic hormone is the result of inappropriate ADH secretion leading to a euvolemic hyponatremia and decreased urine output (King, 2016).

Table 9: Cerebral Salt Wasting versus Syndrome of Inappropriate ADH Secretion

	Cerebral Salt Wasting	SIADH
Urine osmolality	↑	↑
Urine sodium concentration	↑	↑
Extracellular fluid volume	↓	↑
Fluid balance	Negative	Neutral to slightly +
Sodium balance	Negative	Neutral to slightly +

Treatment of hyponatremia includes administration of hypertonic saline (3% sodium chloride) and/or salt tablets. Supplementation with fludrocortisone can also be helpful in raising the sodium level. Hyponatremia can lead to changes in neurological status, permanent deficits, or death if it is not recognized and treated promptly. The nurse's responsibility is to monitor sodium levels before and after initiation of treatment.

Delirium

Delirium is defined as an acute onset of confusion and fluctuating symptoms of inattention, disturbance of consciousness, or disorganized thinking. It is important to remember that the onset is rapid. The patient may experience hallucinations, disorientation, impaired memory, and disturbances in sleep. Delirium may lead to an increased LOS and has been associated with poorer functional outcomes (Qu et al., 2018). Studies have identified that age, history of dementia, history of previous stroke, severity of stroke, and left cortical stroke are associated with delirium (Qu et al., 2018). Patients who have been in the ICU have additional factors that may influence the development of delirium including ICP monitors, ventilator use, sedation, and the ICU environment (King, 2016).

Assessment of delirium needs a valid and reliable instrument such as the Confusion Assessment Method (CAM) or the CAM-ICU (Ely et al., 2001; Inouye et al., 1999). These assessment tools are easy to use and do not take a lot of time to perform. Delirium is initially treated with nonpharmacologic interventions such as reorientation and assuring that all possible metabolic causes of delirium are addressed, such as infection. Additional interventions include normalization of day and night with increased activity and lighting during the day and minimal interventions and darkened environment at night. Medication for delirium is primarily done with psychotropic drugs or neuroleptic medication on a short-term basis. It is important to note that assessment of delirium and treatment with medication is not enough to help the patient. The underlying cause of the delirium needs to be identified and addressed (Kowalska et al., 2020).

Dysphagia

Dysphagia is a common sequela to a stroke and occurs in 42%–57% of patients. Half of the patients who present with dysphagia aspirate and one-third of those patients develop pneumonia (Guhwe et al., 2016). Silent aspiration (aspiration without cough) increases the risk for pneumonia even more. Because patients have difficulty swallowing, they are at risk for dehydration, malnutrition, increased LOS, and death. Injury to the cerebral hemispheres (MCA distribution) as a result of a stroke impairs voluntary control over swallowing because of contralateral weakness of the face, lip, and tongue. Injury to the frontal lobes may lead to abulia (inability to act decisively) leading to pocketing of food and increased aspiration risk. Brainstem strokes can change the sensation in the mouth and affect the timing of the swallow because of injuries to cranial nerves.

Tools are available for screening patients for swallowing difficulties, but no tool is recommended as superior to another. A tool that is valid and reliable and assesses the risk for aspiration and whether oral feeding is appropriate is important. The swallow screen should be a pass/fail screen and provide information regarding the need for additional testing and intervention by an SLP. The three ounces bedside water swallow screen can be easily done by the bedside clinician. If the patient fails the screen, the patient is NPO until evaluated by the SLP. In addition, the patient should remain NPO until the screen and evaluation are completed (Green et al., 2021; Guhwe et al., 2016; Joundi et al., 2017). Evaluation by the SLP may include a fiberoptic endoscopic evaluation of swallow (FEES) or a modified barium swallow (Smith et al., 2018). Patients who fail a swallowing evaluation are at higher risk for needing a feeding tube, longer hospital LOS, and likelihood of transfer to a long-term care facility after discharge from the acute hospital (Marin et al., 2018). Interventions for dysphagia include modification of the diet (liquid and viscosity modifications), upright positioning for feeding, placement of an enteral feeding tube, and treatment by an SLP that might include oral exercises, stimulation of the oropharynx, and olfactory stimulation (Guhwe et al., 2016). The bedside clinician is in an opportune position to observe and screen patients with stroke and institute interventions that prevent aspiration and its associated sequelae.

Depression

Depression after stroke may affect up to 30%–50% of patients (Guhwe et al., 2016). In addition, racial and ethnic disparities exist. Hispanics have a higher risk of post-stroke depression (PSD) compared to African Americans or Whites. Puerto Ricans have a 4.5 times higher risk of PSD compared to Whites, and other Hispanics have a three times higher risk of PSD (Fei et al., 2016). The pathophysiology of PSD is not well understood. It is thought that there are multiple neurological influences in addition to psychological influences that lead to PSD. Some of the theories include disruption of brain pathways in the frontal cortex and basal ganglia. Early onset of PSD may be related to disruption of the networks that support emotion (Guhwe et al., 2016). Other evidence suggests that pro-inflammatory cytokines and tumor necrosis factor alpha causes the reduction of serotonin after the stroke (Robinson & Jorge, 2016; Towfighi et al., 2017). Others suggest that the physical impairment and psychological (cognitive issues) manifestations of stroke lead to PSD (Robinson & Jorge, 2016).

Assessment for PSD should begin in the acute setting. For bedside clinicians a depression screen needs to be reliable, sensitive, and easy to use (Mitchell, 2016). Examples of screening tools used in the acute setting include Patient Health Questionnaire (PHQ-2 or PHQ-9), a single question screen, a 15 or 30 question Geriatric Depression Scale, and the Montgomery-Asberg Depression Rating Scale. One concern for the bedside clinician is the time needed to administer some of these tests. Ideally, the nurse could ask a few questions and determine if further intervention is required. Screening tools that meet these criteria are the PHQ and the single question screen (Mitchell, 2016). The one question screen asks "Do you often feel sad or depressed?" (Watkins et al., 2007). The PHQ asks up to nine questions related to sleep, activity, and other dimensions by asking the patient to reflect on the past 2 weeks (Ginkel et al., 2012). There is also a two-question version of the PHQ that takes less than 5 minutes to administer.

Treatment of PSD is multifactorial and includes the administration of antidepressants and psychotherapy. Various types of antidepressants have been studied in PSDw. These include selective serotonin reuptake inhibitors (SSRIs) and tricyclic antidepressants (TCAs). There is not one class of drug that has been shown to be superior in the treatment of PSD. The decision to start antidepressants should be based on the symptoms, side effects, previous treatment of depression, and any other medications that the patient is taking (Guhwe et al., 2016). TCAs may be used in those who do not respond to SSRIs, but the muscarinic and anticholinergic effects may limit their use.

Psychotherapy is an important adjunct to antidepressants and can be very helpful. Unfortunately, psychotherapy is costly and time intensive (Guhwe et al., 2016) and not always available in the acute setting. SSRIs have been shown to improve functional recovery. Patients may not show evidence of PSD until 3 months or more after stroke, thus family members and caregivers need

to be educated to be observant of changes that might indicate PSD. Another area of consideration is that of depression in the caregivers for those who have had a stroke. Caregiving can be a burden and depression is common (Robinson & Jorge, 2016).

IN-HOSPITAL STROKE

In-hospital stroke occurs in approximately 35,000 – 75,000 patients each year in the US. In-hospital strokes usually occur in patients who are admitted for another reason, such as cardiac surgery or diagnostic testing. Stroke may be missed in these patients because of the assumption that changes in condition are related to sedation or anesthesia (Nouh et al., 2022). Patients who have a stroke while hospitalized often have more comorbidities, and are more likely to have poorer conditioning and cardioembolic events. Patients who are in the hospital for TIA and who have had to stop antithrombotic medication are also at risk for an in-hospital stroke.

Approximately half of in-house code strokes are ultimately determined to be a stroke mimic such as altered mental status. Other stroke mimics were previously described (Moulin & Leys, 2019; Nouh et al., 2022) Time from recognition to treatment of an in-house stroke tends to be longer than with strokes that are identified in the community, thus it is important for all staff to be able to identify a possible stroke. Patients with an in-house stroke may have worse outcomes likely because of premorbid conditions, not receiving care on a designated stroke unit, and severity of stroke. Imaging and the use of thrombolysis may help to decrease stroke severity (Nouh et al., 2022).

Recommendations for recognition and treatment of in-house stroke include education of all staff on stroke symptoms, clear process for calling a "code stroke", written protocols to expedite treatment, identification of barriers to treatment or to transfer to a stroke center, and quality improvement initiatives (Nouh et al., 2022).

Prevention of a second stroke

Secondary stroke prevention consists of multiple interventions which will be further discussed here (Bridgwood B et al., 2018; Caprio & Sorond, 2019; Kleindorfer et al., 2021):

- **Treatment of HTN**: Patients should have a BP of ≤ 140/90 mmHg. This is accomplished through the use of antihypertensive medications, diet, and exercise.
- **Treatment of dyslipidemia**: Patients should be discharged from the acute care setting on a statin with lipid lowering ability to a goal of LDL-C < 100 mg/dl.
- **Glucose management**: Patients with a potential for diabetes should be screened with fasting glucose, hemoglobin A1C (Hgb A1C), or a glucose tolerance test. Hgb A1C provides better information regarding glucose status over time. Patients should be started on appropriate diabetes medication and lifestyle modification.
- **Obesity**: Patients should be screened for obesity and associated lifestyle modifications should be recommended.
- **Physical activity**: Patients who are inactive but willing to increase physical activity should be referred to a program that will provide behavioral and comprehensive care.
- **Nutrition**: Patients should be counseled to eat a low-salt Mediterranean diet.
- **Sleep apnea**: There is a high prevalence of sleep apnea in patients with stroke and referral to a sleep center should be considered. Continuous positive airway pressure (C-PAP) has shown good outcomes in patients with sleep apnea and should be used.
- **Atrial fibrillation**: warfarin, apixaban, or dabigatran are all appropriate interventions for non-valvular atrial fibrillation after the risk score has been evaluated (Vitali et al., 2019). The type of medication prescribed is based on patient tolerance of side effects and other considerations like cost. Warfarin requires ongoing laboratory monitoring. For patients who have had a TIA and are unable to take anticoagulation, aspirin is recommended.
- Additional recommendations are outlined in "2021 Guideline for the Prevention of Stroke in Patients with Stroke and Transient Ischemic Attack" (Kleindorfer et al., 2021).

EQUITY IN HEALTHCARE

It is estimated that approximately 28% of Americans are racial and ethnic minorities. This is expected to increase to nearly 40% by 2030. Hispanic Americans are the largest growing group in the United States and account for about 15% of the population. African Americans represent about 12%. It is anticipated that the percentage of racial/ethnic minorities will double by 2050 (Day, 1996). Healthcare providers need to be aware of the diversity of the population and assure that patients receive care needed at the time of a stroke. Research has shown that racial/ethnic disparities exist in healthcare (Cruz-Flores et al., 2011; Gardener et al., 2020; Skolarus et al., 2020).

Social determinants of health

The World Health Organization (WHO) has defined social determinants of health (SDOH) as the conditions in which people are born, grow, work, live, and age in the context of a set of forces and conditions that affect daily life (Solar & Irwin, 2010) A variety of factors have been shown to influence cerebrovascular disease, particularly stroke. These factors include economic, physical environment, education, community, and food (Wang et al., 2020). These factors have been associated with utilization of healthcare facilities, particularly emergency departments, increased readmission rates, and increased odds of hospitalization. Research has shown that socioeconomic status (SES), education, employment income, environmental factors, and food insecurity contribute to poorer outcomes for those with cerebrovascular disease (Wang et al., 2020). In one study, individuals that had an increased number of SDOH also had a 2.5 times higher risk of stroke when compared to those with no SDOH (Reshetnyak et al., 2020).

Healthy People 2030 has emphasized the need to address SDOH in order to improve health for all. It describe the following key components of SDOH: economic stability, education, social and community context, health and healthcare, and neighborhood and built environment (US Department of Health and Human Services, 2020). Each of these have sub- categories that need to be considered such as employment, early childhood education, civic participation, access to healthcare, and access to food that supports healthy eating (US Department of Health and Human Services, 2020).

Risk of bias in stroke care

Clinical decision making involves two methods, implicit and explicit decisions. Implicit decisions are unconscious and based on intuition while explicit decisions are based on scientific evidence and logic (Bhat et al., 2021). Bias makes assumptions about groups based on age, race, gender, SES and health literacy. These biases can lead to unintended inequality and disparities in the provision of healthcare in general and stroke care specifically (Bhat et al., 2021). While the focus recently has been on racial bias, other biases exist and the healthcare provider needs to understand their own biases as they provide care. These biases include age, gender, weight, gender identity, religion, SES, disability status, and others (Stamps, 2021).

Narayan describes the effects of implicit bias in healthcare and these include inadequate patient assessment, inadequate diagnosis and treatment, less time providing patient care, and discharge with inadequate follow-up (Narayan, 2019). It is possible to identify implicit bias in oneself and one way to do that is to take an assessment. One website that can be accessed for this is called Project Implicit (https://implicit.harvard.edu/implicit/education.html). The website offers 14 tests to identify one's biases. The tests take approximately 10 minutes and cover many areas, including race. These tests are readily accessible and free.

In a systematic review, the authors identified that implicit bias is as prevalent in healthcare professionals as it is in the general population. In addition, implicit bias affects relationships with patients and biases may influence treatment decisions and levels of care. More research is needed in this area, especially in the care of patients with stroke (FitzGerald & Hurst, 2017).

END-OF-LIFE CARE

Not all patients survive their stroke. For patients that have a devastating ischemic or hemorrhagic stroke, the goal of care is a comfortable death. In general, stroke is a disease of older individuals, but since stroke can occur at any age, it is important that patients and families know the prognosis and can make informed decisions. Research has shown that patients at higher risk for death include those with multiple comorbidities, higher NIHSS scores on admission, atrial fibrillation (or other cardioembolic source), and those who require mechanical ventilation and placement of a gastric feeding tube (Guhwe et al., 2016). Patients with stroke who die in the hospital usually do so because of the size and location of the stroke. Large MCA strokes with edema or brainstem strokes are two etiologies of early hospital death.

Evidence-based practice alert! Families are unprepared for a stroke event. Research has shown that family presence in the ICU, conversations about goals of care, and shared decision-making are critical during the ICU stay (Davidson et al., 2017; Kon et al., 2016b).

Because stroke is a sudden and acute event, families are often not prepared for the drastic change in the patient. They are coping with the sudden admission to the hospital, the various lines and tubes, and the ICU environment. The bedside nurse is in an ideal position to explain all that is happening to the patient, but the bedside nurse is responsible for the care of the patient and, if the patient is critically ill, may not have enough time to address family needs.

Families may not have had any discussions regarding the patient's wishes and thus may feel overwhelmed. Guidelines for patients in the ICU recommend family presence in the ICU, family support, communication with family members, and consultations specific to the needs of the family (Davidson et al., 2017).

Another intervention is shared decision-making. Shared decision-making centers around medical information about the patient, deliberation, and making a treatment decision (Kon et al., 2016a). Ideally, the patient and the legally authorized representative (LAR) are able to discuss treatment options and determine a plan of care. This is not always possible because of the condition of the patient. Often, the LAR or the clinician will be the decision maker based on the situation. It is important to come to consensus on the treatment plan. The discussion regarding patient prognosis needs to be detailed and will likely occur away from the patient's bedside. Ideally, the bedside nurse will be part of that discussion and will be able to support the family as they discuss treatment options.

One area that is often overlooked or delayed is consultation by the palliative care team. The palliative care team is a resource to patients, families, and staff to set goals of care and determine appropriate interventions. The responsibilities of the palliative care team include education, support, and providing orders for patient comfort (Kon et al., 2016b). The nurse's role is to assure that the needs of the patient and family are heard. Family members are under stress at the time of the event and may not make rational decisions. Families should not feel pressured to make decisions but be given a reasonable period of time to consider all of the information presented to them (Braun et al., 2016; Gao et al., 2021). For patients that are placed on comfort care measures, they are often transferred to an acute medical-surgical or stroke unit for their final care. Families are often reluctant to transfer because they have developed a relationship with the ICU nurses. Nurses on general medical units have a higher patient load and may have difficulty meeting the needs of the family. Consults from social services and chaplaincy can assist the nurse in meeting these needs. Comfort care is not "no care." Patients should be turned and suctioned as needed, and pain issues should be addressed. Family members need education that the nurse is providing appropriate care for the comfort of the patient.

Patient and family education

Patients and family members are often overwhelmed at the time of discharge from an acute care hospital. Education includes information on the purpose, dosage, and side effects of any medications, especially if newly prescribed. Personalized information about stroke risk factors and lifestyle modification using the teach-back method will assist in reinforcing any information provided. Knowing when to call 911 for stroke symptoms is very important. One way for patients and family members to remember symptoms of a stroke is using FAST (Face, Arms, Speech, Time). Retrieved from: https://www.stroke.org/en/life-after-stroke/preventing-another-stroke.

The AHA/ASA has patient education regarding all of these topics and more at their website: https://www.stroke.org/en/about-stroke/effects-of-stroke.

Rehabilitation

While the scope of this educational offering is on the patient with an acute stroke, nurses need to be aware of potential destinations upon discharge. Patients may go to an acute rehabilitation facility, long-term acute care, skilled nursing facility, home, or hospice. The bedside nurse should be aware of the offerings and purpose of each facility. For patients going home, the caregiver may need in-hospital education before discharge. Caregivers also need information regarding resources available in the community (Suarez, 2016). Additional information about rehabilitation can be found in "Guidelines for Adult Rehabilitation and Recovery" (Winstein et al., 2016).

STROKE SYSTEMS OF CARE

A system of care is a healthcare model that covers the continuum of services for a specific population of patients. These systems are developed over a geographic area at the state and regional level. The Institute for Healthcare Improvement (IHI) has developed a program called the Triple Aim for Populations. The framework describes an approach to optimizing health system performance to simultaneously improve care, improve population health, and reduce costs per capita (http://www.ihi.org/Topics/TripleAim/Pages/Overview.aspx).

Stroke systems of care contribute to uniformity of care across any health system. The overall goal of establishing stroke systems of care is to improve patient care from the time they enter a facility with stroke-like systems, through treatment, and also through the rehabilitation phase.

The AHA/ASA developed guidelines for stroke systems of care that outline different levels of care and the responsibilities of personnel at each level.

Certification of centers of care is performed by The Joint Commission, Det Norske Veritas, Healthcare Facilities Accreditation Program, and state health departments. Each of these have requirements that must be met to declare that the hospital is certified to care for stroke patients. Uniformity of care across health systems by developing stroke systems of care also assists in data collection across systems to continue to improve patient care (Adeoye et al., 2019).

Stroke centers of care:

- **Acute Stroke-Ready Hospital (ASRH)**: Approximately 50% of stroke patients do not live in a geographical location that is amenable to rapid treatment and transfer of patients with stroke (> 60 miles away). The ASRH is a small, often rural, hospital. The ASRH should be able to supply care with components of the primary stroke center, including the ability to administer t-PA. Minimal staffing would be a physician and a nurse with stroke training who are on call 24/7 and can get to the hospital within 15 minutes. Other elements include written stroke protocols, emergency medical system (EMS), an ED, laboratory studies, brain imaging, and emergent therapies (blood pressure management, IV t- PA, and reversal of coagulopathy; Alberts et al., 2013). The ASRH should provide initial treatment and then transfer to a Primary Stroke Center (PSC) or comprehensive stroke center (CSC).
- **Primary Stroke Center (PSC)**: The PSC is a hospital that can provide care for the patient with a stroke upon admission through the ED. The patient is not transferred to another facility. Recommendations include an acute stroke team that can be at the bedside within 15 minutes, EMS for transport to the nearest facility, ED services that can identify and initially treat a patient presenting with stroke, an acute stroke unit with multi-channel monitoring capability, and nursing staff who are educated on the management of the patient with stroke (Alberts et al., 2011). Additional recommendations are the presence of laboratory services, imaging, administrative support, and certification of the center as a PSC (Alberts et al., 2011).
- **Thrombectomy-Capable Stroke Center (TSC)**: This is a new level of care and is somewhat controversial. The TSC is a center that has the ability to provide thrombectomy but is not a CSC. For hospitals that can provide thrombectomy but are not near a CSC, the designation of TSC seems reasonable. For communities where there is a CSC, the recommendation is to transfer the patient to the facility that provides the highest level of care (Adeoye et al., 2019).
- **Comprehensive Stroke Center (CSC)**: In the United States there are approximately 1500 PSCs and 200 CSCs. CSCs are frequently in tertiary and quaternary hospitals. CSCs see the most complex patients with stroke and provide critical care, neurosurgery, endovascular treatment, and multiple imaging techniques. Because of the volume of patients seen, these centers are able to provide high level quality care with good outcomes (Adeoye et al., 2019).
- **Mobile Stroke Units (MSU)**: The first MSU was developed in Houston, TX. MSUs had been in use in Germany but had not been introduced in the United States, likely because of the complexity of developing such a program. MSUs are able to provide high-level medical care while the patient is enroute to the hospital. MSUs contain a CT scanner, medications, laboratory capability, and are staffed with a registered nurse and a vascular neurologist (Fatima et al., 2020). Thrombolysis can be started in the MSU, thus decreasing the time for administration that might exist if waiting until arrival at the ED (Fatima et al., 2020).

(Hundt & Belmont, 2020)

The Joint Commission provides a table for comparison of the four levels of stroke care. It can be found at: https://www.jointcommission.org/certification/advanced_certification_comprehensive_stroke_centers.aspx

Quality measures

Quality measures assist in identifying areas for improvement and for success and include the following.

Get with the Guidelines-Stroke (GWTG-S)
The AHA developed the GWTG-S program in 2003. The goals are to improve in-hospital stroke care by adhering to the latest scientific evidence. This is a comprehensive program to support quality stroke care. The AHA provides tools, a registry, education, and up-to-date information regarding stroke care.

The following is a list of outcome measures for this program:

- **IV Thrombolysis**: arrive by 3.5 hours, treat by 4.5 hours: Percent of acute ischemic stroke patients who arrive at the hospital within 210 minutes (3.5 hours) of time last known well and for whom thrombolysis was initiated at this hospital within 270 minutes (4.5 hours) of time last known well. Corresponding measure available for inpatient stroke cases.
- **Early antithrombotics**: Percent of patients with ischemic stroke or TIA who receive antithrombotic therapy (e.g., low dose aspirin, clopidogrel, dipyridamole) by the end of hospital day two. Corresponding measures available for observation status only and inpatient stroke cases.
- **VTE prophylaxis**: Percent of patients with ischemic stroke, hemorrhagic stroke, or stroke not otherwise specified who receive VTE prophylaxis the day of or the day after hospital admission.
- **Antithrombotic**: Percent of patients with an ischemic stroke or TIA prescribed antithrombotic therapy at discharge. Corresponding measures available for observation status only and inpatient stroke cases.
- **Anticoagulation for A-Fib/A-flutter**: Percent of patients with an ischemic stroke or TIA with atrial fibrillation/flutter discharged on anticoagulation therapy. Corresponding measures available for observation status only as well as inpatient stroke cases.
- **Smoking cessation**: Percent of patients with ischemic or hemorrhagic stroke, or TIA with a history of smoking cigarettes, who are, or whose caregivers are, given smoking cessation advice or counseling during hospital stay. Corresponding measures available for observation status only and inpatient stroke cases.

- **Intensive statin**: Percent of ischemic stroke or TIA patients who are discharged on intensive statin therapy. Corresponding measures available for observation status only as well as inpatient stroke cases.

The list below includes the GWTG-S comprehensive measures:

- **Door to arterial puncture time**: Time from arrival to arterial puncture for ischemic stroke patients treated at the hospital with intra-arterial catheter-based treatment.
- **Median time to INR reversal (comprehensive)**: Median time to INR reversal in patients treated with procoagulant reversal agent for warfarin related ICH.
- **Median time to procoagulant treatment for ICH (comprehensive)**: Median time to treatment with a procoagulant reversal agent for warfarin related ICH.
- **Thrombolysis in cerebral infarction (TICI) post-treatment reperfusion grade (comprehensive)**: Patients grouped by TICI post-treatment reperfusion grade.

Hospitals provide their data online and are recognized at the bronze, silver, or gold levels by the AHA/ASA:

- **Bronze** recognizes performance of 90 consecutive days.
- **Silver** recognizes performance of 12 consecutive months.
- **Gold** recognizes performance of 24 consecutive months or more.

https://www.heart.org/en/professional/quality-improvement/get-with-the-guidelines/get-with-the-guidelines-stroke

The Joint Commission (TJC) quality measures

Note that the numbers are not sequential, and some numbers may be omitted because of revision of the measures. The following are the Stroke Core (STK) measures:

- STK-1 Venous Thromboembolism (VTE) Prophylaxis.
- STK-2 Discharged on Antithrombotic Therapy.
- STK-3 Anticoagulation Therapy for Atrial Fibrillation/Flutter. STK-4 Thrombolytic Therapy.
- STK-5 Antithrombotic Therapy by End of Hospital Day Two. STK-6 Discharged on Statin Medication.
- STK-8 Stroke Education.
- STK-10 Assessed for Rehabilitation.

For CSCs, there are 10 measures specific to CSC certification plus the eight core measures listed above.

The following are the 10 Comprehensive Stroke (CSTK) measures required for discharges on or after January 1, 2018:

- CSTK-01 National Institutes of Health Stroke Scale (NIHSS) Score Performed for Ischemic Stroke Patients.
- CSTK-02 Modified Rankin Score (mRS) at 90 Days.
- CSTK-03 Severity Measurement Performed for SAH and ICH Patients.
- CSTK-04 Procoagulant Reversal Agent Initiation for Intracerebral Hemorrhage (ICH).
- CSTK-05 Hemorrhagic Transformation.
- CSTK-06 Nimodipine Treatment Administered.
- CSTK-08 Thrombolysis in Cerebral Infarction (TICI) Post-Treatment Reperfusion Grade.
- CSTK-09 Arrival Time to Skin Puncture.
- CSTK-10 Modified Rankin Score (mRS) at 90 Days: Favorable Outcome.
- CSTK-11 Rate of Rapid Effective Reperfusion from Hospital Arrival.
- CSTK-12 Rate of Rapid Effective Reperfusion from Skin Puncture.

https://www.jointcommission.org/performance_measures_for_comprehensive_stroke_centers

Evidence-based practice alert! The outcome measures outlined above are based on research. The bedside clinician is part of the team that assists in assuring that these outcome measures are met. Interventions such as VTE prophylaxis, dysphagia screening, and stroke education are the purview of the bedside nurse and can have a significant impact on outcome (Howard, 2018; Ormseth, 2017).

Conclusion

This overview of acute stroke has included information essential to the care of the patient in the hospital setting. The trajectory of stroke continues after discharge from the hospital to the rehabilitation facility and eventually to home. Patients and families need a great deal of support to deal with the changes that have occurred because of the stroke. Nurses are in the best position to do this.

References

- Adeoye, O., Nyström, K. V., Yavagal, D. R., Luciano, J., Nogueira, R. G., Zorowitz, R. D., Khalessi, A. A., Bushnell, C., Barsan, W. G., Panagos, P., Alberts, M. J., Tiner, A. C., Schwamm, L. H., & Jauch, E. C. (2019). Recommendations for the establishment of stroke systems of care: A 2019 update. *Stroke*, *50*(7), e187-e210. https://doi.org/10.1161/STR.0000000000000173
- Albers, G. W., Caplan, L. R., Easton, J. D., Fayad, P. B., Mohr, J., Saver, J. L., & Sherman, D. G. (2002). Transient ischemic attack—proposal for a new definition. *New England Journal of Medicine*, *347*(21), 1713-1716.
- Alberts, M. J., Latchaw, R. E., Jagoda, A., Wechsler, L. R., Crocco, T., George, M. G., Connolly, E. S., Mancini, B., Prudhomme, S., Gress, D., Jensen, M. E., Bass, R., Ruff, R., Foell, K., Armonda, R. A., Emr, M., Warren, M., Baranski, J., & Walker, M. D. (2011). Revised and updated recommendations for the establishment of primary stroke centers. *Stroke*, *42*(9), 2651-2665. https://doi.org/10.1161/STROKEAHA.111.615336
- Alberts, M. J., Wechsler, L. R., Jensen, M. E. L., Latchaw, R. E., Crocco, T. J., George, M. G., Baranski, J., Bass, R.
- R., Ruff, R. L., Huang, J., Mancini, B., Gregory, T., Gress, D., Emr, M., Warren, M., & Walker, M. D. (2013). Formation and function of acute stroke-ready hospitals within a stroke system of care: Recommendations from the Brain Attack Coalition. *Stroke*, *44*(12), 3382-3393. https://doi.org/10.1161/STROKEAHA.113.002285
- Amarenco, P., Lavallée, P. C., Labreuche, J., Albers, G. W., Bornstein, N. M., Canhão, P., Caplan, L. R., Donnan, G. A., Ferro, J. M., Hennerici, M. G., Molina, C., Rothwell, P. M., Sissani, L., Školoudík, D., Steg, P. G., Touboul, P.-J., Uchiyama, S., Vicaut, É., & Wong, L. K. S. (2016). One-year risk of stroke after transient ischemic attack or minor stroke. *New England Journal of Medicine*, *374*(16), 1533-1542. https://doi.org/10.1056/NEJMoa1412981
- Bell, D. J. & Gaillard, F. (n.d.). Spetzler-Martin arteriovenous malformation grading system. Retrieved August 8, 2019, from https://radiopaedia.org/articles/spetzler-martin-arteriovenous-malformation-grading-system-2?lang=us
- Benjamin, E. J., Muntner, P., Alonso, A., Bittencourt, M. S., Callaway, C. W., Carson, A. P., Chamberlain, A. M., Chang, A. R., Cheng, S., Das, S. R., Delling, F. N., Djousse, L., Elkind, M. S. V., Ferguson, J. F., Fornage, M., Jordan, L. C., Khan, S. S., Kissela, B. M., Knutson, K. L., . . . Virani, S. S. (2019). Heart disease and stroke statistics-2019 update: A report from the American Heart Association. *Circulation*, *139*(10), e56-e528. https://doi.org/10.1161/CIR.0000000000000659
- Bhat, A., Mahajan, V., & Wolfe, N. (2021). Implicit bias in stroke care: A recurring old problem in the rising incidence of young stroke. *Journal of Clinical Neuroscience*, *85*, 27-35. https://doi.org/10.1016/j.jocn.2020.12.017
- Biffi, A., Rattani, A., Anderson, C. D., Ayres, A. M., Gurol, E. M., Greenberg, S. M., Rosand, J., & Viswanathan, A. (2016). Delayed seizures after intracerebral haemorrhage. *Brain*, *139*(10), 2694-2705. https://doi.org/10.1093/brain/aww199
- Bogason, E., Morrison, K., Zalatimo, O., Ermak, D. M., Lehman, E., Markley, E., & Cockroft, K. (2017). Urinary tract infections in hospitalized ischemic stroke patients: Source and impact on outcome. *Cureus*, *9*(2), e1014-e1014.
- Braun, L. T., Grady, K. L., Kutner, J. S., Adler, E., Berlinger, N., Boss, R., Butler, J., Enguidanos, S., Friebert, S., Gardner, T. J., Higgins, P., Holloway, R., Konig, M., Meier, D., Morrissey, M. B., Quest, T. E., Wiegand, D. L., Coombs- Lee, B., Fitchett, G., . . . Roach, W. H. (2016). Palliative care and cardiovascular disease and stroke: A Policy Statement from the American Heart Association/American Stroke Association. *Circulation*, *134*(11), e198-e225. https://doi.org/10.1161/CIR.0000000000000438
- Bridgwood B, Lager KE, Mistri AK, Khunti K, Wilson AD, & Modi, P. (2018). Interventions for improving modifiable risk factor control in the secondary prevention of stroke. *Cochrane Database of Systematic Reviews* (5 Art. No.: CD009103). https://doi.org/10.1002/14651858.CD009103.pub3
- Broderick, J. P., Adeoye, O., & Elm, J. (2017). Evolution of the Modified Rankin Scale and its use in future stroke trials. *Stroke*, *48*(7), 2007-2012. https://doi.org/doi:10.1161/STROKEAHA.117.017866
- Campbell, B. C. V., Mitchell, P. J., Churilov, L., Yassi, N., Kleinig, T. J., Dowling, R. J., Yan, B., Bush, S. J., Dewey, H. M., Thijs, V., Scroop, R., Simpson, M., Brooks, M., Asadi, H., Wu, T. Y., Shah, D. G., Wijeratne, T., Ang, T., Miteff, F., . . . Davis, S. M. (2018). Tenecteplase versus alteplase before thrombectomy for ischemic stroke. *New England Journal of Medicine*, *378*(17), 1573-1582. https://doi.org/10.1056/NEJMoa1716405
- Caprio, F. Z. & Sorond, F. A. (2019). Cerebrovascular disease: Primary and secondary stroke prevention. *Medical Clinics of North America*, *103*(2), 295-308.
- Carroll, D. & Gaillard, F. (n.d.). Cerebral vasospasm following subarachnoid hemorrhage. Retrieved August 8, 2019, from https://radiopaedia.org/articles/cerebral-vasospasm-following-subarachnoid-haemorrhage?lang=us
- Casper, C. L. & Graves, A. M. (2016). Intracerebral hemorrhagic stroke. In J. V. Hickey & S. L. Livesay (Eds.), *The continuum of stroke care: An interprofessional approach to evidence-based care* (pp. 116-140). Wolters Kluwer.
- Censullo, J. L., Harris, C., Keigher, K. M., & Livesay, S. (2016). Hemorrhagic stroke. In M. K. Bader, L. R. Littlejohns, & D. M. Olson (Eds.), *AANN core curriculum for neuroscience nursing* (pp. 247-266). American Association of Neuroscience Nurses.
- Centers for Disease Control and Prevention. (n.d.). *Stroke Facts*. Retrieved March 25, 2022 from https://www.cdc.gov/stroke/facts.htm
- Chung, D. Y., Abdalkader, M., & Nguyen, T. N. (2021). Aneurysmal subarachnoid hemorrhage. *Neurologic Clinics*, *39*(2), 419-442.
- Clissold, B., Phan, T. G., Ly, J., Singhal, S., Srikanth, V., & Ma, H. (2020). Current aspects of TIA management. *Journal of Clinical Neuroscience*, *72*, 20-25.
- Cruz-Flores, S., Rabinstein, A., Biller, J., Elkind, M. S. V., Griffith, P., Gorelick, P. B., Howard, G., Leira, E. C., Morgenstern, L. B., Ovbiagele, B., Peterson, E., Rosamond, W., Trimble, B., & Valderrama, A. L. (2011). Racial-ethnic disparities in stroke care: The American experience. *Stroke*, *42*(7), 2091-2116. https://doi.org/doi:10.1161/STR.0b013e3182213e24
- Davidson, J. E., Aslakson, R. A., Long, A. C., Puntillo, K. A., Kross, E. K., Hart, J., Cox, C. E., Wunsch, H., Wickline, M. A., Nunnally, M. E., Netzer, G., Kentish-Barnes, N., Sprung, C. L., Hartog, C. S., Coombs, M., Gerritsen, R. T., Hopkins, R. O., Franck, L. S., Skrobik, Y., . . . Curtis, J. R. (2017). Guidelines for family-centered care in the neonatal, pediatric, and adult ICU. *Critical Care Medicine*, *45*(1), 103-128. https://doi.org/10.1097/ccm.0000000000002169 Day, J. C. (1996). *Population projections of the United States by age, sex, race, and Hispanic origin: 1995 to 2050.* (P25-1130). Washington, DC: U.S. Government Printing Office
- Del Brutto, V. J., Ardelt, A., Loggini, A., Bulwa, Z., El-Ammar, F., Martinez, R. C., Brorson, J., & Goldenberg, F. (2019). Clinical characteristics and emergent therapeutic interventions in patients evaluated through the in-hospital stroke alert protocol. *Journal of Stroke and Cerebrovascular Diseases*, *28*(5), 1362-1370.
- Derdeyn, C. P., Zipfel, G. J., Albuquerque, F. C., Cooke, D. L., Feldmann, E., Sheehan, J. P., & Torner, J. C. (2017). Management of brain arteriovenous malformations: A scientific statement for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*, *48*(8), e200-e224. https://doi.org/10.1161/STR.0000000000000134
- Dhakal, P., Rayamajhi, S., Verma, V., Gundabolu, K., & Bhatt, V. R. (2017). Reversal of anticoagulation and management of bleeding in patients on anticoagulants. *Clinical and AppliedThrombosis/Hemostasis*, *23*(5), 410-415. https://doi.org/10.1177/1076029616675970
- Ely, E. W., Inouye, S. K., Bernard, G. R., Gordon, S., Francis, J., May, L., Truman, B., Speroff, T., Gautam, S., Margolin, R., Hart, R. P., & Dittus, R. (2001). Delirium in mechanically ventilated patients: Validity and reliability of the Confusion Assessment Method for the Intensive Care Unit (CAM-

ICU). *Journal of the American Medical Association, 286*(21), 2703-2710. https://doi.org/10.1001/jama.286.21.2703
- Evrard, H. C. (2019). The organization of the primate insular cortex [Review]. *Frontiers in Neuroanatomy, 13*. https://doi.org/10.3389/fnana.2019.00043
- Fatima, N., Saqqur, M., Hussain, M. S., & Shuaib, A. (2020). Mobile stroke unit versus standard medical care in the management of patients with acute stroke: A systematic review and meta-analysis. *International Journal of Stroke, 15*(6), 595-608. https://doi.org/10.1177/1747493020929964
- Fei, K., Benn, E. K. T., Negron, R., Arniella, G., Tuhrim, S., & Horowitz, C. R. (2016). Prevalence of depression among stroke survivors. *Stroke, 47*(2), 512-515. https://doi.org/10.1161/STROKEAHA.115.010292
- Felling, R. J., Sun, L. R., Maxwell, E. C., Goldenberg, N., & Bernard, T. (2017). Pediatric arterial ischemic stroke: Epidemiology, risk factors, and management. *Blood Cells, Molecules, and Diseases, 67*, 23-33. https://doi.org/10.1016/j.bcmd.2017.03.003
- FitzGerald, C. & Hurst, S. (2017). Implicit bias in healthcare professionals: A systematic review. *BMC Medical Ethics, 18*(1), 19. https://doi.org/10.1186/s12910-017-0179-8
- Francoeur, C. L. & Mayer, S. A. (2016). Management of delayed cerebral ischemia after subarachnoid hemorrhage. *Critical Care, 20*(1), 277. https://doi.org/10.1186/s13054-016-1447-6
- Galiczewski, J. M. & Shurpin, K. M. (2017). An intervention to improve the catheter associated urinary tract infection rate in a medical intensive care unit: Direct observation of catheter insertion procedure. *Intensive and Critical Care Nursing, 40*, 26-34. https://doi.org/https://doi.org/10.1016/j.iccn.2016.12.003
- Gao, L., Zhao, C. W., & Hwang, D. Y. (2021). End-of-life care decision-making in stroke. *Frontiers in Neurology, 12*, 702833-702833. https://doi.org/10.3389/fneur.2021.702833
- Gardener, H., Sacco, R. L., Rundek, T., Battistella, V., Cheung, Y. K., & Elkind, M. S. V. (2020). Race and ethnic disparities in stroke incidence in the Northern Manhattan Study. *Stroke, 51*(4), 1064-1069. https://doi.org/doi:10.1161/STROKEAHA.119.028806
- Ginkel, J. M. D., Gooskens, F., Schepers, V. P. M., Schuurmans, M. J., Lindeman, E., & Hafsteinsdóttir, T. B. (2012). Screening for poststroke depression using the Patient Health Questionnaire. *Nursing Research, 61*(5), 333–341. https://doi.org/10.1097/NNR.0b013e31825d9e9e
- Green, T. L., McNair, N. D., Hinkle, J. L., Middleton, S., Miller, E. T., Perrin, S., Power, M., Southerland, A. M., & Summers, D. V. (2021). Care of the patient with acute ischemic stroke (posthyperacute and prehospital discharge): Update to 2009 comprehensive nursing care Scientific Statement: A Scientific Statement from the American Heart Association. *Stroke, 52*(5), e179-e197. https://doi.org/doi:10.1161/STR.0000000000000357
- Guhwe, M., Chioffi, S. M., & Blessing, K. (2016). Management of stroke-related complications. In J. V. HIckey & S. L. Livesay (Eds.), *The continuum of stroke care: An interprofessional approach to evidence-based care* (pp. 183-258). Wolters Kluwer.
- Hemphill, J. C., Bonovich, D. C., Besmertis, L., Manley, G. T., & Johnston, S. C. (2001). The ICH score. *Stroke, 32*(4), 891-897. https://doi.org/10.1161/01.STR.32.4.891
- Hickey, J. V. & Livesay, S. L. (2020). Intracerebral hemorrhagic stroke. In J. V. HIckey & A. L. Strayer (Eds.), *The clinical practice of neurological and neurosurgical nursing* (8th ed., pp. 557-571). Wolters Kluwer.
- Hinkle, J. L., Morrison, K., & Siewart, L. (2016). Ischemic stroke. In M. K. Bader, L. R. Littlejohns, & D. M. Olson (Eds.), *AANN core curriculum for neuroscience nursing* (6th ed., pp. 229-246). American Association of Neuroscience Nurses.
- Hundt, B. & Belmont, J. (2020). Systems and quality. In K. M. Keigher, S. L. Livesay, & J. L. Wessol (Eds.), *Comprehensive review for stroke nursing* (2nd ed., pp. 317-344). American Association of Neuroscience Nurses.
- Inouye, S. K., van Dyck, C. H., Alessi, C. A., Balkin, S., Siegal, A. P., & Horwitz, R. I. (1999). Clarifying Confusion: The Confusion Assessment Method A New Method for Detection of Delirium. *Annals of Internal Medicine, 113*(12), 941- 948.
- Jain, S., Teasdale, G. M., & Iverson, L. M. (2019). *Glasgow Coma Scale*. StatPearls Publishing.
- Jasne, A. S., Chojecka, P., Maran, I., Mageid, R., Eldokmak, M., Zhang, Q., Nystrom, K., Vlieks, K., Askenase, M., Petersen, N., Falcone, G. J., Wira, C. R., Lleva, P., Zeevi, N., Narula, R., Amin, H., Navaratnam, D., Loomis, C., Hwang, D. Y., & Sharma, R. (2020). Stroke code presentations, interventions, and outcomes before and during the COVID-19 pandemic. *Stroke, 51*(9), 2664–2673. https://doi.org/10.1161/str.0000000000000347
- Joundi, R. A., Martino, R., Saposnik, G., Giannakeas, V., Fang, J., & Kapral, M. K. (2017). Predictors and outcomes of dysphagia screening after acute ischemic stroke. *Stroke, 48*(4), 900-906. https://doi.org/10.1161/STROKEAHA.116.015332
- Kapral, M. K. & Bushnell, C. (2021). Stroke in women. *Stroke, 52*(2), 726-728. https://doi.org/doi:10.1161/STROKEAHA.120.033233
- Katan, M. & Luft, A. (2018). Global burden of stroke. *Seminars in Neurology, 38*(02), 208-211.
- Keiser, M. & Wilkerson, M. (2020). Stroke diagnostics. In K. M. Keigher, S. L. Livesay, & J. L. Wessol (Eds.), *Comprehensive review for stroke nursing* (2nd ed., pp. 135-165). American Association of Neuroscience Nurses.
- Kim, W. & Kim, E. J. (2018). Heart failure as a risk factor for stroke. *Journal of Stroke, 20*(1), 33-45. https://doi.org/10.5853/jos.2017.02810
- King, M. L. (2016). Subarchnoid hemorrahge. In J. V. Hickey & S. L. Livesay (Eds.), *The continuum of stroke care: An interprofessional approach to evidence-based care* (pp. 141-182). Wolters Kluwer.
- Kleindorfer, D. O., Towfighi, A., Chaturvedi, S., Cockroft, K. M., Gutierrez, J., Lombardi-Hill, D., Kamel, H., Kernan, W. N., Kittner, S. J., Leira, E. C., Lennon, O., Meschia, J. F., Nguyen, T. N., Pollak, P. M., Santangeli, P., Sharrief, A. Z., Smith, S. C., Turan, T. N., & Williams, L. S. (2021). 2021 Guideline for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack: A Guideline From the American Heart Association/American Stroke Association. *Stroke, 52*(7), e364-e467. https://doi.org/doi:10.1161/STR.0000000000000375
- Kolmos, M., Christoffersen, L., & Kruuse, C. (2021). Recurrent ischemic stroke – A systematic review and meta- analysis. *Journal of Stroke and Cerebrovascular Diseases, 30*(8), 105935.
- Kon, A. A., Davidson, J. E., Morrison, W., Danis, M., & White, D. B. (2016a). Shared decision-making in intensive care units. Executive Summary of the American College of Critical Care Medicine and American Thoracic Society policy statement. *American Journal of Respiratory and Critical Care Medicine, 193*(12), 1334-1336. https://doi.org/10.1164/rccm.201602-0269ED
- Kon, A. A., Davidson, J. E., Morrison, W., Danis, M., & White, D. B. (2016b). Shared decision making in ICUs: An American College of Critical Care Medicine and American Thoracic Society policy statement. *Critical Care Medicine, 44*(1), 188-201. https://doi.org/10.1097/ccm.0000000000001396
- Kowalska, K., Droś, J., Mazurek, M., Pasińska, P., Gorzkowska, A., & Klimkowicz-Mrowiec, A. (2020). Delirium post- stroke: Short- and long-term effect on depression, anxiety, apathy and aggression (Research Study-Part of PROPOLIS Study). *Journal of Clinical Medicine, 9*(7). https://doi.org/10.3390/jcm9072232
- Kuczynski, A., Marzoughi, S., Sultan, A. S. A., Goyal, M., Demchuk, A., & Almekhlafi, M. A. (2019). Abstract 83: Therapeutic Hypothermia in Patients With Acute Ischemic Stroke a Systematic Review of Prospective Controlled Studies. *Stroke, 50*(Suppl_1), A83-A83. https://doi.org/doi:10.1161/str.50.suppl_1.83
- Kuramatsu, J. B., Sembill, J. A., & Huttner, H. B. (2019). Reversal of oral anticoagulation in patients with acute intracerebral hemorrhage. *Critical care (London, England), 23*(1), 206-206. https://doi.org/10.1186/s13054-019-2492-8
- Littlejohns, L. & Slazinski, T. (2016). Anatomy of the nervous system. In M. K. Bader, L. R. Littlejohns, & D. M. Olson (Eds.), *AANN core curriculum for neuroscience nursing* (6th ed., pp. 19-56). American Association of Neuroscience Nurses.
- Livesay, S. L. & Keigher, K. M. (2020). Anatomy and physiology. In K. M. Keigher, S. L. Livesay, & J. L. Wessol (Eds.), *Comprehensive review for stroke nursing* (2nd ed., pp. 1-34). American Association of Neuroscience Nurses.
- Man, S., Zhao, X., Uchino, K., Hussain, M. S., Smith, E. E., Bhatt, D. L., Xian, Y., Schwamm, L. H., Shah, S., Khan, Y., & Fonarow, G. C. (2018). Comparison of acute ischemic stroke care and outcomes between comprehensive stroke centers and primary stroke centers in the United States. *Circulation: Cardiovascular Quality and Outcomes, 11*(6), e004512. https://doi.org/10.1161/circoutcomes.117.004512
- Marin, S., Serra-Prat, M., Ortega, O., & Clavé, P. (2018). Cost of oropharyngeal dysphagia after stroke: protocol for a systematic review. *BMJ Open, 8*(12), e022775. https://doi.org/10.1136/bmjopen-2018-022775
- Merkler, A. E., Diaz, I., Wu, X., Murthy, S. B., Gialdini, G., Navi, B. B., Yaghi, S., Weinsaft, J. W., Okin, P. M., Safford, M. M., Iadecola, C., & Kamel, H. (2018). Duration of heightened ischemic stroke risk after acute myocardial infarction. *Journal of the American Heart Association, 7*(22), e010782. https://doi.org/doi:10.1161/JAHA.118.010782
- Mitchell, P. H. (2016). Nursing assessment of depression in stroke survivors. *Stroke, 47*(1), e1-e3. https://doi.org/10.1161/STROKEAHA.115.008362
- Morgenstern, L. B., Zahuranec, D. B., Lim, J., Shi, X., Brown, D. L., Kerber, K. A., Meurer, W. J., Skolarus, L. E., Adelman, E. E., Campbell, M. S., Case, E., & Lisabeth, L. D. (2021). Tissue-based stroke definition impacts stroke incidence but not ethnic differences. *Journal of Stroke and Cerebrovascular Diseases, 30*(6), 105727.
- Mossavar-Rahmani, Y., Kamensky, V., Manson, J. E., Silver, B., Rapp, S. R., Haring, B., Beresford, S. A. A., Snetselaar, L., & Wassertheil-Smoller, S. (2019). Artificially sweetened beverages and stroke, coronary heart disease, and all-cause mortality in the Women's Health Initiative. *Stroke, 50*(3), 555-562. https://doi.org/doi:10.1161/STROKEAHA.118.023100
- Moulin, S. & Leys, D. (2019). Stroke mimics and chameleons. *Current Opinion in Neurology, 32*(1), 54-59. https://doi.org/10.1097/wco.0000000000000620
- Narayan, M. C. (2019). Addressing implicit bias in nursing: A review. *AJN The American Journal of Nursing, 119*(7). https://journals.lww.com/ajnonline/Fulltext/2019/07000/CE__Addressing_Implicit_Bias_in_Nursing__A_Review.27.aspx
- National Institutes of Health. (n.d.). NIH Stroke Scale. In National Institutes of Neurological Disorders and Stroke (Ed.): Department of Health and Human Services.
- Neifert, S. N., Chapman, E. K., Martini, M. L., Shuman, W. H., Schupper, A. J., Oermann, E. K., Mocco, J., & Macdonald, R. L. (2021). Aneurysmal subarachnoid hemorrhage: The last decade. *Translational Stroke Research, 12*(3), 428-446. https://doi.org/10.1007/s12975-020-00867-0
- Nouh, A., Amin-Hanjani, S., Furie, K. L., Kernan, W. N., Olson, D. M., Testai, F. D., Alberts, M. J., Hussain, M. A., & Cumbler, E. U. (2022). Identifying best practices to improve evaluation and management of in-hospital stroke: A Scientific Statement From the American Heart Association. *Stroke, 0*(0), STR.0000000000000402. https://doi.org/doi:10.1161/STR.0000000000000402
- Pandian, J. D., Gall, S. L., Kate, M. P., Silva, G. S., Akinyemi, R. O., Ovbiagele, B. I., Lavados, P. M., Gandhi, D. B. C., & Thrift, A. G. (2018). Prevention of stroke: A global perspective. *The Lancet, 392*(10154), 1269-1278.
- Phipps, M. S. & Cronin, C. A. (2020). Management of acute ischemic stroke. *BMJ, 368*, l6983. https://doi.org/10.1136/bmj.l6983
- Powers, W. J., Rabinstein, A. A., Ackerson, T., Adeoye, O. M., Bambakidis, N. C., Becker, K., Biller, J., Brown, M., Demaerschalk, B. M., Hoh, B., Jauch, E. C., Kidwell, C. S., Leslie-Mazwi, T. M., Ovbiagele, B., Scott, P. A., Sheth, K. N., Southerland, A. M., Summers, D. V., & Tirschwell, D. L. (2018). 2018 guidelines for the early management of patients with acute ischemic stroke: A guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke, 49*(3), e46-e99. https://doi.org/10.1161/STR.0000000000000158
- Powers, W. J., Rabinstein, A. A., Ackerson, T., Adeoye, O. M., Bambakidis, N. C., Becker, K., Biller, J., Brown, M., Demaerschalk, B. M., Hoh, B., Jauch, E. C., Kidwell, C. S., Leslie-Mazwi, T. M., Ovbiagele, B., Scott, P. A., Sheth, K. N., Southerland, A. M., Summers, D. V., & Tirschwell, D. L. (2019). Guidelines for the early management of patients with acute ischemic Stroke: 2019 update to the 2018 Guidelines for the early management of acute ischemic stroke: A guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke, 50*(12), e344-e418. https://doi.org/10.1161/STR.0000000000000211
- Qu, J., Chen, Y., Luo, G., Zhong, H., Xiao, W., & Yin, H. (2018). Delirium in the acute phase of ischemic stroke: Incidence, risk factors, and effects on functional outcome. *Journal of Stroke and Cerebrovascular Diseases, 27*(10), 2641-2647. https://doi.org/10.1016/j.jstrokecerebrovasdis.2018.05.034
- Quigley, P. A. (2016). Redesigned fall and injury management of patients with stroke. *Stroke, 47*(6), e92-e94. https://doi.org/10.1161/STROKEAHA.116.012094
- Reshetnyak, E., Ntamatungiro, M., Pinheiro, L. C., Howard, V. J., Carson, A. P., Martin, K. D., & Safford, M. M. (2020). Impact of multiple social determinants of health on incident stroke. *Stroke, 51*(8), 2445-2453. https://doi.org/doi:10.1161/STROKEAHA.120.028530
- Robinson, R. G. & Jorge, R. E. (2016). Post-Stroke depression: A review. *American Journal of Psychiatry, 173*(3), 221-231. https://doi.org/10.1176/appi.ajp.2015.15030363
- Rodgers, M. L., Fox, E., Abdelhak, T., Franker, L. M., Johnson, B. J., Kirchner-Sullivan, C., Livesay, S. L., & Marden, F.A. (2021). Care of the patient with acute ischemic stroke (endovascular/intensive care unit-postinterventional therapy): Update to 2009 comprehensive nursing care Scientific Statement: A Scientific Statement From the American Heart Association. *Stroke, 52*(5), e198-e210. https://doi.org/doi:10.1161/STR.0000000000000358
- Roland, R. & Gaillard, F. (n.d.). Subarachnoid hemorrhage. Retrieved August 8, 2019, from https://radiopaedia.org/articles/subarachnoid-haemorrhage?lang=us
- Sacco, R. L., Kasner, S. E., Broderick, J. P., Caplan, L. R., Connors, J. J., Culebras, A., Elkind, M. S. V., George, M.G., Hamdan, A. D., Higashida, R. T., Hoh, B. L., Janis, L. S., Kase, C. S., Kleindorfer, D. O., Lee, J.-M., Moseley, M. E., Peterson, E. D., Turan, T. N., Valderrama, A. L., & Vinters, H. V. (2013). An updated definition of stroke for the 21st century. *Stroke, 44*(7), 2064-2089. https://doi.org/10.1161/STR.0b013e318296aeca
- Saint, S., Greene, M. T., Krein, S. L., Rogers, M. A. M., Ratz, D., Fowler, K. E., Edson, B. S., Watson, S. R., Meyer- Lucas, B., Masuga, M., Faulkner, K., Gould, C. V., Battles, J., & Fakih, M. G. (2016). A Program to prevent catheter- associated urinary tract infection in acute care. *New England Journal of Medicine, 374*(22), 2111-2119. https://doi.org/10.1056/NEJMoa1504906
- Saver, J. L., Chapot, R., Agid, R., Hassan, A. E., Jadhav, A. P., Liebeskind, D. S., Lobotesis, K., Meila, D., Meyer, L., Raphaeli, G., Gupta, R., Amista', P., Andsberg, G., Cagnazzo, F., Isalberti, M., Karabegovic, S., Kollia, K., Mangiafico, S., Mis, M., . . . Zamaro, J. (2020). Thrombectomy for distal, medium vessel occlusions. *Stroke, 51*(9), 2872-2884. https://doi.org/doi:10.1161/STROKEAHA.120.028956
- Seagraves, K. B. & Livesay, S. L. (2016). Ischemic stroke. In J. V. Hickey & S. L. Livesay (Eds.), *The continuum of stroke care: An interprofessional approach to evidence-based care* (pp. 93-115). Wolters Kluwer.
- Shkirkova, K., Wang, T. T., Vartanyan, L., Liebeskind, D. S., Eckstein, M., Starkman, S., Stratton, S., Pratt, F. D., Hamilton, S., Kim-Tenser, M., Conwit, R., Saver, J. L., & Sanossian, N. (2019). Quality of acute stroke care at primary stroke centers before and after certification in comparison to never-certified hospitals. *Frontiers in Neurology, 10*, 1396. https://doi.org/10.3389/fneur.2019.01396
- Skolarus, L. E., Sharrief, A., Gardener, H., Jenkins, C., & Boden-Albala, B. (2020). Considerations in addressing social determinants of health to reduce racial/ethnic disparities in stroke outcomes in the United States. *Stroke, 51*(11), 3433- 3439. https://doi.org/doi:10.1161/STROKEAHA.120.030426
- Smith, E. E., Kent, D. M., Bulsara, K. R., Leung, L. Y., Lichtman, J. H., Reeves, M. J., Towfighi, A., Whiteley, W. N., & Zahuranec, D. B. (2018). Effect of dysphagia screening strategies on clinical outcomes after stroke: A systematic review for the 2018 guidelines for the early management of patients with acute ischemic stroke. *Stroke, 49*(3), e123- e128. https://doi.org/10.1161/STR.0000000000000159
- Solar, O. & Irwin, A. (2010). *A conceptual framework for action on the social determinants of health*. Geneva, Switzerland: WHO Press
- Solomon, R. A. & Connolly, E. S. (2017). Arteriovenous malformations of the brain. *New England Journal of Medicine, 376*(19), 1859-1866. https://doi.org/10.1056/NEJMra1607407
- Stamps, D. C. (2021). Nursing leadership must confront implicit bias as a barrier to diversity in health care today. *Nurse Leader, 19*(6), 630-638.
- Suarez, L. (2016). Post-stroke reintegration into the community. In J. V. Hickey & S. L. Livesay (Eds.), *The continuum of stroke care: An interprofessional approach to evidence-based care* (pp. 304-325). Wolters Kluwer.
- Teasdale, G. & Jennett, B. (1974). Assessment of coma and impaired consciousness: A practical scale. *The Lancet, 304*(7872), 81-84.
- US Department of Health and Human Services. (2020). Healthy People 2030. Retrieved 12 February 2022, from www.healthypeople.gov
- Virani, S. S., Alonso, A., Aparicio, H. J., Benjamin, E. J., Bittencourt, M. S., Callaway, C. W., Carson, A. P., Chamberlain, A. M., Cheng, S., Delling, F. N., Elkind, M. S. V., Evenson, K. R., Ferguson, J. F., Gupta, D. K., Khan, S. S., Kissela, B. M., Knutson, K. L., Lee, C. D., Lewis, T. T., . . . Tsao, C. W. (2021). Heart disease and stroke statistics- 2021 update: A Report From the American Heart Association. *Circulation, 143*(8), e254-e743. https://doi.org/10.1161/cir.0000000000000950
- Vitali, F., Serenelli, M., Airaksinen, J., Pavasini, R., Tomaszuk-Kazberuk, A., Młodawska, E., Jaakkola, S., Balla, C., Falsetti, L., Tarquinio, N., Ferrari, R., Squeri, A., Campo, G., & Bertini, M. (2019). CHA2DS2-VASc score predicts atrial fibrillation recurrence after cardioversion: Systematic review and individual patient pooled meta-analysis. *Clinical Cardiology, 42*(3), 358-364.
- Wang, A, Kho, A. N. & French, D. D. (2020). Association of the Robert Wood Johnson Foundations' social determinants of health and Medicare hospitalisations for ischaemic strokes: a cross-sectional data analysis. *Open Heart, 7*(1), e001189. https://doi.org/10.1136/openhrt-2019-001189
- Warach, S. J., Dula, A. N., & Milling, T. J. (2020). Tenecteplase thrombolysis for acute ischemic stroke. *Stroke, 51*(11), 3440-3451. https://doi.org/doi:10.1161/STROKEAHA.120.029749
- Watkins, C. L., Lightbody, C. E., Sutton, C. J., Holcroft, L., Jack, C. I. A., Dickinson, H. A., van den Broek, M. D., & Leathley, M. J. (2007). Evaluation of a single-item screening tool for depression after stroke: A cohort study. *Clinical Rehabilitation, 21*(9), 846-852. https://doi.org/10.1177/0269215507079846
- Whelton, P. K., Carey, R. M., Aronow, W. S., Casey, D. E., Collins, K. J., Himmelfarb, C. D., DePalma, S. M., Gidding, S., Jamerson, K. A., Jones, D. W., MacLaughlin, E. J., Muntner, P., Ovbiagele, B., Smith, S. C., Spencer, C. C., Stafford, R. S., Taler, S. J., Thomas, R. J., Williams, K. A., . . . Wright, J. T. (2018). 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: A report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Journal of the American College of Cardiology, 71*(19), e127- e248. https://doi.org/10.1016/j.jacc.2017.11.006
- Wilson, S. E. & McPeak, M. M. (2020). Preventative care. In K. M. Keigher, S. L. Livesay, & J. L. Wessol (Eds.), *Comprehensive review for stroke nursing* (2nd ed., pp. 35-96). American Association of Neuroscience Nurses.
- Winstein, C. J., Stein, J., Arena, R., Bates, B., Cherney, L. R., Cramer, S. C., Deruyter, F., Eng, J. J., Fisher, B., Harvey, R. L., Lang, C. E., MacKay-Lyons, M., Ottenbacher, K. J., Pugh, S., Reeves, M. J., Richards, L. G., Stiers, W., & Zorowitz, R. D. (2016). Guidelines for Adult Stroke Rehabilitation and Recovery. *Stroke, 47*(6), e98-e169. https://doi.org/doi:10.1161/STR.0000000000000098
- Yan, T., Liu, C., Li, Y., Xiao, W., Li, Y., & Wang, S. (2018). Prevalence and predictive factors of urinary tract infection among patients with stroke: A Meta-analysis. *American Journal of Infection Control, 46*(4), 402-409. https://doi.org/10.1016/j.ajic.2017.10.001

Course Code: ANCCOH05SM

Using Evidence in Clinical Nursing Practice, 2nd Edition

3 Contact Hours

Release Date: March 24, 2022

Expiration Date: March 24, 2025

Faculty

Robin McCormick, DNP, MSN, RN, is a registered nurse with a research background focused on vulnerable populations, maternal-child outcomes, and adult health. She has clinical nursing experience working in medical-surgical nursing and critical care and spent many years as a hospital-based educator implementing evidence-based practice in clinical settings. She received a BSN from Troy University, an MSN from the University of South Alabama, and a Doctor of Nursing Practice from Troy University. She is the assistant ASN coordinator for Troy University, where she also works as an assistant professor, teaching concepts of evidence-based practice to undergraduate nursing students.

Robin McCormick has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Peer reviewer:
Brenda Williams, PhD, MBA, RN, is an RN with over 35 years' experience in multiple nursing areas. She holds an Executive MBA and has been involved in new start-ups, re-vamps, and old established businesses. Dr. Williams' PhD dissertation is a qualitative transcendental phenomenological study titled: "An Exploration of Bullied Nurses, Witnesses, and a Hospital's Bottom Line". Dr. Williams serves as a Research Chair for a DBA program at Indiana Wesleyan University and facilitates classes at the Bachelor and Master level at Ohio Christian University, in addition to writing curriculum. She also serves as a Subject Matter Expert (SME) for the American Association of Kidney Patients (AAKP).

Brenda Williams has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Course overview

Evidence-based practice (EBP) relies on scientific research findings to modify or develop policies and procedures that incorporate the latest evidence into clinical practice. The purpose of this course is to help nurses incorporate nursing research findings into their practice for the maximum benefit of patients and the facilitation of professional growth and development.

Learning objectives

After completing this course, the learner will be able to:

- Apply nursing research methods and evidence-based practice (EBP) to nursing practice.
- Choose appropriate EBP models for the implementation of EBP.
- Employ concepts of nursing research when implementing EBP.
- Design an EBP project based on the nursing research process.
- Discuss how to translate evidence into practice.
- Identify barriers to implementing EBP and strategies to reduce them.
- Describe the staff nurse's role in promoting EBP and research.

How to receive credit

- Read the entire course online or in print which requires a 3-hour commitment of time.
- Complete the self-assessment quiz questions which are at the end of the course or integrated throughout the course. These questions are NOT GRADED. The correct answer is shown after you answer the question. If the incorrect answer is selected, the rationale for the correct answer is provided. These questions help to affirm what you have learned from the course.
- Depending on your state requirements you will be asked to complete either:
  - An affirmation that you have completed the educational activity.
  - A mandatory test (a passing score of 70 percent is required). Test questions link content to learning objectives as a method to enhance individualized learning and material retention.
- If requested, provide required personal information and payment information.
- Complete the MANDATORY Course Evaluation.
- Print your Certificate of Completion.

CE Broker reporting

Colibri Healthcare, LLC, provider # 50-4007, reports course completion results within 1 business day to CE Broker. If you are licensed in Arkansas, District of Columbia, Florida, Georgia, Kentucky, Michigan, Mississippi, New Mexico, North Dakota, South Carolina, or West Virginia, your successful completion results will be automatically reported for you.

Accreditations and approvals

Colibri Healthcare, LLC is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation.

Individual state nursing approvals

Colibri Healthcare, LLC is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation. In addition to states that accept courses offered by ANCC Accredited Providers, Colibri Healthcare, LLC is an approved Provider of continuing education in nursing by: Alabama Board of Nursing, Provider #ABNP1418 (valid through February 5, 2025); Arkansas State Board of Nursing, Provider #50-4007; California Board of Registered Nursing, Provider #CEP17480 (valid through January 31, 2024); California Board of Vocational Nursing and Psychiatric Technicians (LVN Provider #V15058, PT Provider #V15020; valid through December 31, 2023); District of Columbia Board of

Nursing, Provider #50-4007; Florida Board of Nursing, Provider #50-4007; Georgia Board of Nursing, Provider #50-4007; Kentucky Board of Nursing, Provider #7-0076 (valid through December 31, 2023; CE Broker Provider #50-4007); Michigan Board of Nursing, Provider #50-4007; Mississippi Board of Nursing, Provider #50-4007; New Mexico Board of Nursing, Provider #50-4007; North Dakota Board of Nursing, Provider #50-4007; South Carolina Board of Nursing, Provider #50-4007; and West Virginia Board of Registered Nurses, Provider #50-4007. This CE program satisfies the Massachusetts States Board's regulatory requirements as defined in 244 CMR5.00: Continuing Education.

Activity director

June D. Thompson, DrPH, MSN, RN, FAEN, Lead Nurse Planner

Disclosures

Resolution of conflict of interest
In accordance with the ANCC Standards for Commercial Support for continuing education, Colibri Healthcare, LLC implemented mechanisms prior to the planning and implementation of the continuing education activity, to identify and resolve conflicts of interest for all individuals in a position to control content of the course activity.

Sponsorship/commercial support and non-endorsement
It is the policy of Colibri Healthcare, LLC not to accept commercial support. Furthermore, commercial interests are prohibited from distributing or providing access to this activity to learners.

Disclaimer

The information provided in this activity is for continuing education purposes only and is not meant to substitute for the independent medical judgment of a healthcare provider relative to diagnostic and treatment options of a specific patient's medical condition.

Course verification

All individuals involved have disclosed that they have no significant financial or other conflicts of interest pertaining to this course. Likewise, and in compliance with California Assembly Bill No. 241, every reasonable effort has been made to ensure that the content in this course is balanced and unbiased.

INTRODUCTION

The following three situations describe practice scenarios in which the use of evidence-based practice (EBP) could make a significant contribution to safe, effective patient care.

Scenario 1
Maria is the surgical intensive care unit (ICU) representative to the Nursing Research Council. She proposes the design of a research study that focuses on the correlation between nursing burnout and patient outcomes. Maria and her colleagues believe that if they are required to take 30-minute meal breaks, with two 15-minute rest breaks off the nursing unit each shift, the hospital should provide a nurse to cover these breaks. By doing so, patient care would be more efficient and effective and patient outcomes would improve. They want to determine if there is evidence to justify these beliefs. They also agree to abide by the evidence obtained from a review of the literature and a well-designed nursing research project.

Scenario 2
Aaliyah is a nurse practitioner who works in a neurological rehabilitation center. Many of her patients are dealing with the effects of a stroke. One of the center's physiatrists (specialists in physical medicine and rehabilitation) recently published an article in a medical journal contradicting the center's protocol for bladder retraining in stroke patients. The article is based primarily on his personal preferences and not on scientific research findings. This physician has considerable power in the community and expects the rehabilitation center leaders to support his decisions and comply with his requests.

Even though patient outcomes about bladder retraining have been excellent, the center's administrators encourage the rehabilitation team to consider changing the protocol based on this physician's opinions, not on available evidence. Aaliyah, a nursing department representative on the Evidence-Based Practice Council, has been asked to respond to administrative concerns. Aaliyah is asking for the council's support in gathering evidence to justify the current practice.

Scenario 3
Various nursing councils are being established as part of a community medical center's pursuit of Magnet accreditation. The councils include nursing research and evidence-based nursing practice councils. The formation of these councils has triggered both enthusiasm and resistance. Many nurses look forward to having more input into nursing practice within their organization. They want to participate in research that helps, not only to facilitate EBP, but also to improve nursing practice and enhance patient outcomes.

Some nurses, however, are not as eager to participate in research and formalized EBP. They are concerned about learning about the nursing research process and fear that formalizing EBP will create more work without enhancing practice. They also question if the amount of time and effort necessary to achieve and maintain Magnet accreditation is worthwhile. They state that nursing turnover and staffing shortages are too high to be able to work on improving practice when the nurses are already experiencing high rates of burnout.

* * * * *

These three scenarios illustrate some of the strengths of EBP and some of the barriers to its implementation. Scenario 1 shows how research is necessary to the implementation of EBP. Maria and her colleagues ponder a change in a protocol they hope will ultimately enhance patient outcomes. They do not request or attempt to initiate such a change without objective evidence to support their beliefs. Such evidence is obtained from a review of relevant studies in the healthcare literature and well-designed nursing research projects. Note that Maria and her colleagues agree to abide by objective findings. One of the hallmarks of EBP is that its practitioners support the concept to improve patient outcomes.

Scenario 2 is a bit more complicated and moves into an area where nurses and other healthcare professionals are all too familiar. In this scenario, an influential physician is proposing

protocol changes without the benefit of objective evidence. Physicians are not the only persons who can wield influence.

Any member of the healthcare team may use influence to control, or attempt to control, healthcare practices. In this scenario, a nurse practitioner is seeking help to gather evidence to determine which is the best approach to bladder re-training. However, additional actions may be necessary. It may be helpful to talk to the physician about concerns regarding the current protocol and why his proposed changes would be beneficial. It may also be essential to find evidence to support the physician's viewpoint. Findings may indicate the need for further investigation, including a literature review and more research. It is crucial to keep an open mind about new or different ideas. Another hallmark of EBP is the willingness to continually evaluate practice inpatient outcomes.

Scenario 3 describes one of the barriers to implementing EBP (and to nursing research). The establishment of nursing councils that focus on EBP and nursing research necessitates changes in practice. As the scenario describes, these changes can trigger both enthusiasm and resistance, typical responses to change. There will be those who embrace change as an opportunity for career advancement and those who resist it. Why is there so much resistance to change, even when it is designed to improve patient outcomes? Fear of the unknown, concern that the change will increase workload, high levels of burnout, and apprehension about acquiring the skills and knowledge necessary to adhere to EBP and promote nursing research contribute to dissatisfaction and resistance.

EBP is no longer a new initiative. It is the foundation of nursing practice. This education program provides information about the EBP process, the nursing research process, and how to implement an EBP nursing practice successfully.

DEFINITION OF TERMS

Nurses use research as a scientific basis for nursing practice. An increasing number of research studies have been conducted to translate evidence effectively into practice (Chein, 2019).

Evidenced-based care promotes quality health outcomes for individuals, families, communities, and healthcare. Research and EBP are intertwined. For nurses to conduct nursing research and use findings to establish EBP, they must first know terms related to both research and EBP.

Nursing research

Nursing research is a systematic, rigorous, critical investigation conducted for answering questions regarding nursing phenomena. Nursing research follows the steps of scientific inquiry (Polit & Beck, 2022).

Quantitative research

Quantitative, or empirical, research is a structured way of collecting and analyzing data to investigate research questions or hypotheses that describe phenomena, evaluate relationships, determine differences, and explain cause-and-effect relationships between variables and evaluate the effectiveness of interventions. Quantitative research uses computational, statistical, and mathematical tools to obtain results (Melnyk & Fineout-Overholt, 2019; Polit & Beck, 2022).

There are four approaches to quantitative research (Center for Innovation in Research and Teaching, n.d; Melnyk & Fineout-Overholt, 2019):

1. Descriptive design.
2. Correlational design.
3. Quasi-experimental design.
4. Experimental design.

Descriptive design
This type of quantitative research is performed to describe the status of a variable (a measurable characteristic that varies) or phenomenon. The research does not start with a hypothesis, but one is formulated after data collection. Data collection is typically observational. An example of this type of research is a description of men's attitudes towards male contraception interventions.

Correlational design
A correlational design explores relationships between variables by using statistical analysis. It does not look for cause and effect. The data collection process is primarily observational. An example of correlational design is a study of the relationship between verbal abuse and clinical depression.

Quasi-experimental design (causal-comparative)
This form of quantitative research is designed to identify a cause-effect relationship between two or more variables. Control groups are identified and exposed to a variable. Results are compared to groups not exposed to the variable. An example of this type of research is a study of the development of compassion and emotional intelligence in nursing students (Teskereci et al., 2021).

Experimental design (true experimentation)
The experimental design uses the scientific method to establish a cause-and-effect relationship among a group of variables. The researchers try to control all variables except the variable that is being manipulated (independent variable). An example of experimental design is a study of

efficacy of the treatment with dapagliflozin and metformin compared to metformin monotherapy for weight loss in patients with class III obesity (Ferreira-Hermosillo, 2020).

Qualitative research

Qualitative research is conducted if the question to be addressed is regarding a better understanding of the meaning of a human experience, such as grief or hope. Qualitative research is discovery-oriented and uses words and descriptions, not numbers, to discover or explain phenomena (Polit & Beck, 2022).

The following are types of qualitative research (Polit & Beck, 2022; Rashid, et al., 2019):

- **Ethnography**: Ethnography entails describing and interpreting a culture (the way a group of people lives) and behaviors associated with a particular culture according to values and norms. An example of ethnography in healthcare is using an ethnographic approach to study newly licensed nurses' experience caring for patients with Coronavirus Disease 2020.
- **Phenomenology**: Phenomenology is used to describe and understand everyday life experiences. Phenomenology researchers investigate subjective phenomena obtained through in-depth conversations with research participants. The sample size is generally small, often ten people or fewer. Data are reported as vivid, detailed, in-depth descriptions organized into key themes. The overall goal is to help readers enrich their understanding of specific life experiences. An example of a phenomenology study in healthcare is the experiences of parents living with terminally-ill children.
- **Grounded theory**: Grounded theory is conducted to comprehend the social and psychological processes that characterize an event or a situation. The grounded theory tries to explain people's actions from the perspectives of those involved in the event or situation. An example of a grounded theory research project is to explore new graduates' perceptions of workplace readiness when entering nursing practice in an Intensive Care Unit.

- **Case study**: A case study is an in-depth study of a single case example or a minimal number of cases. An individual, a family, or another type of social unit may be the focus of the study. A case study focuses on understanding why an individual thinks, behaves, or progresses in a particular way. An example of a case study is a focus on how several nurses interact with a female patient who was diagnosed with terminal breast cancer.
- **Critical theory**: A critical theory researcher is concerned with a critique of society. Researchers conducting a critical theory study hope to identify ways to improve society. Thus, it is action oriented. Critical theory aims to "make people aware of contradictions and disparities in social practices and become inspired to change them" (Polit & Beck, 2022, p. 169). An example of a critical theory study is to follow patients whose income is below the poverty line and determine their ability to adhere to medication regimens. Findings would be disseminated in a way that fosters awareness of problems and stimulates action to correct them.
- **Feminist theory**: Feminist theory is similar to critical theory. The focus, however, is on "gender domination and discrimination within patriarchal societies" (Polit & Beck, 2022, p. 169). Researchers conduct research that helps to facilitate an end to women's unequal position in society compared to men's position.
- **Participatory action research**: Participatory action research is focused on researchers and participants working together to understand a problematic situation and change it for the better. The goal is to "produce not only knowledge but also action, empowerment, and consciousness raising" (Polit & Beck, 2022, p. 170). An example of this type of research is developing a community plan to tackle maternal and neonatal health problems in rural West Virginia.

Self-Assessment Quiz Question #1

A nurse wants to research the experience of grief in parents who have lost a child to cancer. This type of research is:
a. Quantitative.
b. Critical Appraisal.
c. Qualitative.
d. Quality Improvement.

EVIDENCE-BASED PRACTICE (EBP)

EBP is the process of collecting, evaluating, and integrating valid research evidence (combined with clinical expertise and knowledge of patient and family values, preferences, and beliefs) to improve clinical practice, the work environment, or patient outcomes. EBP aims to close the gap between what is known to be effective and what is being done in healthcare settings (Polit & Beck, 2022).

Quality improvement
Quality improvement (QI) is the formal, systematic data analysis for monitoring and improving patient care. QI uses currently available knowledge and evidence to improve patient outcomes, enhance the safety of healthcare systems, and improve job performance (Melnyk & Fineout-Overholt, 2019; Polit & Beck, 2022).

Critical appraisal
Critical appraisal involves evaluating the strengths and weaknesses of research evidence by using existing standards to identify the merit and validity of the research for use in clinical practice. *Critical appraisal* is also known as a research or evidence critique (Melnyk & Fineout-Overholt, 2019; Polit & Beck, 2022).

Validity
Validity is the extent to which assumptions made in a research study are accurate and well-founded. When validity is used to describe a research tool, it means the extent to which that tool measures what it was intended to measure (Melnyk & Fineout-Overholt, 2019; Polit & Beck, 2022).

Reliability
Reliability refers to the extent to which a measurement is free from measurement error. In other words, it is the extent to which study results are the same for repeated measurements. It refers to the ability to count on research findings to make a difference when clinicians apply them to practice (Melnyk & Fineout-Overholt, 2019; Polit & Beck, 2022).

Nursing consideration: Nurses must be able to appraise the steps of the research process, read the research literature critically, and make informed clinical decisions based on the validity and reliability of research findings to successfully and knowledgeably implement EBP (Polit & Beck, 2022).

Self-Assessment Quiz Question #2

The formal, systematic analysis of data for monitoring patient outcomes is:
a. Quality improvement.
b. Quantitative research.
c. Qualitative research.
d. EBP.

Using models to implement EBP in nursing

EBP in nursing is a problem-solving approach to clinical decision-making in healthcare settings. It depends on three components (Newhouse et Al., 2007):
1. The best available scientific research evidence.
2. The best available clinical expertise.
3. Patient and family values and preferences.

To successfully implement EBP, nurses must consider both internal and external influences on practice. For example, internal influences might be the support of nurse managers who provide adequate staffing levels to initiate nursing research. External factors might be health-related community issues, such as an influenza epidemic or a significant trauma event requiring immediate care for numerous victims. All factors that impact a community and its healthcare facilities affect EBP (Melnyk & Fineout-Overholt, 2019).

To date, several EBP models serve as frameworks to guide the translation of evidence into practice. The following are examples of EBP models.

The Johns Hopkins Nursing Evidence-Based Practice Model
The Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) model is dedicated to the advancement of EBP and to the support of nurses who work to improve patient care outcomes by translating evidence into practice (Dang et al., 2022).

The revised JHNEBP model is composed of three interrelated components (Dang et al., 2022):
1. **Inquiry** launches the EBP process. The inquiry focuses on the efforts of the nurse to question, examine, and collect information about a problem, issue, or concern.
2. **Practice** reflects the translation of what nurses know into what they do. Practice is the range of nursing activities that define patient care.
3. **Learning** involves both the individual as a learner and the organization as a learning culture. A learning culture not only improves learning but also increases employee satisfaction, promotes creativity, and encourages problem-solving.

Implementation of the JHNEBP model is a 20-step process that occurs in three phases, described by the acronym **PET** (Dang et Al., 2022):
1. **P**ractice question.
2. **E**vidence.
3. **T**ranslation.

Practice question
The first phase involves the practice question. The practice question identifies an answerable question regarding a practice issue or concern that needs to be addressed. Nurses must consider how the topic under discussion correlates with organizational and departmental goals and priorities when formulating the question. Such correlation is essential if nurses expect to obtain the support of the organization's leadership (Dang et al., 2022; Melnyk & Fineout-Overholt, 2019).

Evidence
Evidence, the second phase, addresses the "search for, appraisal of, and synthesis of best available evidence. Based on these results, the team makes recommendations regarding practice changes" (Dang et al., 2022).

Translation
During the third phase, translation, it is determined whether changes to practice are feasible, appropriate, and a good fit for the organizational setting. If so, an action plan is created, implemented, and evaluated. The results are communicated to appropriate persons within and outside of the organization (Dang et al., 2022).

The Iowa Model of Evidence-Based Practice
The Iowa Model of Evidence-Based Practice focuses on guiding clinicians at all levels of practice through a team-based, multiphase process according to the following phases (Iowa Model Collaborative, 2017):

- Identify triggers, issues, or opportunities.
- State the question or purpose.
- Interprofessional team formation.
- Evidence review, critique, and synthesis.
- Change implementation through piloting.
- Identify and sustain practice change.
- Outcome dissemination.

The Iowa model identifies the following "triggers" for an EBP endeavor (Melnyk & Fineout-Overholt, 2019):

- Clinical or patient-identified issue.
- Organization, state, or national initiative.
- Data or new evidence.
- Accrediting agency requirements and regulations.
- Philosophy of care.

These triggers activate paths that include decision points with evaluative feedback loops when identifying and implementing practice changes.

The Stetler model
The Stetler model was initially developed to focus on research utilization. The model has been updated and refined to fit into the EBP paradigm, emphasizing helping nurses assess how research findings can help guide and improve clinical practice. The focus is on practitioner expertise, context, and evidence, as well as on the translation of evidence into practice (Melnyk & Fineout-Overholt, 2019; National Collaborating Centre for Methods and Tools, n.d.).

The Stetler model consists of the following five phases (Melnyk & Fineout-Overholt, 2019; National Collaborating Centre for Methods and Tools, n.d.):

1. **Preparation** includes purpose, relative assessment, and the search for sources of evidence.
2. **Validation** of evidence involves validating evidence found in sources, such as the subject literature and quality improvement data.
3. **Comparative evaluation/decision making** involves critiquing, synthesizing, and deciding to use the evidence while considering internal factors, such as organizational practices and expertise of individual EBP clinicians, and external factors, such as research protocols and organizational standards.
4. **Refinements** guide the translation of evidence into clinical practice.
5. **Evaluation** involves assessing the impact of change, including outcomes met and the degree to which the practice change was implemented.

Star Model of Knowledge Transformation
The Star Model of Knowledge Transformation depicts the relationship between different stages of knowledge as newly discovered knowledge is moved into practice (School of Nursing UT Health Science Center San Antonio, 2015).

The five stages of the model are referred to as *star points* (School of Nursing UT Health Science Center San Antonio, 2015):

- **Star Point 1: Discovery research**: Star Point 1 is the knowledge-generating stage. New knowledge is discovered through scientific inquiry and traditional research investigations.
- **Star Point 2: Evidence summary**: Evidence summary is also a knowledge-generating stage during which research knowledge is synthesized into a single meaningful statement of the state of the science. The evidence summary reduces large amounts of information into a manageable format.
- **Star Point 3: Translation to guidelines**: Transformation requires translating evidence into practice recommendations and integrating these recommendations into practice. The goal of translation is to provide useful and relevant summarized evidence for clinicians and clients.
- **Star Point 4: Practice integration**: Practice Integration involves changing individual and organizational practices through formal and informal methods. Important concepts addressed in this stage are factors that impact the individual and organizational rate of implementing changes in practice.
- **Star Point 5: Outcome evaluation**: Outcome evaluation is the final stage in knowledge transformation. Factors to be evaluated are the impact of EBP on patient health outcomes, provider and patient satisfaction, efficacy, efficiency, economic analysis, and health status impact. As new knowledge progresses through the five stages, the final desired outcome is evidence-based quality improvement of healthcare.

Advancing Research and Clinical Practice Through Close Collaboration (ARCC) model
The ARCC model was developed to provide healthcare organizations with an organized conceptual framework for guiding systemwide implementation and sustaining EBP. The ultimate goal is to facilitate the achievement of quality outcomes.

The ARCC model emphasizes sustainability throughout the organization and consists of the following five steps (Melnyk & Fineout-Overholt, 2019):

1. Assessment of the organizational culture and preparedness to implement practice changes.
2. Identification of organizational strengths as well as barriers to implementation of the EBP.
3. Identification of EBP mentors.
4. Implementation of the evidence into organizational practice.
5. Evaluation of outcomes because of practice change.

Nursing consideration: The ARCC model emphasizes the importance of mentors and EBP for organizational effectiveness. Nurses who use this model of EBP must be willing to work with mentors and incorporate organizational culture as part of practice change (Melnyk & Fineout-Overholt, 2019).

Promoting Action on Research Implementation in Health Services Framework (PARiHS)
The PARiHS framework is often used as an "organizing or conceptual framework to help both explain and predict why the implementation of evidence into practice is or is not successful" (Harvey & Kitson, 2016).

The PARiHS framework emphasizes the need for appropriate facilitators trained in implementing the framework. Effective facilitation increases the likelihood of successful implementation (Harvey & Kitson, 2016).

The PARiHS framework was developed and revised over several years by several authors. The framework consists of several vital constructs (Harvey & Kitson, 2016; Melnyk & Fineout-Overholt, 2019).

The first element is evidence, constituting sources of knowledge obtained from various resources. When assessing the evidence, factors to be assessed include research, clinical experience, patient experience, and local data. The second element is ***context***, which refers to the characteristics of the setting in which PARiHS is implemented. Under context, the culture of the setting, leadership's role, and how services are evaluated are examined. The third element is ***facilitation***. Facilitation is described as a way to help people change and acquire new knowledge and skills. Facilitators must understand their roles and purpose and have the necessary skills and attributes.

In summary, there are numerous models and frameworks for EBP. Organizations should choose one that best fits their respective philosophies, priorities, and goals. Successful implementation of EBP in nursing requires enthusiasm, commitment, and skill. Continuing education endeavors should include updates on EBP and how it impacts patient care and job performance.

Self-Assessment Quiz Question #3

The EBP model that focuses on problem-focused and knowledge-focused triggers to question nursing practice is:
a. Johns Hopkins Nursing Evidence-Based Practice model.
b. The Iowa Model of Evidence-Based Practice.
c. The Stetler model.
d. The Star Model of Knowledge Transformation.

Self-Assessment Quiz Question #4

As part of the implementation of EBP, the nursing department is assigning mentors to help nurses develop EBP skills. The model that overtly emphasizes the importance of mentors is:
a. ARCC.
b. PARiHS.
c. CStar Model of Knowledge Transformation.
d. The Iowa Model.

EBP impact on patient care and job performance

EBP is essential to the enhancement of quality and safety in healthcare. Without EBP, healthcare professionals do not implement patient care consistently. They are at risk for variations in care that could negatively impact patient outcomes (Kerr & Rainey, 2021).

Unfortunately, healthcare organizations across the United States continue to struggle with applying EBP. Organizational factors such as lack of time to find, appraise, implement, and evaluate evidence are key barriers to the EBP process, along with nurses lacking the authority to change care procedures in practice. Nurses in the clinical environment use organizational policies and protocols to guide best practices and tend to do it the way it was always done. Many nurses find it challenging to interpret research findings because of the jargon used in the statistical presentation of research results (Kerr & Rainey, 2021).

Experts suggest that to focus on EBP, organizations must take the following steps (Melnyk & Fineout-Overholt, 2019):
- Develop the right organizational culture.
- Provide continuing education regarding EBP.
- Encourage nurses to take the lead in EBP, promote the professional nursing practice, and focus on EBP.
- Adopt EBP models and frameworks.
- Promote an interprofessional approach.

The right organizational culture
The "right" culture identifies EBP as an organizational imperative. Organizational leadership must identify EBP as a top priority and provide the resources to educate all staff members in its implementation. Implementation of EBP should be part of employees' performance evaluations (Henry et al., 2017).

Ideally, EBP in nursing is a patient-centered, holistic approach to patient care. The organizational culture must support nurses' and other healthcare professionals' ability to utilize research to close the gap between theory and clinical practice. Effective implementation of EBP has been shown to decrease errors, injuries, and adverse patient outcomes (Melnyk & Fineout-Overholt, 2019).

Provide continuing education regarding EBP
Nurses make up the largest workforce in the US healthcare system. They practice in all types of healthcare settings, and nursing provides 24 hours per day patient care in inpatient and outpatient settings. Implementation of EBP relies on their ability and willingness to establish EBP environments.

A gap exists between education and practice. As part of undergraduate education, nursing students are exposed to EBP and taught that EBP is necessary for safe, quality patient care and job performance. After graduation, as they become part of the "real world" of licensed nursing practice, newly licensed nurses must deal with the culture of the organizations that employ them. Some cultures embrace EBP; others do not. Nurses must be competent in the implementation of EBP to promote its implementation. Such competency cannot be achieved and maintained without ongoing continuing education (Li et al., 2021).

Covid-19 has undoubtedly changed many aspects of nursing care and practice. Nurses do not practice by the same standards they did 15 years ago or even 3 years ago, in some instances (Duncan et al., 2021). Continuing education provides nurses with up-to-date information to apply to their practices to improve patient outcomes and professional job performance.

Demonstration of competency has been part of nursing performance evaluations for several years. Competency in EBP should be part of the job performance evaluation for all healthcare professionals. Competency cannot be attained without education, and education will not be effective unless nurses genuinely want to learn about and support EBP (Fu et al., 2020).

Any EBP competency must be aligned with the EBP process and be part of the ongoing evaluation of the nurse's job performance evaluation. The ultimate goal of EBP continuing education is to ensure that EBP is the standard of care delivered by healthcare professionals across the country and around the world (Melnyk & Fineout-Overholt, 2019).

EBP and professional nursing practice
As previously noted, nurses comprise the largest workforce in healthcare practice in the United States. Nurses should thus take the lead in promoting and implementing EBP (Melnyk & Fineout-Overholt, 2019).

The National Academies of Sciences, Engineering, and Medicine (the National Academies)—formerly known as the Institute of Medicine (IOM)—has consistently called on nurses to take on a more significant role in America's healthcare system (Wolters Kluwer, 2018).

In 2008, The Robert Wood Johnson Foundation (RWJF) and the National Academies launched a 2-year initiative to assess and facilitate the transformation of the nursing profession. The initiative has four key points (Wolters Kluwer, 2018):
- Nurses should practice to the full extent of their education and training.
- Nurses should achieve higher levels of education and training through an improved education system that promotes seamless academic progression.
- Nurses should be full partners with physicians and other healthcare professionals in redesigning healthcare in the United States.
- Effective workforce planning and policymaking require better data collection and information infrastructure.

These goals correlate with the EBP initiatives. By using the scientific inquiry that forms the foundation of EBP, nurses can and should take leadership roles not only in EBP, but also in all aspects of the country's healthcare delivery systems.

Adopt EBP Models and Frameworks
EBP is often viewed as a theoretical concept that is difficult to apply in the "real world," making it challenging to promote and use. Adopting and implementing a model or framework of EBP throughout an organization can help apply evidence at the point of patient care. Implementation of EBP should also be part of organizational and departmental goals. By using models or frameworks and identifying EBP goals and objectives, clinicians and scholars can work together to use EBP to improve patient care delivery. The goals and objectives should also include clear expectations that EBP is an interdisciplinary approach to be conducted in a collaborative fashion, not as individual departmental strategies (Melnyk & Fineout-Overholt, 2019). For example, the intensive care unit employees may be working on an EBP goal to reduce the incidence of delirium development in their patient population. Employees from nursing, occupational therapy, physical therapy, pharmacy, clinical nutrition, and other departments would be involved in reducing delirium cases by working together as an interdisciplinary team.

Promote an interprofessional approach
Successful implementation of EBP requires a vibrant interdisciplinary team vision in conjunction with clear expectations (including goals and objectives) from organizational leaders that EBP is the basis of all delivered patient care. EBP should be an essential part of the organization's vision, mission, and values statements, as well as in the strategic plan. The organization should also make interprofessional continuing education regarding EBP a part of the orientation process and ongoing education for all employees (Melnyk & Fineout-Overholt, 2019).

The following are suggestions for implementing EBP.

When applying evidence (research findings) to clinical practice, nurses and their interdisciplinary colleagues should use a problem-solving approach to patient care (Melnyk & Fineout-Overholt, 2019):

- Ask a clinical question.
- Gather the latest and most relevant research to answer the question.
- Analyze the evidence.
- Incorporate personal clinical experience, patient's situation, available resources, and patient's preferences and values.
- Evaluate the results.
- Apply the evidence to the delivery of patient care.

Henry et. al (2019) developed a model for the swift implementation of EBP. Their model is called *Evidence Scanning for Clinical, Operational, and Practice Efficiencies* (E-SCOPE) and involves four steps:

1. Conduct quarterly evidence searches to identify newly published scientific evidence.
2. Decide which evidence-based practices to implement with input from the interdisciplinary team.
3. Support implementation of selected practices. Specific responsibility for implementation should be given to qualified individuals.
4. Monitor progress. The progress of implementation should be monitored and regularly evaluated, usually each quarter but more often if needed.

Experts in all fields emphasize the importance of applying EBP across the continuum of care. EBP must be established as the basis of healthcare in all settings and by all members of the interdisciplinary team.

NURSING RESEARCH

The language of critical appraisal and research

Before further discussing EBP and nursing research, it is necessary to define a few essential terms related to research. The following list is not all-inclusive, but it does provide a basis for discussions concerning EBP and nursing research:

- **Validity**: The extent to which assumptions made in a research study are accurate and well-founded. When validity is used to describe a research tool, it means the extent to which that tool measures what it is intended to measure (Polit & Beck, 2022).
- **Reliability**: The extent to which a measurement is free from measurement error. In other words, it is the extent to which study results are the same for repeated measurements (Polit & Beck, 2022).
- **Risk**: The probability of harm or injury (physical, psychological, social, or economic) as a result of participating in a research study (UCI Office of Research, 2019).
- **Outcome**: The conclusions investigators reach as the result of the research(Polit & Beck, 2022)

In addition to understanding the preceding concepts, nurses must be familiar with additional terms essential to the critical analysis of research articles. The following is a sampling of these terms (Polit & Beck, 2022):

- **Abstract**: A brief, comprehensive summary of a research study that appears at the beginning of an article.
- **Case study**: A research method that involves a thorough, in-depth assessment of an individual, group, or another social unit.
- **Cause and effect**: A relationship in which one event (the cause) makes another event happen (the effect).
- **Conceptual framework**: The structure of concepts or theories that serves as the foundation for a study.
- **Consent**: Permission given by a competent person to participate in a research study. *Consent* is also referred to as informed consent and is an ethical obligation of the researcher. The researcher must obtain voluntary informed consent from research participants after telling them about both the potential benefits and the possible risks of participating in the study.
- **Control group**: A group in a research study that consists of participants who do not receive the treatment or intervention under investigation. The outcomes of participants in the control group are compared to those of the participants who receive the treatment or intervention under investigation to establish its effectiveness or ineffectiveness.
- **Double-blind study**: Neither the researchers nor the participants know the specific details of the experiment. This type of study is used to safeguard against experimental bias. An example of a double-blind study involves a medication trial where trial medications and placebos are administered. At the time of administration, neither group nor the investigators know which group received the placebo and which group received the medication.
- **Experimental research group**: A group of randomly selected participants from the research group who will receive the experimental treatment, medication, or variable.
- **Hypothesis**: An educated prediction about the relationship between two or more variables.
- **Mean**: The average score between two variables or scores. It is the arithmetic average of all scores.
- **Random selection**: A selection process in which each member of the identified population has an equal and independent chance of being included in the sample.
- **Randomization**: A method of choosing a sample in which each member of the population has an equal and independent chance of being selected to either the experimental group or the control group.
- **Risk**: The possible negative consequences of participation in a research study.

- **Sample**: A sample is a subset of a population that is used to represent an entire group.
- **Single-blind study**: A study in which the researchers know specific details of the study, but the participants do not.
- **Theoretical framework**: The theoretical rationale for the hypothesis. It serves as the structure that supports the theory of a research investigation.
- **Theory**: An idea or set of interrelated concepts and propositions intended to explain and make predictions regarding phenomena.
- **Variable**: An intervention or action that is being studied to observe its effect on the research group.

Self-Assessment Quiz Question #5

A study in which neither the researchers nor the participants know the specific details of the experiment is a/an:
a. Double-blind study.
b. Experimental study.
c. Control group study.
d. Random selection study.

Developing the clinical (research) question

Scenario 4

Mai works in the stroke rehabilitation unit of a large teaching hospital. She has recently been promoted to Clinical Nurse II and she is very proud of her achievements. As part of her new role, Mai has been appointed to serve as a member of the hospital's Nursing Research Council.

Mai and her colleagues are concerned about an increase in the incidence of delirium among their patients. They believe that sleep deprivation is increasing this incidence. The standard on the unit is that patients are awakened for vital signs at 6 a.m. They are also bathed before 9:30 a.m. before physical and occupational therapy sessions begin. The nurses are proposing to delay taking vital signs and to bathe patients on a timetable that coincides with their habits at home before the stroke, including helping patients to bathe in the evening rather than early morning. They want to decrease sleep interruptions and promote adequate rest. They have found that patients who suffer from episodes of delirium have longer lengths of stay and poorer patient outcomes. Mai and her colleagues wonder what interventions can prevent delirium and ultimately lead to better patient outcomes.

Their initial proposed changes in clinical interventions will require changes in staffing routines and the cooperation of the interdisciplinary team. Mai's colleagues urge her to consult the members of the Nursing Research Council for help in determining if these changes are in alignment with available evidence and if a research study might help identify and implement practice changes. They also need help in formulating the clinical research question.

With the help of experts on the Nursing Research Council, an initial plan is developed:

- *Develop a focused clinical question to help focus on the relevant issues.*
- *Perform a literature search.*
- *Critically appraise relevant research articles.*
- *Identify other sources of evidence.*
- *Gather non-research data from the rehabilitation unit, including the incidence of delirium, characteristics of the affected population, and the effect of delirium on patient outcomes.*

In Scenario 4, Mai and her colleagues have some genuine concerns and ideas about improving practice. However, they need to define what they want to investigate. This means that it is necessary to develop a focused and structured question that will serve as a basis for the literature review and the identification of relevant external evidence.

The PICO format

Many nurses rely on the PICO format to formulate EBP research questions. The question itself will serve as a guide for literature review and the gathering of evidence (Polit & Beck, 2022).

- **"P" Stands for Population**
  What patient population/patient problem is being investigated? In this case, Mai's patient population consists of adult (18 years of age and older) stroke patients who suffer from delirium in the intensive care unit. However, the nurses also need to evaluate the need for further population specifications. For example, do clinical findings show that delirium occurs primarily in patients within a specific age range in their clinical setting? If so, that is the age range on which they will focus. For another example, is it necessary to eliminate patients from the study population who have received a diagnosis of dementia, which can be mistaken for delirium? Does the severity of stroke seem to predispose patients to delirium? Should they concentrate on a population with a certain degree of impairment caused by stroke? Findings from the literature, quality improvement data, and input from nurses who have clinical expertise in stroke rehabilitation will be used as evidence. Defining a particular population is a critical initial step that must be considered carefully.
- **"I" Stands for Intervention**
  What is going to be done for or to the identified patient population? What potential interventions should be considered to increase the amount of rest and sleep the patients receive? Mai and her colleagues propose changing the time vital signs are taken and when activities such as bathing are performed. They also want to show that ultimately getting more rest and potentially decreasing delirium will positively impact patient outcomes. Mai and her colleagues need to refine their focus. They may be looking at two issues: Does adequate sleep and rest decrease the incidence of delirium in stroke rehabilitation patients? Does a decrease in delirium lead to an increase in the achievement of desired patient outcomes? Can the two issues be combined into one literature review or research study? Mai and her colleagues have some work to do before choosing the interventions. Interventions depend on the research question, and the question must be carefully developed.
- **"C" stands for Comparison**
  What is the alternative to the planned intervention? Mai and her colleagues are thinking of using a control group of patients who continue to have vital signs taken and will be assisted to bathe at the current times. This will provide a comparison to those patients whose sleep will not be interrupted for vital signs and bathing. However, if the question focuses on decreasing the incidence of delirium and improving patient outcomes, there needs to be a more evident determination of what the interventions will be, as well as who will comprise the control group.
- **"O" Stands for Outcome**
  What are the desired outcomes? Outcomes require that nurses clearly state what they are hoping to achieve.

The preceding questions should help Mai and her colleagues to determine what they want to investigate. As they work with nurse researcher colleagues, they will refine and identify their clinical research question.

Nursing consideration: Developing and refining a clinical research question is not an easy task. Consulting nurses with research expertise will help to accomplish this task and conduct a successful critical appraisal of relevant literature.

Review of the literature and critical appraisal of EBP research articles

After the research question is refined and clarified, a literature review is necessary. A literature review (or critical appraisal) is an organized, systematic process for evaluating research studies in a given field. The reviewer uses a set of standardized criteria to objectively establish the strength, quality, quantity, and consistency of evidence provided by the studies. The goal of the literature review is to determine the applicability of the research under review to clinical practice (Polit & Beck, 2022).

Nursing consideration: Evidence gathered from the critical appraisal of the literature—as well as patient care data, clinical experience/expertise, and patient and family preferences and values—are all used to justify changes in clinical practice. This evidence can also support the current practice or trigger additional research. Nurses must be prepared to objectively evaluate all types of evidence to provide the best possible patient care.

The literature review helps narrow the researcher's focus and establish a foundation and theoretical basis for the research project. A review of the literature should achieve the following (Polit & Beck, 2022):

- Identify appropriate areas for investigation.
- Provide credible initiatives for patient care.
- Define appropriate concepts.
- Explain the proposed relationship between concepts.
- Provide evidence for clinical practice initiatives.

The literature review involves critiquing the evidence and putting the results of the review in writing. How findings from the literature review are presented can persuade organizational leadership to accept or reject proposed changes in clinical practice or support or block proposed nursing research studies. Thus, nurses must be able to prepare a clear and concise written essay of their literature review findings.

Here are some recommendations for reading and critiquing a research article (Polit & Beck, 2022):

- **Authors**: Who conducted the research? Do their titles and credentials indicate expertise in the research?
- **Bias**: Is the article free of bias? Were the researchers paid to conduct the research? If so, did this interfere with the ability of the researchers to conduct scientific, objective research and report the findings without bias? Was there any evidence of researcher bias in the data collection or analysis?
- **Title**: Does the title accurately describe the article? A good title is intriguing and triggers interest. However, before spending time reading the article, it is best to critically review the title. An appropriate title should communicate key concepts, methods, and variables. For instance, the keywords of the investigator's research question should appear, to some extent, in the titles of the article they are critiquing. Reading the abstract helps to determine if the title accurately describes the article.
- **Abstract**: Does the abstract accurately convey the key concepts of the article? A good abstract contains the purpose of the study; the pertinent research question or questions; and a brief overview of methodology, results, and conclusions. The abstract should help the nurse decide if the article is worthy of being included in their literature review. Abstracts should typically be from 250-500 words in length.
- **Introduction**: Does the introduction make the purpose of the article clear?
- **Problem statement**: Is the problem clear? Is it properly explained?
- **Purpose of the study**: Has the researcher clearly explained the purpose of the study?
- **Research questions**: Are the research questions clearly stated? Is there a null hypothesis, if appropriate?
- **Theoretical framework**: Is the theoretical framework described? If there is no theoretical framework, should there be one?
- **Literature review**: Is the literature relevant to the study? Is it thorough? Does it include recent research (within the last 5 years, although 3 years is preferred)? Does the literature review support the need for the study?
- **Methods**: Is the research design appropriate for the study? Does the sample correlate with the research design and is the size adequate? Was a data collection instrument used? If so, was it relevant to the study? How were data collected? Were methods, instruments, and surveys reliable and valid?
- **Analysis**: Is the analytical approach consistent with the study questions and research design?
- **Results**: Are the results presented clearly in the text of the article? Are there tables or figures? If so, are they clear and relevant to the study? Are the statistics clearly explained?
- **Discussion**: Are the results explained in relation to the theoretical framework and research questions? Is the significance to nursing explained?
- **Limitations**: Are limitations identified? Are the implications of the limitations discussed?
- **Conclusion**: Are there recommendations for nursing practice, future research, and policymakers?

All literature reviews should include the following (Melnyk & Fineout-Overholt, 2019):

- **Introduction**: Describes the general state of the literature on the identified topic.
- **Methodology**: Provides a concise narrative of how the literature search was conducted, including what terminology was used to initiate the search, so that it is reproducible by other investigators.
- **Findings**: Provides a summary of the major findings of the critical analysis of the literature review.
- **Discussion**: Presents a more detailed description of findings from broader studies to more focused studies.
- **Conclusion**: Provides the overall state of the research; implications for clinical practice; and, if indicated, suggestions for additional research.

When reviewing the literature, nurses are cautioned to avoid the following (Melnyk & Fineout-Overholt, 2019):

- Stating personal opinions, unless the review includes evidence that supports such opinions.
- Stating what they think nurses should do, unless the review includes evidence that supports such assertions.
- Providing long descriptions of the topic under review without referencing research studies.
- Providing numerous lengthy definitions, signs and symptoms, and treatment initiatives of a specific illness without focusing on research studies that provide evidence to support the purpose of the review of the literature.
- Discussing research studies without showing how these studies correlate with each other.

Nursing consideration: A literature review must be focused, succinct, organized, and free from personal bias.

Identification of key words for literature search

Before accessing Internet search engines or other resources, it is imperative to identify keywords to save time and narrow the search to relevant citations. For example: Suppose a group of rehabilitation nurses specializing in stroke care is interested in improving bladder training for increasing continence and independent bladder functioning. In a search engine, the nurses cannot simply type in "urinary incontinence" or "bladder training." Citations for thousands, if not millions, of resources will appear.

Researchers must ask themselves the following questions (Polit & Beck, 2022):

- What is the specific problem or research question that the literature must help to define?
- What is the scope of the literature review?
- Is the search wide enough to make sure that all relevant literature has been found?
- Is the search narrow enough to make sure that irrelevant literature has been discarded?
- Have we critically analyzed the literature?
- Have we cited and discussed study findings contrary to our perspectives?

In the example about bladder training, researchers would use such words as "stroke," with "bladder training" and "urinary incontinence" being typed as a subcategory under "stroke." Researchers must decide on age parameters: if they are going to exclude any coexisting problems, such as Alzheimer's disease; and if they are going to study both men and women.

The search can be narrowed by asking the following questions (Polit & Beck, 2022):

- Who are the patients to be studied?
- What is the problem?
- When does the problem occur?
- Why does it need to be studied?

Researchers can access search engines by using such terms as "bladder retraining in female stroke patients over the age of 65" and "urinary incontinence in female stroke patients over the age of 65". This would limit the study to females of a certain age. If researchers wanted to study both men and women, the researcher would include the term "male" in the parameters or delete the term "female."

Assessing credibility of the literature

Because many resources are now published exclusively on the Internet, it is vital to critique these resources. Here are some questions to ask to help in the critique of Internet resources (Polit & Beck, 2022):

- What are the author's credentials? Are they listed? Are the credentials appropriate for the material they have written?
- Is the author's contact information provided?
- Are references listed? Are they credible? Are they current?
- When was the website created? How and when is the site updated?
- Is any website sponsorship clearly stated? Funding sources must be identified.
- Does the website contain advertising? If so, is it separate from the scholarly material?
- Is information objective and free from bias?
- Does the website provide contact information if technical assistance is needed?
- Is a privacy statement available? Any information requested by users of the website should be protected by a privacy statement.
- What is the purpose of the website? Is it primarily scholarly, informative, or entertaining?

Scholarly sources are typically at least 5 pages long and usually longer. The articles usually have an abstract and a specific outline to the article: introduction (background), presentation of the problem, how the problem is going to be studied, findings, analysis, and recommendations. Scholarly web sources typically end in .edu or .org. Websites ending in .com and .gov are not typically the location to find scholarly articles. Google Scholar is a good place to start looking for information in databases if the researcher is not attached to a university and does not have access to their databases.

Nursing consideration: Many websites have a link called "About Us". This link generally describes the persons responsible for the site and those who contribute scholarly information. This description should include credentials and contact information. Nurses must always be aware of author credentials when conducting a literature review (Polit & Beck, 2022).

Finding a search engine

One of the first questions nurses should ask when embarking on a search for evidence in the literature is where can relevant research articles be found? The following are helpful search engines for sources of EBP nursing research articles:

- **Agency for Health Research and Quality (AHRQ)**: This agency is a free source of government documents for researchers: http://www.ahrq.gov
- **The Cumulative Index to Nursing and Allied Health Literature (CINAHL)**: This site provides indexing of nursing and allied health literature that covers a wide range of topics. Included in the database are nursing journals and publications, books, nursing dissertations, standards of practice, selected conference proceedings, book chapters, and audiovisuals: https://www.ebscohost.com/nursing/products/cinahl-databases/cinahl-complete
- **Cochrane Collaboration**: This resource provides access to abstracts from the Cochrane Database of Systematic Reviews: http://www.cochrane.org
- **EBSCO Host**: EBSCO Information Services provides information from e-journals, e-books, and research databases: http://www.ebsco.com
- **JBI EBP Database**: Membership is required to access this resource. It provides recommended links and descriptions of levels of evidence of articles: http://joannabriggs.org/
- **National Library of Medicine and the National Institutes of Health MEDLINE and PubMed Resources Guide**: This resource contains journal citations and abstracts for biomedical literature from around the world: http://www.nlm.nih.gov/bsd/pmresources.html
- **ProQuest Nursing & Allied Health Source**: Designed to meet needs of researchers at healthcare facilities and nursing and allied health programs at academic institutes, its database offers abstracting and indexing for thousands of titles and full-text dissertations: http://www.proquest.com/products-services/pq_nursingahs_shtml.html
- **PubMed**: This site comprises more than 22 million citations for biomedical literature from MEDLINE: http://www.ncbi.nlm.nih.gov/pubmed
- **Turning Research into Practice**: This site provides a wide sampling of available evidence from a variety of free online resources: http://www.tripdatabase.com
- **Virginia Henderson International Nursing Library**: This service is free of charge and helps nurses to locate conference abstracts and research study abstracts. It is supported by Sigma Theta Tau International: http://www.nursinglibrary.org

Levels of evidence

It is important to determine which level of evidence the research article provides when critiquing research studies. Levels of evidence are organized into a ranking system to describe the strength of the results measured in research studies. Level I is the strongest form of evidence and Level VII is the weakest (Melnyk & Fineout-Overholt, 2019):

- **Level I**: Evidence is gathered from a systematic review of all relevant randomized controlled trials (RCTs) or evidence-based clinical practice guidelines based on systematic reviews.
- **Level II**: Evidence is gathered from at least one well-designed RCT.

- **Level III**: Evidence is gathered from well-designed controlled trials without randomization, a quasi-experimental study.
- **Level IV**: Evidence is gathered from well-designed case-control and cohort studies.
- **Level V**: Evidence is gathered from systematic reviews of descriptive and qualitative studies.
- **Level VI**: Evidence is gathered from a single descriptive or qualitative study.
- **Level VII**: Evidence is gathered from the opinion of authorities or reports of expert committees.

After completing and presenting the literature review to colleagues and leadership representatives, decisions about translation into practice and the feasibility of conducting nursing research are made. In some cases, clinical practice changes will be piloted based on findings. In other cases, nursing research supervised by trained nurse researchers will be conducted.

Self-Assessment Quiz Question #6

A study that is relying primarily on evidence gathered from at least one well-designed RCT is relying on what level of evidence?
a. VII.
b. V.
c. II.
d. I.

Overview of the nursing research process

After developing the research/clinical practice question and conducting the literature review, the following research elements must be considered (Polit & Beck, 2022):

- **Time**: Will the research be completed within a realistic timeframe?
- **Adequate numbers of participants**: Can an adequate number of patients be obtained to participate in the study?
- **Location of the study**: Most researchers select the organizations for which they work or have some type of association, such as a clinical affiliation. However, researchers must consider the review and approval processes mandated by the organization, the resources available for nursing research, and how supportive the organization is to the nursing research process.
- **Finances**: The costs associated with the nursing research project must be considered. These costs include staff time related to conducting the research, expenses related to analysis, copying charges, and postage or computer resources if surveys or questionnaires are part of the research methodology.
- **Ethics**: Ethics is a significant concern in any research project. How are patients who participate in the study protected? Is there any risk to the health and safety of patients who participate in a study? For example, are they taking an experimental drug or agreeing to an experimental treatment method? How will participants receive an explanation of the study and how will they give informed consent to participate in the research project? How will confidentiality be protected? How will objectivity be maintained during data analysis? At times, some unethical researchers have altered data to skew findings to support the researchers' beliefs. Results must be reported accurately, objectivity must be maintained during analysis, and patients' rights and well-being must always be protected.

Self-Assessment Quiz Question #7

Issues related to ethics in the nursing research process include:
a. Maintaining objectivity during analysis.
b. Determining costs related to analysis.
c. Determining how supportive the organization is to the nursing research process.
d. Assessing if the research study will have an adequate number of participants.

Nursing consideration: It can be a challenge to determine how many research participants are needed for a research study. Qualtrics (a web-based survey tool to conduct survey research, evaluations, and other data collection activities) can be helpful when determining sample size.

After determining how the research study should be implemented, a written proposal to obtain permission to conduct research is developed and presented to the organization's institutional review board (IRB). The IRB reviews studies to ensure that ethical standards are met for the protection of the rights of human participants (Polit & Beck, 2022).

Written research proposals generally contain the following information (Polit & Beck, 2022):

- Cover sheet.
- Introduction to the proposed research study.
- Objectives of the study.
- Significance of the study.
- Methodology.
- Sample of the consent form.

The IRB often asks for additional information before granting permission to conduct research. After such permission is secured, the research study is implemented and results are evaluated. Results, supported by the literature review and evaluation of the study findings, may indicate a change in nursing practice. This is referred to as *translating evidence into practice*.

Translating evidence into practice

The ultimate goal of EBP is to translate evidence into practice for improving patient outcomes.

In its simplest format, EBP is based on the following (Polit & Beck, 2022):

- **Identifying the clinical EBP research question**: Questions stem from concerns and observations regarding clinical practice and the need to determine if changes in clinical practice are warranted.
- **Gathering evidence**: All available sources of evidence (the literature, clinical expertise, clinical practice guidelines, patient values, and preferences) are objectively reviewed and the evidence identified.
- **Conducting research**: After evaluating the evidence, it may become apparent that implementing a nursing research study is appropriate. Research is conducted under the supervision of nursing research experts and with the approval of the organization's IRB.
- **Generating new knowledge**: Research should add to the body of nursing knowledge for enhancing patient outcomes.
- **Disseminating knowledge gained from research or a critical analysis of all sources of evidence**: Findings should be shared at the unit and departmental meetings, committee meetings, and meetings with administrative and leadership team members. Knowledge gained should be shared not only within the employing organization, but also with the nursing community at large via publications, presentations at professional association meetings and conferences, and collaboration with academic settings.
- **Using findings in practice**: Using evidence to make practice changes or justify the current practice is the foundation of sound healthcare initiatives.

- **Improving the quality of care**: The ongoing primary goal of any healthcare professional should be to improve the quality of care patients are receiving. Translating evidence into clinical practice will improve patient care services.

Self-Assessment Quiz Question #8

Which of the following statements about translating evidence into practice is true?
a. EBP research questions are determined by the physician.
b. Sources of evidence are limited to the literature.
c. Research should add to the body of nursing knowledge.
d. Using evidence to make practice changes is under the jurisdiction of the IRB.

Self-Assessment Quiz Question #9

The role of the IRB is:
a. To design the research study.
b. To determine sample size.
c. To determine costs of the study.
d. To ensure that ethical standards are met.

Clinical practice EBP guidelines

Evidence-based guidelines—also referred to as clinical practice guidelines—are defined as systematic statements to help the practitioner and patient decide appropriate healthcare for specific clinical circumstances. The National Guideline Clearinghouse (NGC), sponsored by the Agency on Healthcare Research and Quality (AHRQ), has stated, "Guidelines are not fixed protocols that must be followed but are intended to identify generally recommended interventions to be considered by a knowledgeable healthcare provider" (National for Complementary and Integrative Health, 2021).

Many professional organizations and associations have developed guidelines for their respective fields. Such guidelines are developed by panels or groups of experts who synthesize and evaluate the evidence before making recommendations for clinical practice.

The American Academy of Physical Medicine and Rehabilitation has explained the need for clinical practice guidelines. According to the Academy, guidelines serve to accomplish the following (2021).
- Describe appropriate care based on the best available. scientific evidence and broad consensus.
- Reduce inappropriate variation in practice.
- Provide a more rational basis for referral.
- Provide a focus for continuing education.
- Promote efficient use of resources.
- Act as a focus for quality control, including audit.
- Highlight shortcomings of existing literature and suggest appropriate future research.

Nursing consideration: Systematic reviews (SRs) of clinical practice guidelines can be valuable tools when searching for valid and reliable guidelines. They can be used to systematically identify, assess, and summarize the current state of guidance on a specific clinical topic (Johnston et al., 2019).

Numerous clinical guidelines are available from a wide variety of healthcare specialties. These guidelines are accessible via the Internet. Healthcare professionals should critique these guidelines. For example, one could ask the following questions ((Johnston, et al., 2019; University of Washington Health Sciences Library, 2019):
- Who were the authors of the guidelines? What are their credentials? Do their credentials indicate expertise in the field the guidelines address?
- Is there an identified professional association that is affiliated with the guidelines? If so, is it a reputable association?
- Is there an identified healthcare system associated with the guidelines? If so, is the healthcare system reputable?
- Are there any conflicts of interest among the authors, associations, or healthcare system and the content of the guidelines? In other words, does one or more of these entities have a monetary or other interest in the content of the guidelines?
- Do the guidelines reflect the application of the most recent scientific evidence?
- What research findings were used to develop these guidelines? Is the research valid and reliable?
- Do the guidelines contradict any valid research findings?
- Are explanations for changes from previous guidelines given? Do these explanations make sense? Are changes based on recent research findings?
- Can the guidelines be implemented into current clinical practice without difficulty?
- Do the guidelines provide resources to help clinicians see how the guidelines were developed? Is contact information available for guideline authors so that clinicians who have questions about the guidelines or who need help with their implantation can contact the authors or other sources of help?

Here are some resources that provide valuable information about locating clinical practice guidelines:
- **AIDSinfo**: This site has all federally approved HIV/AIDS medical practice guidelines. The guidelines are available in multiple formats and contain treatment recommendations and tables: https://aidsinfo.nih.gov/guidelines
- **American Academy of Physical Medicine & Rehabilitation**: This site provides timely, in-depth information about physical medicine and rehabilitation guidelines: https://www.aapmr.org/home
- **American College of Physicians (ACP) Clinical Recommendations**: This site contains three different types of clinical recommendations: clinical practice guidelines, clinical guidance statements, and best practice advice. The ACP's goal is "to provide clinicians with recommendations based on the best available evidence, to inform clinicians of when there is no evidence, and to help clinicians deliver the best healthcare possible: https://www.acponline.org/clinical-information/guidelines
- **American Diabetes Association (ADA)**: The ADA provides the latest ADA clinical practice recommendations. These guidelines are regularly reviewed and updated: https://diabetesjournals.org/care/issue/44/Supplement_1
- **The American Heart Association**: The American Heart Association and the American Stroke Association publish medical guidelines and scientific statements on various cardiovascular disease and stroke topics: https://professional.heart.org/professional/GuidelinesStatements/UCM_316885_Guidelines-Statements.jsp
- **Best Practice Information Sheets**: Joanna Briggs Institute Guidelines are produced specifically for practicing healthcare professionals and are based on the best available international research evidence as reported in systematic reviews: http://joannabriggs.org/
- **FGCU Library Database**: This database is a list of practice guidelines for nursing students and licensed nurses: https://library.fgcu.edu/az.php
- **CMA Infobase**: This is a Canadian database of Canadian practice guidelines and is maintained by the Canadian Medical Association. The database contains 1,200 guidelines that were developed or endorsed by authoritative medical

and healthcare organizations in Canada: https://joulecma.ca/cpg/homepage

- **National Heart, Lung, and Blood Institute**: This site has resources for both healthcare consumers and healthcare professionals. It provides resources to keep healthcare professionals informed about the best practices to treat and manage patient care for those persons who are affected by sickle cells, asthma, hypertension, von Willebrand disease, and cardiovascular disease, and risk reduction in youth: https://www.nhlbi.nih.gov/health-topics/publications-and-resources
- **NCCN Clinical Practice Guidelines in Oncology, National Comprehensive Cancer Network**: The NCCN Clinical Practice Guidelines in Oncology are the recognized standards for clinical policy in oncology. To date, they are the most comprehensive and most frequently updated clinical practice guidelines available in any area of medicine. The guidelines are updated on an ongoing basis. Treatment recommendations are specific and implemented through performance measurement. Issues addressed include cancer detection; prevention and risk reduction; workup; and diagnosis, treatment, and supportive care: https://www.nccn.org/professionals/physician_gls/default.aspx
- **UK's National Institute for Health and Care Excellence**: Referred to as *Guidance Lists* in the United Kingdom, this site has more than 1,110 practice guidelines: https://www.nice.org.uk/guidance/published

Resources to help healthcare professionals locate various practice guidelines also are available (Meyer, 2018; University of Washington Health Sciences Library, 2019):

- **ClinicalKey**: Select "Guidelines" in the browse menu. A search box allows for the search of a particular topic or guideline: https://www.clinicalkey.com/#!/
- **DynaMed Plus**: Healthcare professionals begin by searching for the desired topic or guideline. Guidelines and resources will then be listed in the left-side menu. DynaMed Plus gathers guidelines from national and international sources: https://search.ebscohost.com/login.aspx?authtype=ip,uid&profile=dmp
- **ECRI Guidelines Trust**: ECRI Guidelines Trust has replaced the National Guideline Clearinghouse. It is a publicly available web-based repository of objective evidence-based clinical practice guideline content. Its purpose is to provide physicians, nurses, other clinical specialties, and members of the healthcare community with up-to-date clinical practices to advance safe and effective patient care. This centralized repository includes evidence-based guidance developed by nationally and internationally recognized medical organizations and medical specialty societies: https://guidelines.ecri.org/
- **PubMed**: PubMed comprises more than 20 million citations. There is a quick start guide to help facilitate searches: https://www.ncbi.nlm.nih.gov/pubmed?otool=yalelib
- **UpToDate**: After searching for the topic in question, society guideline links appear in the menu. Guidelines are gathered from both national and international organizations: https://www.uptodate.com/contents/overview-of-clinical-practice-guidelines

Nursing consideration: Many guidelines are accessible on the Internet. It is important to ensure that the most current guidelines are used and that these guidelines are based on a systematic review of the scientific evidence developed by a panel of experts. Guidelines must be accepted at employing organizations (Meyer, 2018).

How can nurses and other healthcare professionals be sure that the websites they are using to obtain clinical guidelines contain accurate and up-to-date information? The University of Washington's Health Sciences Library offers the following suggestions for evaluating websites (Schnall, n.d.). The guidelines have been adapted to focus on clinical guidelines websites:

- **Authority**.
  - Are the guidelines' authors clearly identified?
  - Are the credentials of the authors provided?
  - Are the authors affiliated with a healthcare system or professional association? Do the authors have any declared conflicts of interest?
  - Do the authors have credibility in the fields the guidelines are written for?
  - Is contact information provided for the authors?
- **Accuracy**.
  - Is the information provided in the guidelines accurate?
  - Are references listed? Were they written within the last 3 years? If not, are they considered "classic" information?
  - Are sources of information clearly stated?
  - Is there an explanation of the research methods that were used to gather data?
- **Objectivity**.
  - Is the purpose of the site clearly stated?
  - Is the information presented without bias? Are any conflicts of interest apparent?
  - Is sponsorship acknowledged? Does sponsorship bias the information presented?
- **Coverage**.
  - Does the site meet the needs of the healthcare professionals?
  - Are the guidelines comprehensive? Do they address all-important key aspects of care?
  - Does the site provide any extra features or information not available from other sources or in other formats?
- **Currency**.
  - Is the information provided current? Is the website itself current?
  - Are links current? Do links supplement information important to guideline implementation?
- **Design**.
  - How is the website organized? Is it easy to navigate?
  - Is there an internal search engine?
  - Can the site be accessed on a reliable basis?

The National Heart, Lung, and Blood Institute appoints panels of experts to conduct systematic evidence reviews to facilitate clinical practice guideline development. These experts are not paid and are selected for their scientific and clinical expertise. Persons with apparent financial conflicts and those with professional or intellectual bias are excluded from panel membership.

However, conflicts of interest are sometimes identified among members of the writing and review groups. The following actions handle such conflicts (National Heart, Lung, and Blood Institute, n.d.):

- Members voluntarily verbally disclose any potential conflicts of interest to each other during a general meeting. They must then recuse themselves from voting.
- A methodologist is hired to work with writing groups to provide objectivity in data analysis and in the ranking of evidence via the preparation of evidence tables and facilitating consensus.
- Expert panels provide opportunities for public review and comments via the National Heart, Lung, and Blood Institute or a scheduled public forum.

In summary, reliable, current, and trustworthy clinical practice guidelines should be based on a systematic literature review. The most valid research findings are identified and used to write or update the clinical guidelines.

The quality, reliability, and validity of evidence determines if a particular patient intervention is warranted. The impact of guideline implementation on patient outcomes should be part of every healthcare organization's quality improvement monitoring.

Barriers to the implementation of EBP in nursing

It seems only logical that all organizations should support EBP. However, nurses have identified significant barriers to its implementation. These barriers must be recognized and eliminated or reduced as much as possible.

EBP can be successfully implemented only if all healthcare team members support the EBP model that guides practice in their organization and understand how to apply it to their practice. This means that ongoing continuing education regarding EBP implementation is essential (Polit & Beck, 2022).

Nursing consideration: Research has suggested that the more education nurses have, the more confidence they have in implementing EBP. Thus, nursing and organizational leadership should facilitate the pursuit of additional formal academic education, including graduate education and ongoing continuing education (Polit & Beck, 2022).

According to recent research, the following are barriers to EBP and suggestions for the reduction or elimination of such barriers.

Organizational culture
The organization's culture is pivotal to EBP implementation and the process of conducting nursing research. If the organization's administrative and leadership staff do not support nursing research and EBP, it is nearly impossible to implement such processes successfully (Paler, et al., 2021). An organizational culture that is stagnant tolerates an attitude of "we have always done it this way," even if evidence suggests that the "old ways" are no longer an acceptable practice. Some nurses have reported that a culture of learning exists in organizations that promote EBP. Leadership team members want clinicians to have the most current knowledge and access to the most reliable evidence in these types of cultures. Access to the most current evidence promotes best practices from nurses. To develop a culture of learning leadership, all healthcare providers must learn about the benefits of EBP and research. Benefits that are most likely to grab the attention of these individuals are decreases in healthcare costs, decreased length of stay, decreased readmissions, and improved patient outcomes. In these situations, administration and leadership need continuing education as much as staff members do.

Insufficient knowledge
Lack of knowledge has been cited as a significant barrier to research and EBP implementation (Paler, et al., 2021). The education received in basic nursing education programs is not sufficient. Nurses at all levels of practice and who hold all types of nursing positions need ongoing continuing education regarding the implementation of nursing research and EBP. The organization's nursing professional development (NPD) practitioners must work closely with all members of the organization to provide ongoing continuing education and training in EBP and research processes.

Lack of motivation
It is easy to become entrenched in the routine of "we have always done it this way." Even experienced nurses believe that if they have implemented patient care in specific ways for a long time without problems, that there is no need to change (Alatawi, 2021). Some research has even suggested that the longer nurses have practiced nursing, the more likely they are to become entrenched. This further emphasizes the need for continuing education. Adult learners need to know why they are doing something or why they need to change established patterns of care. Disseminating evidence that shows EBP improves patient outcomes is imperative.

Perceived lack of time
Nurses and nurse managers have expressed concern that there is not enough time to stay current regarding the latest evidence or to participate in nursing research (Paler, et al., 2021). Patient care is the top priority. However, nursing administration and leaders should allot time for continuing education and research whenever possible.

Inadequate access to up-to-date technology
It is an overwhelming challenge to access the most current evidence and participate in nursing research without good technological equipment (Alatawi, 2021). Nurses need easy access to the Internet, assistance to use technology as needed, and education to use technology as part of EBP and nursing research. Librarians in universities and hospitals and hospital education departments can often assist.

Physician and patient issues

Research findings have suggested that physicians and patients have different values and beliefs that conflict with EBP. Treatment initiatives that have been in place for years and seem to be working may serve as a basis for conflict. Implementing change can be quite a struggle, especially if there is no desire to acknowledge that new evidence could be helpful (Alatawi, 2021). Support from administration and leadership, the establishment of a culture of change, and ongoing education for all practitioners are essential.

Leadership support
Administration and leadership team members should overtly support and acknowledge nurses who participate in, publish, and disseminate EBP and research findings (Melnyk & Fineout-Overholt, 2019). Such nursing actions should be acknowledged in performance evaluations and be part of the requirements for clinical advancement.

Many strategies in the promotion of EBP and nursing research and strategies to reduce or remove barriers to their implementation depend on the support of administration and leadership. This does not mean, however, that staff nurses do not have a role in establishing a culture of learning and practice improvement.

Here are some suggestions for staff nurse involvement in the promotion of EBP and nursing research:

- Identify ways to disseminate new, relevant evidence to nursing colleagues. Examples of ways to do this are starting a nursing journal club and sharing quick, short "blasts" of new information via electronic media such as texting, e-mail, and the organization's website employee section. Information may also be shared with management's authorization via the organization's social media pages. A portion of staff meetings should be devoted to disseminating EBP or nursing research information.
- Promote the formation of an EBP/nursing research council. As more and more organizations adopt a shared governance model, forming such councils is expected and is becoming commonplace. A council with designated responsibility for EBP and nursing research can evaluate EBP data that may be helpful, not only for nursing but also for the entire organization. Consider the formation of an interdisciplinary EBP council. Patient care plans are not developed in departmental isolation. The actions of one department affect the actions of the others. Working together to promote EBP will enhance patient outcomes.
- Participate in interdisciplinary patient rounds. Regularly working with other healthcare team colleagues can improve patient care and improve interdisciplinary working relationships. Sharing EBP and nursing research data in appropriate ways will also help dispel the doubts of those who are reluctant to adopt the EBP format of delivering patient care
- Participate in and promote continuing education about EBP and nursing research. Work with nursing professional development specialists as they develop and implement such education. Encourage colleagues to participate in education. Staff nurses should also consider taking an active role in educating colleagues. They can ask experts in continuing education to help them develop and enhance teaching skills.
- Encourage the establishment of a mentor program for EBP and nursing research. Research has suggested that nurses want and need mentors to implement EBP and participate in

nursing research effectively. Nurses with expertise in EBP and nursing research should consider becoming mentors. These individuals have an obligation to disseminate knowledge and promote practice strategies that improve patient outcomes.
- Stay current in the latest research and clinical practice guidelines in the field. Identify professional nursing organizations in specialty practice areas that publish standards of practice and EBP, and frequently check the online sites or receive notices of new information.

Nursing consideration: When sharing EBP and research information via public sources (e-mail, the organization's social media pages), nurses must be sure to adhere to HIPAA and organizational mandates regarding privacy and confidentiality. They should avoid posting information on personal social media pages. At no time should privacy and confidentiality standards be violated!

Self-Assessment Quiz Question #10

Barriers to EBP and nursing research can be diminished by:
a. Establishing a culture of administrative control.
b. Taking punitive action against nurses who are not motivated to implement EBP.
c. Allowing physicians to dictate nursing practice.
d. Providing ongoing continuing education.

Conclusion

Organizations are responsible for establishing a culture of learning that stimulates ongoing inquiry and translation of the best available evidence to clinical practice. Healthcare organizations must support EBP and nursing research by ensuring that nurses have the time to devote to EBP and nursing research, have access to continuing education, and have opportunities to collaborate with interdisciplinary teams for the provision of the best possible patient care.

References

- Alatawi, M., Aljuhani, E., Alsufiany, F., Aleid, K., Rawah, R., Aljanabi, S., & Banakhar, M. (2020). Barriers of implementing evidence-based practice in nursing profession: A literature review. *American Journal of Nursing Science*, *9*(1), 35. https://doi:10.11648/j.ajns.20200901.16
- American Academy of Physical Medicine and Rehabilitation. (2021). Clinical Practice Guidelines. https://www.aapmr.org/quality-practice/evidence-based-medicine/clinical-practice-guidelines
- Center for Innovation in Research and Teaching. (n.d.). *Quantitative approaches.* https://cirt.gcu.edu/research/developmentresources/research_ready/quantresearch/approaches
- Center on Knowledge Translation for Disability & Rehabilitation Research (KTDRR). (2021). *Evidence-based guidelines.* http://ktdrr.org/ktlibrary/guidelines.html
- Chein, L. (2019). Evidence-Based Practice and Nursing Research. *Journal of Nursing Research, 27*(4). https://www.doi:10.1097/jnr.0000000000000346
- Dang, D., Dearholt, S., Bissett, K., Ascenzi, J., & Whalen, M. (2022). *Johns Hopkins evidence-based practice for nurses and healthcare professionals: model and guidelines.* 4th ed. Sigma Theta Tau International. https://www.hopkinsmedicine.org/evidence-based-practice/ijhn_2017_ebp.html
- Duncan, R., Szabo, B., Jackson, Q. L., Crain, M., Lett, C., Masters, C., Spinks, R., Uhrig, L. K., & Gullatte, M. M. (2021). Care and Coping During COVID-19: Practice changes and innovations in the oncology setting. *Clinical Journal of Oncology Nursing*, 25(1), 48–55. https://doi-org.libproxy.troy.edu/10.1188/21.CJON.48-55
- Ferreira-Hermosillo, A., Molina-Ayala, M. A., Molina-Guerrero, D., Garrido-Mendoza, A. P., Ramírez-Rentería, C., Mendoza-Zubieta, V., Espinosa, E., & Mercado, M. (2020). Efficacy of the treatment with dapagliflozin and metformin compared to metformin monotherapy for weight loss in patients with class III obesity: a randomized controlled trial. *Trials*, 21(1), 1–10. https://doi-org.libproxy.troy.edu/10.1186/s13063-020-4121-x
- Fu, L., Su, W., Ye, X., Li, M., Shen, J., Chen, C., Guo, Q., Ye, L., & He, Y. (2020). Evidence-Based Practice Competency and Related Factors Among Nurses Working in Public Hospitals. INQUIRY: *The Journal of Health Care Organization, Provision, and Financing*. https://doi.org/10.1177/0046958020927876
- Harvey, G. & Kitson, A. (2016). PARiHS revisited: From heuristic to integrated framework for the successful implementation of knowledge into practice. *Implementation Science, 11*(1). https://doi.org/10.1186/s13012-016-0398-2.
- Henry, S. L., Mohan, Y., Whittaker, J., Koster, M., Schottinger, J. E., & Kanter, M. H, (2019) E-SCOPE: A strategic approach to identify and accelerate implementation of evidence-based best practices. *Medical Care, 57.* p S239-S245. https://doi:10.1097/MLR.0000000000001191
- Iowa Model Collaborative. (2017). Iowa model of evidence-based practice: Revisions and validation. *Worldviews on Evidence-Based Nursing, 14*(3), 175–182. https://doi:10.1111/wvn.12223
- Johnston, A., Kelly, S. E., Hsieh, S. C., Skidmore, B., & Wells, G. A. (2019). Systematic review of clinical practice guidelines: A methodological guide. *Journal of Clinical Epidemiology,* 108, 64–76. https://www.sciencedirect.com/science/article/pii/S0895435618302877
- Kaplan, L. (n.d.). *Framework for how to read and critique a research study.* Silver Spring, MD: American Nurses Association. https://www.nursingworld.org/
- Kerr, H. & Rainer, D. (2019). Addressing the current challenges of adopting evidence-based practice in nursing. *British Journal of Nursing, 30*(16), 970-974. https://doi.10.12968/bjon.2021.30.16.970
- Li, S. M., Cao, M., & Zhu, X. (2019). Evidence-based practice: Knowledge, attitudes, implementation, facilitators, and barriers among community nurses—systematic review. *Medicine, 98*(39). https://doi:10.1097/MD.0000000000017209
- Melnyk, B. M. & Fineout-Overholt, E. (2019). *Evidence-based practice in nursing and healthcare: A guide to best practice (4th. Ed.)* Wolters Kluwer.
- Meyer, C. (2018). *Finding clinical practice guidelines.* https://library.medicine.yale.edu/blog/finding-clinical-practice-guidelines
- National Center for Complementary and Integrative Health. (2021). Clinical practice guidelines. https://www.nccih.nih.gov/health/providers/clinicalpractice
- National Collaborating Centre for Methods and Tools. (n.d.). *Stetler model of evidence-based practice*. https://www.nccmt.ca/knowledge-repositories/search/83
- National Heart, Lung, and Blood Institute. (n.d.). *About systematic evidence reviews and clinical practice guidelines.* https://www.nhlbi.nih.gov/node/80397
- Newhouse, R. P., Dearholt, S., Poe, S., Pugh, L. C., & White, K. M. (2007). Organizational change strategies for evidence-based practice. *The Journal of Nursing Administration, 37*(12), 552–557. https://doi.org/10.1097/01.NNA.0000302384.91366.8f
- Paler, C. M. & Arganza Cachaper, G. (2021). Evidence-Based Practice: Are Nurses Ready? *Journal of Nursing Practice Applications & Reviews of Research*, 11(1), 43–50. https://doi-org.libproxy.troy.edu/10.13178/jnparr.2021.11.01.1006
- Polit, D. F. & Beck, C. T. (2022). *Essentials of nursing research: Appraising evidence for nursing practice (10th ed.).* Wolters Kluwer.
- Rashid, M., Hodgson, C. S., & Luig, T. (2019). Ten tips for conducting focused ethnography in medical education research. *Medical education online, 24*(1), 1624133. https://doi.org/10.1080/10872981.2019.1624133
- Schnall, J. G. (n.d.). *Criteria for evaluating websites.* http://media.hsl.washington.edu/media/howto/navigating/criteria.pdf
- SIS International Research. (2021). What is quantitative research? https://www.sisinternational.com/what-is-quantitative-research/
- Teskereci, G., Öncel, S., & Arslan, Ü. Ö. (2020). Developing compassion and emotional intelligence in nursing students: A quasi-experimental study. *Perspectives in Psychiatric Care*, 56(4), 797–803. https://doi-org.libproxy.troy.edu/10.1111/ppc.12494
- UCI Office of Research. (2019). *Assessing risks and benefits.* https://research.uci.edu/compliance/human-research-protections/irb-members/assessing-risks-and-benefits.html
- Wolters Kluwer. (2018). *Update on future of nursing report: Are we there yet?* http://lippincottsolutions.lww.com/blog.entry.html/2018/02/13/update_on_futureof-q5jh.html

USING EVIDENCE IN CLINICAL NURSING PRACTICE, 2ND EDITION

Self-Assessment Answers and Rationales

1. The correct answer is C.
Rationale: The nurse wants to research grief, which is a common human experience. Qualitative research is conducted to better understand the meaning of a human experience.

2. The correct answer is A
Rationale: Quality improvement (QI) is the formal, systematic analysis of data for monitoring and improving patient care.

3. The correct answer is B.
Rationale: The Iowa model focuses on identifying triggers, issues, or opportunities, stating the question or purpose, formation of interprofessional teams, reviewing evidence, critiquing, synthesizing, and change implementation through piloting.
- Identify and sustain practice change
- Outcomes dissemination.

4. The correct answer is A.
Rationale: The ARCC model emphasizes the importance of mentors and EBP for organizational effectiveness.

5. The correct answer is A.
Rationale: Neither the researchers nor the participants know the specific details of the experiment in a double-blind study. This type of study is used to safeguard against experimental bias.

6. The correct answer is C.
Rationale: Level II evidence is obtained from at least one well-designed RCT.

7. The correct answer is A.
Rationale: It is imperative that results are reported accurately, objectivity is maintained during analysis, and patients' rights and well-being are always protected.

8. The correct answer is C.
Rationale: Research should add to the body of nursing knowledge for enhancing patient outcomes.

9. The correct answer is D
Rationale: The IRB reviews studies to ensure that ethical standards are met for the protection of the rights of human participants.

10. The correct answer is D.
Rationale: Participating in and promote the delivery of continuing education about EBP and nursing research reducing barriers to EBP implementation.

Course Code: ANCCOH03UE

Elite
PO Box 37 | Ormond Beach, FL 32175
Questions? Call us toll-free: 1-866-344-0971

Ohio Nursing Professionals
CE Correspondence Package
Course Participant Sheet

Please fill in all the information below in CAPITAL LETTERS. Upon completion, please return this sheet, along with payment and mail to the address above. If paying by check or money order, please make payable to Elite for $38.95. For even faster service, we offer this course participant affirmation sheet online with instant certificate issuance. Please visit **EliteLearning.com/Book** to complete your affirmation online.

Please PRINT NEATLY in the areas below using black or blue pen only:

First Name | **M.I.** | **Last Name**

Mailing Address

Suite / Floor / Apt Number | **City (do not abbreviate)** | **State**

Zip Code | **Telephone Number** (Please include area code) | **OH Nursing License Number** (Starts with two letters: RN or PN) (Please provide to receive course credit)

E-Mail address (include to receive processing confirmation and instant certificate access)

☐ Entire Course only $38.95 or

☐ Laws and Rules for Ohio Nurses, 2nd Edition (Mandatory) - $14.95
☐ Basic Psychiatric Concepts - $35.95
☐ Diabetes Prevention and Management for Healthcare Professionals - $25.95
☐ Hypertension Management: Evidence-Based Guidelines - $31.95
☐ Stroke Management in the Acute Care Setting - $29.95
☐ Using Evidence in Clinical Nursing Practice, 2nd Edition - $23.95

Payment Method

☐ Check / M.O. Enclosed for:
☐ Visa / Mastercard / AMEX / Discover

Visa / Mastercard / AMEX / Discover Number | Credit Card Expiration Date

Cardholder Signature: _____

Important Note:
The box below must be checked for verification sheet to be processed.

☐ By checking this box and signing below, I hereby affirm that I have completed this educational activity, including the self-assessment. If faxing or mailing be sure to also fill out and include course evaluation.

_____
Signature

For Internal Use Only - Please Do Not Mark In This Area

ANCCOH2423

9209245292

Test Expiration Date: 11/16/2024					
Chapter 1: ANCCOH01LR	Chapter 2: ANCCOH06PC	Chapter 3: ANCCOH05DM	Chapter 4: ANCCOH04HT	Chapter 5: ANCCOH05SM	Chapter 6: ANCCOH03UE

NURSING - COURSE EVALUATION (ANCCOH2423 - Required)

To receive continuing education credits for this program, this mandatory evaluation form must be completed.

Licensee Name: _____ **License #**_____

Your honest feedback is vital for the planning, evaluation, and design of future educational programs.

SECTION I: Demographics: Your current license type and education level: ❍LPN/LVN ❍RN - Associate degree ❍RN - Bachelor's degree ❍RN - Master's degree ❍APRN - Master's degree ❍Doctorate / DNP / Other Doctorate ❍Other (specify)_____

How long have your been a nurse: ❍Less than 5 years ❍6 to 10 years ❍11 to 15 years ❍16 to 20 years ❍Over 20 years ❍Not a nurse

SECTION II: Course Evaluation
Please complete the following for each course you have completed. Mark the circle that best matches your evaluation of the question.

1. After completing this course, I am able to meet each of the Learning Outcomes.	7. The course demonstrated the author's knowledge of the subject.
2. The course content was unbiased and balanced.	8. I intend to apply the knowledge from this course to my practice.
3. The course was relevant to my practice.	9. What I have learned from this course will have an impact on my knowledge.
4. I would recommend this course to my peers.	10. What I have learned from this course will have an impact on patient outcome.
5. What I have learned from this course will have an impact on my practice.	11. The overall rating for this course.
6. The course was well-organized and clear.	

	Laws and Rules for Ohio Nurses, 2nd Edition 1 Contact Hour					Basic Psychiatric Concepts 6 Contact Hours				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
2	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
3	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
4	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
5	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
6	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
7	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
8	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
9	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
10	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
	Excellent	Good	Average	Below Average	Poor	Excellent	Good	Average	Below Average	Poor
11	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
12	How many total hours did it take you to complete this course? Please indicate the number of hours: _____									
13	Please provide any additional feedback on this course: _____									

SECTION III: General

Fill in the circle below numbers **0=Not likely at all, 5=Neutral and 10=Extremely likely**

How likely is it that you would recommend Elite to a friend or colleague?..... 0 1 2 3 4 5 6 7 8 9 10

If your response is less than a 10, what about the course could we change to score a 10? _____

_____

List other topics that you would like to see provided: _____

❑ I agree to allow Colibri Healthcare, LLC to use my comments. If you agree, please provide your name and title as you would like to see them to appear.

_____

NURSING - COURSE EVALUATION (ANCCOH2423 - Required)

To receive continuing education credits for this program, this mandatory evaluation form must be completed.

Licensee Name: _____ **License #**_____

Your honest feedback is vital for the planning, evaluation, and design of future educational programs.

SECTION I: Demographics: Your current license type and education level: ❍LPN/LVN ❍RN - Associate degree ❍RN - Bachelor's degree ❍RN - Master's degree ❍APRN - Master's degree ❍Doctorate / DNP / Other Doctorate ❍Other (specify)_____

How long have your been a nurse: ❍Less than 5 years ❍6 to 10 years ❍11 to 15 years ❍16 to 20 years ❍Over 20 years ❍Not a nurse

SECTION II: Course Evaluation
Please complete the following for each course you have completed. Mark the circle that best matches your evaluation of the question.

1. After completing this course, I am able to meet each of the Learning Outcomes.	7. The course demonstrated the author's knowledge of the subject.
2. The course content was unbiased and balanced.	8. I intend to apply the knowledge from this course to my practice.
3. The course was relevant to my practice.	9. What I have learned from this course will have an impact on my knowledge.
4. I would recommend this course to my peers.	10. What I have learned from this course will have an impact on patient outcome.
5. What I have learned from this course will have an impact on my practice.	11. The overall rating for this course.
6. The course was well-organized and clear.	

	Diabetes Prevention and Management for Healthcare Professionals 5 Contact Hours					Hypertension Management: Evidence-Based Guidelines 4 Contact Hours				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
2	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
3	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
4	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
5	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
6	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
7	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
8	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
9	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
10	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
	Excellent	Good	Average	Below Average	Poor	Excellent	Good	Average	Below Average	Poor
11	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
12	How many total hours did it take you to complete this course? Please indicate the number of hours: _____									
13	Please provide any additional feedback on this course: _____									

SECTION III: General

Fill in the circle below numbers **0=Not likely at all, 5=Neutral and 10=Extremely likely**

How likely is it that you would recommend Elite to a friend or colleague?..... 0 1 2 3 4 5 6 7 8 9 10

If your response is less than a 10, what about the course could we change to score a 10? _____

_____

List other topics that you would like to see provided: _____

❑ I agree to allow Colibri Healthcare, LLC to use my comments. If you agree, please provide your name and title as you would like to see them to appear.

_____

NURSING - COURSE EVALUATION (ANCCOH2423 - Required)

To receive continuing education credits for this program, this mandatory evaluation form must be completed.

Licensee Name: _____ **License #**_____

Your honest feedback is vital for the planning, evaluation, and design of future educational programs.

SECTION I: Demographics: Your current license type and education level: ❍LPN/LVN ❍RN - Associate degree ❍RN - Bachelor's degree ❍RN - Master's degree ❍APRN - Master's degree ❍Doctorate / DNP / Other Doctorate ❍Other (specify)_____

How long have your been a nurse: ❍Less than 5 years ❍6 to 10 years ❍11 to 15 years ❍16 to 20 years ❍Over 20 years ❍Not a nurse

SECTION II: Course Evaluation
Please complete the following for each course you have completed. Mark the circle that best matches your evaluation of the question.

1. After completing this course, I am able to meet each of the Learning Outcomes.	7. The course demonstrated the author's knowledge of the subject.
2. The course content was unbiased and balanced.	8. I intend to apply the knowledge from this course to my practice.
3. The course was relevant to my practice.	9. What I have learned from this course will have an impact on my knowledge.
4. I would recommend this course to my peers.	10. What I have learned from this course will have an impact on patient outcome.
5. What I have learned from this course will have an impact on my practice.	11. The overall rating for this course.
6. The course was well-organized and clear.	

	Stroke Management in the Acute Care Setting 5 Contact Hours					Using Evidence in Clinical Nursing Practice, 2nd Edition 3 Contact Hours				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
2	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
3	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
4	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
5	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
6	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
7	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
8	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
9	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
10	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
	Excellent	Good	Average	Below Average	Poor	Excellent	Good	Average	Below Average	Poor
11	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
12	How many total hours did it take you to complete this course? Please indicate the number of hours: _____									
13	Please provide any additional feedback on this course: _____									

SECTION III: General

Fill in the circle below numbers **0=Not likely at all, 5=Neutral and 10=Extremely likely**

How likely is it that you would recommend Elite to a friend or colleague?..... 0 1 2 3 4 5 6 7 8 9 10

If your response is less than a 10, what about the course could we change to score a 10? _____

_____

List other topics that you would like to see provided: _____

❑ I agree to allow Colibri Healthcare, LLC to use my comments. If you agree, please provide your name and title as you would like to see them to appear.

_____