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NEW MANDATORY REQUIREMENT FOR MICHIGAN LICENSE RENEWAL

A new rule was added to the Michigan Public Health Code - General Rules in 2021 requiring training on implicit bias as a condition for initial licensure or registration, as well as license or registration renewal.

Beginning on June 1, 2022, and for every renewal thereafter, an applicant for license or registration renewal must have completed a minimum of 1 hour of implicit bias training **for each year** of the applicant's license or registration cycle.

For example:

- If you renewed your license in August of 2022, you would have been required to have 1 hour of training for that renewal, even if the length of your license cycle is 2 years.
- When you renew your 2-year license in August of 2024, you will need to have completed two (2) hours of Implicit Bias Training within the preceding 48 months.
- See more details on our FAQ page. Scan the QR code.

Important Note: This training is in addition to any continuing education required for license renewal.

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ABOUT THE TRAINING COURSES

- *Michigan Implicit Bias Training for Healthcare Professionals* - This interactive 1-hour implicit bias training provides the historical context of race and its relationship to the development of racial implicit bias. Presented by **Benjamin D. Reese, Jr., PsyD**.
- *Implicit Bias in Everyday Life* - This 2-hour interactive session focuses in interpreting bias lingo and provides examples of the dangers of implicit bias and how these may be harmful to the healthcare provider and patient. The 90-minute presentation is followed by 30 minutes of Q&A with presenter **Kimberly Norwood**.
- *Recognizing, Combating, and Addressing Implicit Bias* - This 1-hour course discusses everyday unconscious biases and how they impact our thoughts, beliefs, and behaviors. Following a 40-minute presentation will be a 15-minute Q&A session with presenter **Jennefer Witter**.

IMPORTANT NOTE!
Upon completion of this book, you will receive an emailed discount code within 7 days of completion to be used toward one of the implicit bias training webinars. Be sure to provide your email address when completing this book.

WHAT'S INSIDE

SATISFIES PAIN ASSESSMENT AND MANAGEMENT REQUIREMENT

REMAINING COURSES SATISFY GENERAL HOURS REQUIREMENT

FREQUENTLY ASKED QUESTIONS

What are the requirements for license renewal?

Licenses Expire	Contact Hours	Mandatory Subjects
Licenses expire every two years from date of initial licensure.	25 (All hours are allowed through home-study)	Pain and Symptom Management - 2 contact hours required each renewal. Human Trafficking - A one-time requirement. Implicit Bias - Effective 6/1/2022, training on implicit bias is required as a condition for initial licensure or registration as well as license and registration renewal. Implicit bias training will be required every license or registration renewal.

How much will it cost?

If you are only completing individual courses in this book, enter the code that corresponds to the course below online.

COURSE TITLE	HOURS	PRICE	COURSE CODE
Michigan Nurses Pain Assessment and Management (Mandatory)	2	$20.95	ANCCMI02PM
Crisis Resource Management for Healthcare Professionals	3	$23.95	ANCCMI03CR
Documentation in the Electronic Age for Nurses	3	$23.95	ANCCMI03EA
Management of Anxiety and Depression for Healthcare Professionals	3	$23.95	ANCCMI03AD
Staying Healthy: Vaccine Preventable Diseases	10	$44.95	ANCCMI10SH22
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Are my credit hours reported to the Michigan board?
Yes, the Michigan Board of Nursing uses CE Broker to track and verify your compliance. We report your hours electronically to the Board through CE Broker within one business day. Remember, do not forward your CE documentation to the board, keep your certificate in a safe place for your records.

What information do I need to provide for course completion and certificate issuance?
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Important information for licensees:
Always check your state's board website to determine the number of hours required for renewal, mandatory topics (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.

Licensing board contact information:
Michigan Board of Nursing | Department of Licensing and Regulatory Affairs | Bureau of Professional Licensing
Health Professions Licensing Division | Ottawa Building | 611 W. Ottawa | PO Box 20004 | Lansing, Michigan 48909
Phone (517) 241-0199 | Website: https://www.michigan.gov/lara/about/contact-us

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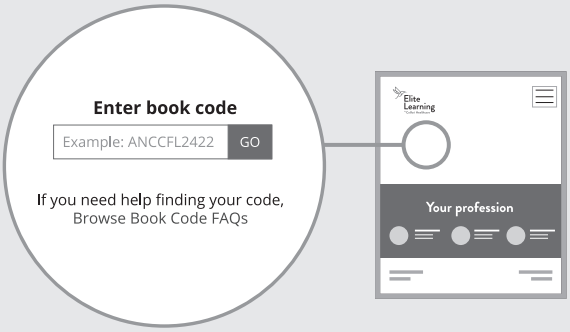

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- Fill out the answer sheet and evaluation found in the back of this booklet. Please include a check or credit card information and e-mail address. Mail to Elite, **PO Box 37, Ormond Beach, FL 32175**.
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- Submissions without a valid e-mail will be mailed to the address provided.

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Michigan Nurses Pain Assessment And Management (Mandatory)

2 Contact Hours

Release Date: October 19, 2022

Expiration Date: October 19, 2025

Faculty

Ann M. Schreier, PhD, RN, received her baccalaureate degree in nursing from Boston University; an MSN from the University of California, San Francisco; and a PhD from Stanford University. Currently Dr. Schreier is a professor at East Carolina University, College of Nursing in the Nursing Science Department. She is a past president of the American Society of Pain Management Nursing.

Ann M. Schreier has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Reviewer:

Robyn Caldwell, DNP, MSN, FNP-BC, earned a doctor of nursing practice (DNP) from Samford University in nursing administration with an emphasis on nursing education in 2013, a postmasters certificate as a family nurse practitioner from Delta State University in 2003, a masters degree in nursing administration (MSN) in 1996, and a 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 at local, state, and national venues. Currently, Dr. Caldwell is employed in an urgent care setting and is working on a postmasters as a psychiatric mental health nurse practitioner (PMHNP).

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

Course overview

This course meets the Michigan Board of Nursing requirement for Pain Assessment and Management content. It will provide nurses with an overview of the physiology of pain and will differentiate between acute and chronic pain. The focus of the program will be on assessment, as well as on pharmacologic and nonpharmacologic treatment modalities for the patient experiencing pain.

Learning objectives

After completing this course, the learner will be able to:

- Recall the definition, the nature, the impact, and the expression of pain. Differentiate between nociceptive and neuropathic pain.
- Discuss the physiology of pain.
- Choose the appropriate pain assessment tool for individual clients based upon cognitive abilities.
- Demonstrate an understanding of various treatments for acute and chronic pain, including pharmacological and nonpharmacological treatment modalities.
- Discuss the special considerations for pain management in populations such as the elderly, pediatric patients, and those who are addicted to drugs or at risk for addiction.
- Select appropriate educational information for patients regarding pain management. Discuss barriers to adequate treatment of pain.

How to receive credit

- Read the entire course online or in print which requires a 2-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.

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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

Pain affects millions worldwide, and one in five people experience chronic pain (International Association for the Study of Pain [IASP], 2020). In the U.S., high-impact chronic pain (pain that interferes significantly with physical function) affects over 19 million individuals. Pain is an "unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage" (IASP, 2020). Pain can be acute (lasting less than three to six months) or chronic (persisting for more than three months) (World Health Organization [WHO], 2019). In the U.S., pain is a public health crisis that impacts the physical, psychological, and social aspects of individuals experiencing pain (U.S. Department of Health and Human Services [HHS], 2019). An individual's response to pain is unique. Biological factors (comorbidities, physiological stress, genetics, and cognition), psychological and emotional factors (anxiety, fear, depression), social factors (cultural/familial attitudes toward pain), and previous experiences of pain influence pain (Ireland & Lalkhen, 2019).

Prevalence

The prevalence of pain can be challenging to assess due to the available and reliable data. Using data from a subsample of the National Health Interview Survey, 33% of adults without cancer reported at least one painful medical diagnosis (Unseld et al., 2020). These data exclude individuals without a medical diagnosis who may experience painful conditions and those with cancer experiencing pain. Barriers to healthcare

access and other factors such as reluctance to seek care may increase pain prevalence (Cooney et al., 2018). Additionally, racial and ethnic disparities in pain reporting increase the likelihood of inadequate pain treatment (Anderson et al., 2021).

In the U.S., approximately 50.2 million adults (20.5%) experience pain on most days or every day. The most common locations are the back, hip, knee, and foot (Yong et al., 2022). According to the Centers for Disease Control and Prevention [CDC] (2022), ambulatory clinics reported visits as preventive (33.4%), new onset conditions (32.8%), and chronic problems (32.1%). Exacerbations of chronic diseases, like pain syndromes, are identified as the most problematic. Pain prevalence is also prevalent in the aging population. The prevalence of pain ranges between 45% and 70% in frail older adults (Reyes et al., 2019). The high incidence of pain requires that health care workers be informed of best practices in pain assessment, treatment, and management to achieve the best outcome.

Financial impact

The financial impact of pain is burdensome, with billions of dollars lost directly (through treatment or caregiving) and indirectly (through lost wages or productivity). The total treatment-related costs for those experiencing pain are up to $635 billion annually (Smith & Hillner, 2019). The misuse of opioid pain prescriptions alone in the U.S. carries an economic burden of $78.5 billion a year, which includes costs of healthcare, lost productivity, addiction treatment, and criminal justice involvement (HHS, n.d.).

PHYSIOLOGIC & PATHOLOGIC PAIN

Pain can be considered physiologic or pathologic. Physiologic pain occurs when tissue is injured; its function is to prevent further injury and promote survival. In addition, the injured person develops a memory in response to the pain and will avoid being injured in the same fashion (e.g., a small child getting burned by the stove will remember to avoid touching a hot stove in the future). Physiologic pain is often associated with acute, short-lived pain.

Neuropathologic pain can also start with a tissue injury, but eventually changes occur in the peripheral and central nervous system along somatosensory pathways from the periphery to the cortex (Clauw et al., 2019). Unfortunately, these changes do not serve a known purpose and can cause chronic (long-lasting) pain, such as neuropathic pain and fibromyalgia (Clauw et al., 2019).

NOCICEPTIVE PAIN AND NEUROPATHIC PAIN

There are two main subtypes of pain: Nociceptive pain and neuropathic pain.

Nociceptive pain is the perception of noxious stimuli, is usually caused by tissue damage, and is subcategorized into somatic or visceral pain (Rosenquist, 2017). Somatic pain occurs from tissue injury in the skin and deep tissue—such as fascia, tendons, and bone—can be described as sharp, burning, or throbbing; and is easily localized (Behrends, 2022). Visceral pain originates in the viscera, usually in internal organs, and stretch receptors mediate poorly localized, deep, and dull sensations (Behrends, 2022). Common stimulators of these afferent nerves are compression, inflammation, ischemia, or infiltration by tumors (Ramos & Eti, 2019).

Neuropathic pain occurs due to abnormal neural activity resulting from injury, disease, or nervous system dysfunction; this includes diabetic neuropathy, trigeminal neuralgia, and thalamic pain (Behrends, 2022; Montgomery et al., 2018). Neuropathies are the most prevalent type among individuals with diabetes (Iqbal et al., 2018). In addition, neuropathic pain is prevalent among cancer survivors and can result from cancer or cancer treatments (Yoon & Oh, 2018). Symptoms of neuropathic pain include burning, shooting, numbing, and tingling (Behrends, 2022).

Scenario 1

Mary is a new graduate RN and has begun work in an emergency department. The hospital is a tertiary care hospital that serves a large rural area in the southeastern U.S. Mary is still in her orientation period at the hospital and works with an RN preceptor named Teresa. Teresa has 10 years of experience in the emergency department and two years of experience in a medical-surgical unit in the same hospital. Today is a Saturday, and the emergency department is experiencing a high volume of patients. Teresa assigns Mary to see patients that are less acutely ill. Mary is caring for several patients who are experiencing pain.

Michael Jones is a 16-year-old male who has come to the emergency department after injuring his ankle while playing basketball. His left ankle is swollen, and he cannot stand on his left leg without grimacing. The x-ray reveals no fracture. After the physician examines him, he diagnoses him with a severe sprain and recommends applying ice and wrapping the ankle with an ace bandage and a boot. He instructs Michael not to bear weight on the left foot for one week and to take ibuprofen for pain. The physician arranges for a referral to a sports medicine physician at the hospital. Mary provides Michael with crutches and discharge instructions. Michael tells Mary that his ankle is throbbing and he doesn't think the pain is as sharp as it was at the beginning.

Self-Assessment Quiz Question #1

Teresa asks Mary about Michael's pain. Mary recalls that there are two types of pain: nociceptive pain and neuropathic pain. She describes Michael's pain as:

a. Neuropathic pain because of the severity and his ability to locate the site and source of the pain.
b. Nociceptive pain because he can localize the pain, and there is evidence of tissue damage.
c. A combination of nociceptive and neuropathic pain because he complains of greater severity than expected, although he can localize it.
d. Nociceptive pain because it is evident that there is inflammation and abnormal nerve functioning.

Mary has another patient who is admitted because of back pain. Mr. Ellis is a 62-year-old man complaining of severe back pain. During the admission assessment, Mary asks Mr. Ellis about his pain and uses a numerical rating scale (NRS). Mr. Ellis states that his pain is currently an 8 out of 10 on the rating scale. He tells Mary that he first started having back pain when he was 59. Mr. Ellis states that he usually manages the pain with acetaminophen and rests when it bothers him. He has not seen a physician for his pain because he does not have a physician and doesn't have a good insurance plan. Today, the pain became severe and was radiating down his left leg. He also couldn't think about anything else, so his wife said it was time to go to the emergency department.

When Mary has a break, she talks with Teresa about her patients. She tells Teresa that she is very puzzled by the fact that Mr. Ellis has not sought care for his back pain in the past. He has been experiencing this pain for years, and now he has come to the emergency department for something that would be less costly in an outpatient setting.

Self-Assessment Quiz Question #2

Which of the following statements are accurate about Mr. Ellis' pain?

a. Many patients are like Mr. Ellis and reluctant to seek care until they cannot function.
b. Mr. Ellis has likely come to the emergency department to get an opioid.
c. Mr. Ellis has acute nociceptive pain.
d. All of the above are correct.

Nociception is a four-stage process that the body utilizes to process painful stimuli:

1. Transduction: Painful stimuli are converted to neuronal action potentials at the sensory receptor.
2. Transmission: Action potentials move via neurons from peripheral receptors to the spinal cord and the brain.
3. Perception: The brain receives the information from the action potentials and perceives them as painful.
4. Modulation: The transmission of pain is altered via this process

Transduction

Painful stimuli are first encountered by nociceptors, which are nerve endings. Nociceptors convert painful stimuli (mechanical, chemical, or thermal) into neuronal action potentials that travel through the spinal cord and finally to the brain. Nociceptors are found throughout the body, including in the skin, muscle, connective tissue; circulatory system; and viscera of the abdomen, pelvis, and thoracic cavity (Hudspith, 2019).

Nociceptors are stimulated by direct injury to nerve endings or the release of chemicals as part of the inflammatory response. These chemicals include potassium, hydrogen, lactate, prostaglandins, serotonin, and bradykinin. These chemicals affect the membrane potential of the pain receptor, triggering depolarization and an action potential that makes its way to the brain, which processes it as pain (Hudspith, 2019).

Transmission

A-delta and C fibers are primary afferent neurons that transmit action potentials (also known as nerve impulses) to the central nervous system. A- delta fibers are larger and myelinated, and they quickly carry impulses (in about 0.1 s) that result in a sharp first pain response. C fibers are smaller and unmyelinated; take longer (about 1 s or more) to transmit impulses; and result in a dull, aching pain sensation (Hudspith, 2019). A- delta fibers are responsible for the initial sharp pain sensation a person feels, which causes the person to swiftly remove themselves from the cause of injury (Hudspith, 2019). C fibers relay a slower pain that grows over time and causes suffering (Hudspith, 2019).

Nociceptive impulses travel through A-delta and C fibers, enter the spinal cord from the dorsal roots, and then synapse relay neurons at the dorsal horn (Hudspith, 2019). Next, the pain signals travel to the brain via the spinothalamic tract (Hudspith, 2019). The A-delta pain fibers are primarily transmitted via a spinothalamic tract known as the neospinothalamic tract and secrete an instantaneously acting neurotransmitter known as glutamate (Hudspith, 2019). The neospinothalamic tract has fewer synapses than the paleospinothalamic tract, so the C fibers travel more slowly, and the information they carry is quickly transmitted to the thalamus and the primary somatosensory cortex (Hudspith, 2019). As a result of this quick transmission, pain is easily pinpointed.

The slower C pain fibers take the paleospinothalamic pathway. In addition, type C pain fibers secrete glutamate and a slower-acting neurotransmitter known as substance P, which is associated with the transmission of slow and chronic pain (Ireland & Lalkhen, 2019). This pathway contains more synapses and goes to various parts of the brain but mostly ends in the lower regions of the brain associated with chronic pain (Hudspith, 2019; Ireland & Lalkhen, 2019). As a result of the many synapses and slower transmission time, pain transmitted via the paleospinothalamic pathway is harder to localize, which may account for patients being unable to provide specific information about pain location.

Perception

Pain perception is how the brain processes the information it receives from nociceptive impulses. Anxiety, fear, catastrophizing, and prior experiences influence pain perception (Clauw et al., 2019). Psychosocial factors influence pain, including social support, active coping, acceptance, and self-efficacy (Clauw et al., 2019). Pain perception makes the pain experience unique to every individual. Pain threshold is the amount of painful stimulation needed to provoke the perception of pain (Cox, 2018). Pain tolerance varies from person to person and is influenced by genetics, culture, gender, age, and previous experience with pain (National Institutes of Health [NIH], 2020). Pain expression is how the pain is communicated—for example, crying, grimacing, or moaning (NIH, 2020).

Modulation

Pain modulation occurs in various ways. The gate control theory of pain by Melzack and Wall (1965) assumes that perceived pain could be either increased or decreased via a gate closing or opening at the dorsal horn of the spinal cord. The gate considers various sensory inputs and opens or closes accordingly, allowing or stopping the transmission of pain impulses. While the gate control theory may serve as a guide to explain modulation in acute pain, the processes are much more complex in chronic pain. Scientific understanding of the nervous system and brain function has increased since 1965. As a result, Melzack (2005) developed the neuromatrix theory of pain to reflect a more current understanding of chronic pain. Melzack (2005) postulates that multiple dimensions influence human beings' interpretation of and reaction to pain. An individual must first become aware of pain, synthesize the experience within the neuromatrix, and then respond with actions. Cognition, sensory signaling, and emotions interact in the brain to impact perception, stress regulation, and voluntary and involuntary musculoskeletal responses to pain.

Descending modulation is a process that occurs from pathways that descend from the forebrain and brainstem to the spinal cord. For example, the periaqueductal gray (PAG) region receives information from higher brain centers and facilitates an analgesic effect through the release of endogenous opioids or the administration of opioids (Hudspith, 2019). Likewise, the rostroventromedial medulla region (RVM) facilitates or inhibits nociceptive inputs that will result in pain or inhibit pain (Hudspith, 2019). Neuroreceptors influencing descending modulation include glutamate, neurokinin, serotonin (5HT), GABA, adenosine, and alpha2-adrenoreceptors (NIH, 2020).

Scenario 2

April, an RN, is working on a general surgical floor in a community hospital in a rural Midwestern state. She has worked on this unit for about a year and has noticed that patients who have similar surgeries respond to pain differently. Today, she is caring for two patients who have had knee replacements. The first patient is a 72-year-old man of Swedish descent. He is highly educated and has been coping with arthritic knee pain by taking over-the-counter medications and receiving periodic steroid injections. On the first postoperative day, he rated his pain as a three on a numerical scale. However, he is very cooperative with physical therapy. April's second patient is a 55-year-old female of Italian descent. She also had chronic

knee pain before the surgery and was receiving opioids and prescription NSAIDs for her pain. On her first postoperative day, she rates her pain intensity as a seven on a numerical scale. She moans and cries when working with the physical therapist and states that she fears that she will never be able to walk again without pain.

Self-Assessment Quiz Question #3

Which statement provides an explanation about different reactions to the same surgical intervention?

a. Some patients have more neuroreceptors than other patients and thus more pain signals are transmitted.
b. Male patients are better equipped to modulate the descending pain signals.
c. Pain perception is unique for everyone, and pain threshold varies with gender, culture, age, and previous experiences.
d. Women generally have a greater number of C-delta fibers, and more pain is transmitted through these slow fibers.

Self-Assessment Quiz Question #4

How does the use of relaxation techniques change the response to pain?

a. Anxiety intensifies the perception of pain in the brain.
b. Relaxation techniques modulate the pain experience, as the gate control theory explains.
c. Relaxation techniques assist with stress regulation and involuntary musculoskeletal response to pain.
d. All of the above are correct.

In April's unit, it is common to apply ice packs for all knee replacement surgery patients. April is concerned that her female patient is so anxious about her pain. She consults with her colleague, who suggests that this patient might benefit from some relaxation techniques.

Nursing consideration: In addition to assessing pain intensity, the nurse needs to consider other dimensions of pain such as location, quality, duration, and radiation. The multidimensional assessment assists in determining the underlying cause. For example, pain that is easily localized, constant, and worsened by movement may originate in the bone, while cramping pain could arise in the intestine (Ramos & Eti, 2019).

PAIN ASSESSMENT

A thorough pain assessment is key to understanding the extent and nature of a person's pain and facilitates diagnosis and treatment. In addition to a comprehensive history and physical, the nurse should document an initial pain assessment. The nurse should use an evidence-based pain assessment tool appropriate to the individual patient. The nurse selects a valid and reliable tool for the age, developmental level, and cognitive status and is culturally sensitive to the individual.

A comprehensive pain assessment includes the following (Drew, 2018; Ramos & Eti, 2019).

- Pain location
- Pain intensity (can utilize a pain scale, such as visual analog or numerical rating) What exacerbates the pain?
- What relieves the pain?
- Quality of the pain (throbbing, dull, sharp) Onset of pain
- Duration of pain
- If pain affects sleep and function.

Standards and clinical policy should guide pain assessment (Joint Commission, 2018). Further, employers must provide appropriate education related to assessing and treating pain. Acute pain should be evaluated before and after administering pain medication and on a regular schedule that is determined by workplace policy.

Nursing consideration: There is a complex bidirectional relationship between depression and pain. Therefore, persons who experience chronic pain can benefit from psychological, pharmacologic, and nonpharmacologic interventions (Michaelides & Zis, 2019). Patients who experience chronic pain and mood disorders should be considered for referral to psychological services.

PAIN SCALES

Numerous pain scales are available to nurses that help patients quantify their pain experience. However, assessing only pain intensity misses the multiple dimensions or components of pain, such as psychological and physiologic effects (Brasure et al., 2019). Visual pain scales are helpful for children over age three or four and children with cognitive impairments (Jaaniste et al., 2021). An example of a visual pain scale is the Wong-Baker Scale, which utilizes a series of faces, from a smiling face indicating no pain to a crying face that displays the most severe pain (Wong-Baker Faces Foundation, 2016). Utilize a standardized scale such as a numerical rating scale (NRS) or the Visual Analog Scale (VAS) with patients over age eight years (Crellin et al., 2021). With the NRS, the nurse asks the patient to rate their pain on a scale from 0 to 10, with 0 being no pain and ten being the worst pain.

While self-reporting pain is the gold standard, many persons cannot self-report, for example, the preverbal child, those who are unconscious or critically ill, or individuals with cognitive impairments (Crellin et al., 2021). When caring for those who are unable to self-report, the nurse must be cognizant of potential pain sources (Crellin et al., 2021). Observed behaviors often reflect a patient's response to pain. Many observation scales

have been developed and validated for various populations, specifically neonates, adults who are critically ill/unconscious, adults with cognitive impairments, and those with a terminal illness (Crellin et al., 2021).

The revised FLACC Scale is effective for assessing pain in patients who are unable to rate their pain or use a face scale. The scale's sum can range from 0 to 10 (Crellin et al., 2021). The acronym stands for:

Face.
Legs.
Activity.
Cry.
Consolability.

Similarly, the MBPS scale uses face, movement, and cry behaviors to provide a pain score that also ranges from 0 to 10 (Crellin et al., 2021).

Another example of a behavioral observational tool is the Pain Assessment Checklist for Seniors with Limited Ability to Communicate (PACSLAC- II), which is reliable and valid for assessing pain in adults who are cognitively impaired adult and have chronic pain (Ruest et al., 2017).

In a review of behavioral pain assessment tools that are valid and reliable for critically ill adults who cannot communicate, three tools demonstrated the highest psychometric properties: The Behavioral Pain Scale, the Behavioral Pain Scale-Non-Intubated, and the Critical Care Pain Observation Tool (Gelinas et al., 2019).

Nursing consideration: For patients who are unable to verbalize pain, the nurse should keep in mind principles of pain assessment by proactively considering potential causes of pain (interventions and conditions), soliciting information about usual behavior from family members, using valid and reliable observation tools, and reducing the emphasis on changes in vital signs as indicators of pain (Crellin et al., 2021).

Scenario 3

Susan is an RN who is working in an outpatient family practice department. It is common for patients to see the primary physician with complaints of pain. Susan has noted that it is one of the most common reasons for office visits. The clinic nurses have discussed using a standardized assessment for all patients who complain of pain. Susan expresses concern about everyone receiving the same evaluation. She gives some examples of patients who have recently visited the clinic. For instance, Mrs. Jones is a 90-year-old woman with Alzheimer's disease who is becoming less verbal. She has been a long-time patient and has osteoarthritis. Another patient is a 55-year-old with hypertension who was recently seen for low back pain. Mrs. Silver is a 25-year-old who has a six-month-old baby and a three-year-old son. She brought her son to the clinic yesterday because he had fallen and injured his left arm. The nurses have decided that they will need several different tools for their patients.

Self-Assessment Quiz Question #5

Which pain intensity scale is most appropriate for children aged three and older?
a. A numerical rating scale.
b. The FLACC Scale.
c. The Wong-Baker Faces Scale.
d. The Visual Analog Scale.

Self-Assessment Quiz Question #6

Which standardized pain scale would be most appropriate for a nonverbal patient with dementia?
a. A numerical rating scale completed by the patient's caregiver.
b. The Critical Care Pain Observation Tool.
c. The FLACC Scale.
d. The PACSLAC-II.

ACUTE PAIN

Acute pain results from tissue injury and resolves when the injury heals. Evidence is insufficient at this time to predict or state the length or duration of acute pain, but experts report the course is anywhere between seven and 30 days but might be prolonged in some cases up to 90 days (Brasure et al., 2019). There are various causes of acute pain, including nociceptive, inflammatory, neuropathic, and ischemic (Brasure et al., 2019). Acute pain is an expected physiologic response to noxious stimuli, is usually of sudden onset, is time limited, and can become pathologic (HHS, 2019). In many cases of acute pain, a discrete cause or event links to pain perception (HHS, 2019). Common causes of acute pain include trauma, medical procedures (such as dental procedures and venipunctures for intravenous placement), and surgery. In addition, acute pain activates protective biological processes and promotes recovery (HHS, 2019). Abdominal pain, muscle pains and strains, injuries, chest pain, and headaches are among the top reasons patients seek help in emergency departments (Hooker et al., 2018).

Patients with chronic medical conditions, including migraine, sickle cell disease, and dysmenorrhea, also experience acute pain exacerbations (Swift, 2018). This type of pain is known as episodic acute pain, in which there is a flare-up of acute pain of an existing chronic pain condition (Swift, 2018). In these cases, treatment is aimed at controlling the acute pain episode.

The sympathetic nervous system is initially stimulated during acute pain, causing signs and symptoms such as elevated heart and respiratory rate, blood pressure, sweating, pallor, nausea, and vomiting (Eksterowicz, 2018). When assessing the individual experiencing acute pain, the nurse must consider the biopsychosocial factors that modify the pain experience, pain behaviors, and response to treatment (Swift, 2018). Psychological factors such as state anxiety (the psychological and physiological reaction to an event), the tendency toward catastrophizing, and the social setting and genetic makeup can modulate the individual response (Swift, 2018). Therefore, reliance on intensity scales for assessment is insufficient (Swift, 2018).

POST-SURGICAL ACUTE PAIN PROGRESSION TO CHRONIC PAIN

Some patients develop chronic postsurgical pain (CPSP), and many risk factors have been identified (American Chronic Pain Association [ACPA], 2020). These factors include preoperative pain and anxiety, comorbidities such as fibromyalgia, genetic factors, type of surgery, anesthesia used, and severity of postoperative pain (ACPA, 2020). While the biological mechanism is not entirely understood, multimodal analgesia can effectively reduce the incidence of CPSP (ACPA, 2020). In the perioperative period, clinic best practice recommendations include using multimodal treatment tailored to the procedure and individual characteristics of the patient, as well as multidisciplinary teams (HHS, 2019). In addition, specific surgical procedures carry a greater risk of persistent pain—breast, cardiac, and orthopedic joint replacements (Eksterowicz, 2018).

TREATMENT OF PAIN

Treatment of acute pain

Acute pain management aims to treat the underlying cause through accurate diagnosis and effective evidence-based treatment (HHS, 2019). Acute pain indicates an underlying issue; therefore, proper assessment must diagnose and treat the cause effectively. As is true with surgical pain, multimodal treatment based on clinical guidelines and individualized pain assessment results in more effective pain management and recovery (HHS, 2019; IASP, 2020). In addition, multimodal, multidisciplinary therapy results in lower opioid use (HHS, 2019; Pitchon et al., 2018). The treatment of acute pain requires pharmacologic and nonpharmacologic approaches that work in the following ways (Hudspith, 2019; Ireland & Lalkhen, 2019).

Nursing consideration: Acute pain management in the postoperative period is necessary to avoid the development of chronic pain (IASP, 2020). Therefore, ensuring adequate pain control is the nurse's role as a patient advocate.

Interrupting the peripheral transmission of pain

Examples include splinting to reduce further injury of tissue; applying heat or cold to reduce swelling; using pharmacologic agents, such as NSAIDs, that inhibit prostaglandin production; and local anesthetics that interrupt the pain pathway by blocking sodium from entering the neuron and interfering with the action potential.

Modulating pain transmission at the spinal cord

Examples include cutaneous stimulation that blocks the progression of nociceptive transmissions, such as transcutaneous electrical nerve stimulation (TENS), massage, acupuncture, therapeutic touch, and application of heat or cold to the area. Epidural and intrathecal analgesia— opioids, local anesthetics, and alpha-adrenergic blocking agents—act on the spinal cord to block pain. Opioids used in this way bind with opioid receptors, thereby decreasing the release of neurotransmitters such as substance P. Intraspinal local anesthetics block nerve conduction. Alpha- adrenergic blocking agents work by blocking the transmission of mediated pain.

Spinal column stimulators may be used for those with chronic pain and may "close the gate" by altering the input descending from the brain to the spinal cord. Spinal column stimulators, used for neuropathic pain in failed back surgery or complex regional pain syndrome, have minimal side effects. Implantable pulse generators provide stimulation through electrodes placed into the epidural space (Woodington et al., 2021).

Altering the perception and integration of pain

Examples include opioids for moderate to severe pain and nonpharmacologic treatments such as hypnosis, distraction, guided imagery, relaxation techniques, and biofeedback.

PHARMACOLOGIC PAIN RELIEVERS

Categories of medications commonly used in the treatment of pain include the following (HHS, 2019).

- Nonopioids, including acetaminophen and NSAIDs.
- Anticonvulsants.
- Antidepressants.
- Musculoskeletal agents.
- Antianxiety medications.
- Opioids (also called narcotics): Morphine, codeine, hydrocodone, oxycodone, and methadone; tramadol and tapentadol are not actual opioids but work similarly to opioids, primarily on the same receptors.

Non-opioids

Nonsteroidal anti-inflammatory drugs

NSAIDs are helpful for mild to moderate pain. NSAIDs include such drugs as ibuprofen, aspirin, naproxen, and celecoxib. The NSAIDs are recommended as a first-line treatment when the patient's clinical condition is appropriate (HHS, 2019). However, NSAIDs carry the risk of side effects, and patients who take higher doses of NSAIDs for extended periods are most at risk. Side effects of NSAIDs include the following (HHS, 2019):

- **Cardiovascular**: NSAIDs may increase blood pressure and the risk for heart attack in patients with an increased risk.
- **Gastrointestinal**: Short-term use can cause stomach upset; long-term use can cause ulcers and gastric bleeding.
- **Kidneys**: NSAIDs can affect kidney function and should be monitored in those with kidney disease.
- **Tinnitus**: Ringing in the ears can occur in those taking high doses of aspirin.

NSAIDs have a thinning effect on the blood and should be used with caution or avoided in patients on blood thinners or antiplatelet aggregation drugs (warfarin, clopidogrel) (Ngo & Bajaj, 2022).

Acetaminophen

Acetaminophen (Tylenol) is a first-line treatment depending on the patient's clinical condition. Acetaminophen can cause liver toxicity even in low doses in those with liver dysfunction or those who heavily drink alcohol (ACPA, 2020). Therefore, the dosage of acetaminophen should not exceed 3,000 mg per day unless managed by a physician (ACPA, 2020). Many medications contain acetaminophen that may not be obvious to the patient. These medications include many over-the-counter formulations for sleep and colds. Prescription medications containing acetaminophen include Lorcet, Vicodin, Ultracet, Percocet, Roxicet, Midrin, and Tylox.

Opioids

Opioids are morphine-like substances that occur naturally in the body (endorphins, enkephalins, dynorphins), or they can be synthetic or semisynthetic (ACPA, 2020). Opioids act on three primary receptors in various areas of the central nervous system (CNS), from the cerebral cortex to the spinal cord and peripheral locations, and are the drug of choice for moderate to severe pain in the critically ill (Ramos & Eti, 2019).

Opioids can be given orally, intravenously, subcutaneously, transdermally, or intramuscularly and are the preferred medication to treat acute postsurgical pain as part of a multimodal plan (Ireland & Lalkhen, 2019). Adjust the dosage of opioids for those with renal or liver dysfunction (Sowa et al., 2018). The efficacy of opioids for long-term use is unclear (Manhapra et al., 2020). Use caution when prescribing opioids for older adults, as fall risk increases when taking opioids (Manhapra et al., 2020). Opioids are not the first choice in chronic pain management but are used extensively and effectively in those suffering moderate to severe acute pain (HHS, 2019).

Take precautions when prescribing opioids to any patient (Oliver et al., 2018; Volkow et al., 2018). There should be a comprehensive examination, an assessment of risk for substance misuse disorder, a plan for regular evaluation by the provider, referral to a specialist for comorbid conditions, avoidance of anti-anxiety drugs such as benzodiazepines, and a naloxone orderfor potential overdose.

Opioids can cause many side effects, including respiratory depression, nausea, vomiting, thought and memory impairment, and drowsiness (ACPA, 2020). Constipation is frequent, with up to 80% of those taking opioids for chronic pain affected (ACPA, 2020). Anyone taking an opioid should be educated about and treated to prevent constipation (ACPA, 2020). There are a significant number of analgesic medication errors, with 36% to 39% reported to poison control by adults age 20 to 50 (Eluri et al., 2018). Many mistakes are related to decreased understanding by patients and caregivers. The rule of thumb is to start "low and slow" when administering opioids (Dowell et al., 2016).

Nursing consideration: In 2016, in response to an increase in opioid prescribing rates, the Centers for Disease Control and Prevention (CDC) issued a new recommendation for prescribing opioids for adults experiencing chronic pain in outpatient settings (CDC, 2016). Specific recommendations can be found on the CDC website at https://www.cdc.gov/mmwr/volumes/65/rr/rr6501e1.htm. Long-term use of opioids for chronic pain should be considered carefully and monitored often.

OPIOID-INDUCED RESPIRATORY DEPRESSION

Nurses must be aware that all patients receiving opioids are at risk. As a result, every patient should receive a comprehensive assessment of risk. For patients receiving opioids, nurses should assess for sedation, respiratory rate and quality, and oxygen saturations before, during, and after opioid administration (Jungquist et al., 2020).

Risk factors for respiratory depression in patients on opioid therapy include the following (Jungquist et al., 2020):

- Pulmonary disease, cardiac disease, or need for supplemental oxygen.
- Known or suspected sleep-disordered breathing.
- STOP-BANG total score of >3 of 8.
    - Snore, Tired, Obstruction, Pressure, BMI, Age, Neck, Gender .
- Diagnosis of either obstructive or central sleep apnea.
- Previous or current smoker.
- A history of opioid-induced respiratory depression.
- Obesity hypoventilation syndrome.
- Obesity with BMI >30.
- Impaired renal or hepatic function.
- Opioid naïve and receiving a continuous opioid infusion.
- Taking other medications with sedative properties and opioids.
- Received general anesthesia.
- Surgical incision of head, neck, chest, or upper abdomen.

ADJUVANT ANALGESICS AND MEDICATIONS

Adjuvant medications are medications not typically used for pain relief but may be helpful in certain pain-causing conditions with or without the presence of a pain reliever. Adjuvant medications include antidepressants, anticonvulsants, musculoskeletal agents, and anti-anxiety agents.

Antidepressants can be helpful for patients with chronic pain conditions, even if they do not suffer from depression (American Psychological Association [APA], 2022; NIH, 2020). In addition, they tend to work better for patients experiencing certain types of pain—such as pain from fibromyalgia, headache, and neuropathy—as opposed to acute or musculoskeletal pain (APA, 2022; NIH, 2020).

Anticonvulsant medications, such as gabapentin, pregabalin, and carbamazepine, have been helpful in certain chronic pain conditions that involve nerve injury, such as trigeminal neuralgia (APA, 2022; NIH, 2020).

Muscle relaxants are helpful at times in acute low back pain. However, these drugs are sedating; therefore, prescribe them with caution over a short duration (APA, 2022; NIH, 2020).

Nursing consideration: All medications have side effects and potential interactions with other drugs and must be considered carefully for each individual who is experiencing pain.

Scenario 4

Lee, an RN, works in a medical-surgical unit at a suburban community hospital. Today, he is caring for Ms. Pierce. She is a 60-year-old patient who fell and broke her leg. She tells Lee that she was walking her dog, and he chased a cat; as a result, she became entangled in the leash. She recently learned that she has osteopenia and has just begun taking calcium and vitamin D. She has some questions about why her physician has prescribed so many medications. Lee explains that her drugs are all used to treat pain and include acetaminophen, gabapentin, and hydrocodone as needed.

Self-Assessment Quiz Question #7

Which statement is true about using this combination of medications to treat pain?

a. Each medication acts upon different physiologic processes to more effectively relieve pain.
b. Acetaminophen acts on the central nervous system to reduce pain perception, thus reducing the need for hydrocodone.
c. Gabapentin is a potent muscle relaxant and thus reduces spasms associated with fractures.
d. Hydrocodone is a potentiator of gabapentin and thus improves pain relief.

Lee also cares for Mr. Jones, a 50-year-old man who had abdominal surgery to remove a large abdominal mass. Unfortunately, the mass was positive for cancer, and further testing is planned. Mr. Jones is receiving morphine for pain via patient-controlled analgesia (PCA). Lee looks in Mr. Jones's chart and sees that he has a BMI of 35 and no smoking history.

Self-Assessment Quiz Question #8

Which of the following increases the risk of opioid-induced respiratory depression for Mr. Jones?

a. Cancer diagnosis.
b. Middle aged.
c. Obesity.
d. None of the above.

INTERVENTIONAL PAIN RELIEF TREATMENTS

NNeuraxial analgesia includes spinal, epidural, and combined spinal-epidural analgesia (Eksterowicz, 2018). This type of regional anesthesia reduces mortality, morbidity, and length of stay for surgical patients (Albrecht & Chin, 2020). Epidural analgesia uses local anesthetics and adjuvant medications injected into the epidural region of the spine. Spinal anesthesia is the injection of local anesthetics (with or without using adjuvant medicines) into the subarachnoid space (Bagley, 2020). Combined spinal-epidural analgesia is analgesia that starts with an intrathecal injection and an epidural catheter's placement to

deliver an additional drug (Bagley, 2020). Neuraxial anesthesia is the most effective and most commonly used pain reliever utilized in women in childbirth (Bagley, 2020). Various medications are used in neuraxial anesthesia but typically include local anesthetics and opioids.

Epidural steroid injections

Epidural steroid injections (ESIs) are the most used pain management technique for spinal pain and are used most frequently for lumbar pain (CMS, 2022). Various medications are used, including local anesthetics and glucocorticoids. Although not approved by the Food and Drug Administration (FDA), cervical epidural injections are used in clinical practice (Epstein, 2018). Risks include infection, injection into the dural space, and strokes (Epstein, 2018). In addition, lumbar and cervical dural punctures during the procedure can result in significant neurological injury (Epstein, 2018). However, there is efficacy for lumbar injections (Ngo & Bajaj, 2022).

Nursing consideration: Corticosteroids injected into the epidural region of the spine can cause rare but severe neurological side effects (Epstein, 2018). Therefore, nurses should ensure the patient knows to report any side effects immediately, including loss of vision or changes in vision, tingling or weakness in the extremities or face, dizziness, severe headache, or seizures (Epstein, 2018).

Patient-controlled analgesia

Patient-controlled analgesia (PCA) is a form of on-demand pain relief directed by the patient. PCA is an intravenous or subcutaneous medication delivery system accessed via a controller, which provides basal infusion rates in addition to on-demand doses (Eksterowicz, 2018). PCAs cause an increased risk for respiratory depression (Eksterowicz, 2018). In addition, older patients who have kidney dysfunction or respiratory disease, or are on other sedating medications need close monitoring (Eksterowicz, 2018). The nurse is responsible for ensuring that the patient understands its use.

Peripheral nerve blocks

Peripheral nerve blocks (PNBs) deliver local anesthesia via a catheter near the nerve or nerve plexus in the form of a single injection or continuous for extended relief (Eksterowicz, 2018).

PNBs are beneficial in reducing the use of opioids and postoperative nausea and can potentially reduce hospital stays following surgery (Eksterowicz, 2018). In addition, PNBs improve patient satisfaction and are beneficial for ambulatory surgical patients. With proper technique, adverse effects are minimal (Ardon et al., 2019). An ultrasound-guided approach with nerve stimulation ensures the placement of PNBs (Ardon et al., 2019, Eksterowicz, 2018).

MULTIMODAL APPROACH TO PAIN MANAGEMENT

The Inter-Agency Task Force Report on Best Pain Practices (HHS, 2019) defined multimodal pain management as an approach that includes treatments from multiple disciplines to address the pain condition and accompanying biopsychosocial effects of both acute and chronic pain. Multimodal pain management has various medical specialties and disciplines. This approach enhances patient care and reduces the reliance on opioids.

Complimentary integrative therapies to reduce pain

Pain management can be complex and often requires complementary therapies to achieve the best outcome for the individual patient. Even though one treatment may be effective for a patient, the same treatment may have little to no effect on another patient. There is insufficient research support for many of these therapies, and, as a result, it is difficult for health care providers to determine which treatment might be helpful for an individual patient (HHS, 2019).

Evidence-Based Research: A systematic review of the evidence to support complementary, integrative therapies for chronic low back pain, fibromyalgia, chronic tension headache, osteoarthritis, and chronic neck pain concluded that there is evidence for exercise, acupuncture, cognitive-behavioral therapy, mind–body practices, and multidisciplinary rehabilitation (Skelly et al., 2018).

Complementary therapies include acupuncture, chiropractic manipulation, yoga, music therapy, massage, biofeedback, distraction, nutritional supplements, and guided imagery (HHS, 2019). Biofeedback is a conditioned response to pain that increases blood flow to specific areas through relaxation, decreasing the concentration of pain-inducing chemicals, and possibly increasing the number of endorphins released (ACPA, 2020). This therapy assists with chronic pain such as headaches. Distraction provides pain relief by providing additional input to the brain. Because the brain can process only a finite amount of stimulus, distraction thus reduces pain. Guided imagery alters the perception of painful stimuli in higher brain levels and produces relaxation and analgesic effects. It can be helpful to relax the mind and visualize positive images (ACPA, 2020).

PATIENT EDUCATION

Effectively treating acute pain may reduce the development of chronic pain (IASP, 2020). Patients should be educated early in the course of treatment, and the methods of addressing the pain and their details should be included in the plan of care for pain management. Best pain prevention and management practices include maintaining a healthy lifestyle, including an anti-inflammatory diet (rich in vegetables, fruits, and lean proteins), refraining from smoking and excess alcohol intake, and regular exercise to maintain a healthy weight (IASP, 2020). When acute pain is present, educate patients to use cold compresses on the affected area, take over-the-counter NSAIDs unless contraindicated, and use physical therapy and stress-relieving measures such as meditation (IASP, 2020; NCCIH, 2022). Educate patients about medication benefits, side effects, and how and when to take the medication. Obtain informed consent for an opioid or other potentially addictive drugs. Provide instructions to avoid alcohol and illicit substances, to store medicines securely, not to share or allow others access to the medications, and to dispose of any leftover medications safely.

Discontinuing pain medication

Pain medication taken for several days at regular intervals may cause physical dependence. Therefore, the patient must be carefully advised on how and when to stop taking pain medications.

SPECIAL CONSIDERATIONS FOR SPECIFIC POPULATIONS EXPERIENCING PAIN

Geriatric population

The elderly population is prone to painful conditions, including fibromyalgia, diabetic neuropathy, osteoarthritis, degenerative joint disease, cancer, postherpetic neuralgia, and rheumatoid disorders (Schwan et al., 2019). It is challenging to manage pain in this population. Careful communication and assessment are necessary, as some older adults do not readily report their pain for various reasons, including fear of addiction, cognitive impairment, or cultural differences, or their initial complaints are not specific (Schwan et al., 2019). Because older adults are at greater risk of adverse effects due to of many factors—comorbidities and associated medication interactions, decreased liver and renal function, cognitive impairments, decreased mobility, and increased risk for falls—the patient should be evaluated for cognitive impairment, fall risk, and respiratory or renal malfunction (Schwan et al., 2019).

Older adults are often prescribed opioids because of concerns about NSAIDs. One study found that hospitalized older adults were more likely to receive an opioid prescription at discharge than an NSAID (Deng et al., 2018). To reduce the risk of adverse effects of medications, nonpharmacologic and complementary therapies should be considered (Schwan et al., 2019). When older adults are prescribed analgesic medications, the initial dose should be low and titrated carefully; reassessment of the effectiveness of pain management therapies and side effects is essential to ensure optimal pain relief (Schwan et al., 2019).

Pediatric population

Pain in children must be recognized and treated effectively (HHS, 2019). Because the infant and child's brain is not fully developed, they risk developing chronic pain conditions through neuroplasticity (HHS, 2019). Unfortunately, acute and chronic pain are prevalent in the pediatric population, and undertreatment is common (Hurley-Wallace et al., 2019). The International Association for the Study of Pain attributes this undertreatment partly to insufficient education across disciplines and has developed online curricula to address this inadequacy (Hurley-Wallace et al., 2019).

Children may have trouble verbalizing their pain, depending on their verbal, intellectual, and social abilities (Herr et al., 2019). Therefore, nurses must use the most appropriate pain scale to evaluate the pediatric patient and reassess pain relief after medication administration and at regular intervals. Chronic pain is estimated to affect 20% to 40% of children worldwide, with the most common complaints related to musculoskeletal pain, headaches, and abdominal pain (ACPA, 2020).

PAIN MANAGEMENT FOR PERSONS WITH OPIOID USE DISORDER OR THOSE AT RISK FOR OPIOID USE DISORDER

It is challenging to provide pain management for those who have opioid use disorder or those at high risk for opioid misuse or abuse (St. Marie & Broglio, 2020). Therefore, before prescribing an opioid, a risk assessment should be performed with a standardized substance use risk tool (National Institute on Drug Abuse [NIDA], 2018 https://www.drugabuse.gov/nidamed-medical-health-professionals/screening-tools- resources/chart-screening-tools). Evidence-based tools can be found on the NIDA website. In addition, St. Marie and Broglio (2020) recommend suicide risk and withdrawal assessment in patients with opioid use disorder.

Once risk has been assessed, an appropriate treatment plan for the level of risk of abuse should be developed and implemented (Paice, 2018). Universal precautions for opioid prescriptions include the following:

- Regular assessment for aberrant behaviors.
- Provider–patient agreement plan, including patient use of single prescriber and pharmacy.
- Prescriber review of the state prescription drug monitoring program.
- Periodic random urine drug toxicity screenings.

Further, providers should encourage multimodal therapy and recommend mental health services (Paice, 2018).

Opioid addiction prevention

There are strategies that providers can use to prevent the increase in opioid use disorders, particularly for those who experience chronic pain (Volkow et al., 2018).

- First, fully assess pain and function through physical assessment and history.
- Optimize the use of nonopioid therapies, including pharmacologic and nonpharmacologic.
- Follow best practices when prescribing opioids, including the following.
    - Screen for substance abuse risk and mental health illnesses before prescribing.
    - Discuss with the patient the risks and benefits of opioids and provide informed consent and treatment agreement parameters.
    - Avoid combinations of prescription painkillers and sedatives unless there is a specific medical indication.
    - Prescribe the lowest effective dose and only the quantity needed, depending on the expected length of pain.

CDC's guidelines for prescribing opioids can be found here: https://www.cdc.gov/mmwr/volumes/65/rr/rr6501e1.htm.

CHRONIC PAIN

Chronic pain persists or recurs for over three months (IASP, 2020). Chronic pain beyond average healing time is considered pathological (Clauw et al., 2019). Unlike acute pain, chronic pain is a pathological response to changes in the peripheral and central nervous systems (peripheral and

central sensitization). It may be a combination of nociceptive, neuropathic, and central sensitization (Clauw et al., 2019). Examples of predominately nociceptive pain include arthritis and inflammatory conditions such as inflammatory bowel disease (Clauw et al., 2019). Diabetic peripheral neuropathy and trigeminal neuralgia are primarily neuropathic pain conditions, while phantom limb pain and fibromyalgia are thought to be the result of central sensitization (Clauw et al., 2019).

Those experiencing chronic pain may often have trouble sleeping and experience depression or anxiety. These symptoms intermingle and provoke each other. For example, chronic pain causes depression and trouble sleeping; sleep deprivation leads to a lower threshold for pain and anxiety; depression worsens sleep disturbances and causes difficulty sleeping (Clauw et

al., 2019). Chronic pain affects all aspects of a person's life—relationships, ability to work, physical and mental health—and inadequate pain management is associated with increased mortality (Clauw et al., 2019).

Causes of chronic pain

Chronic pain is believed to result from modifications to the peripheral and central nervous systems, and the pain is not associated with tissue damage (Clauw et al., 2019).

Peripheral sensitization
With continued stimulation, changes in the chemical environment of the nerves occur (Clauw et al., 2019; Hudspith, 2019). For example, in peripheral sensitization, there is a reduction in the threshold of nociceptors and a more exaggerated response to pain when the sensory neurons are exposed to damaged tissue and inflammation. As a result, it takes fewer stimuli to send signals through the pain pathway to the brain, and nociceptors are overly responsive or sensitive.

Central sensitization
Central sensitization is an overly active state of the neurons in the CNS. Neuroreceptors of the dorsal horn develop increased spontaneous activity and require fewer peripheral stimuli to be activated (Hudspith, 2019). Central sensitization is characterized by hyperalgesia (heightened pain sensation) and allodynia (pain associated with nonpainful stimuli).

Physical assessment for chronic pain

In addition to a standard pain assessment that includes onset, duration, intensity, quality, and exacerbating factors, notes should be taken on musculoskeletal and neurological abnormalities. For musculoskeletal abnormalities, the clinician should look for atrophy or deformity, or cyanosis of extremities. The difference in temperature of extremities, gait, and range of motion should be assessed for possible neurological abnormalities. The clinician also should evaluate muscle strength and sensation, reflexes, presence of allodynia (pain resulting from light touch or pressure that generally would not cause pain), and presence of hyperalgesia (increased pain response). Assessment of the impact of pain on function, activities, and quality of life is essential in establishing individualized treatment (HHS, 2019).

A thorough and comprehensive assessment is key to developing an individualized treatment plan for a person with chronic pain (Clauw et al., 2019). While the etiology of the pain may be evident, the clinician should not rely exclusively on the etiology. In some cases, a clear etiology may not be found. The characteristics of the pain and the assessment of social and psychological factors are crucial in determining the necessary multidisciplinary care (Clauw et al., 2019). In addition, it is essential to assess for common symptoms that co-occur with chronic pain conditions, such as numbness, fatigue, sleep disorders, and interference in function (HHS, 2019).

TYPES OF CHRONIC PAIN

There are many types of and ways to classify chronic pain, including anatomically or by organ system. Therefore, the ACTTION-American Pain Society Pain Taxonomy (AAPT) decided to classify chronic pain by anatomic site and organ system. These include peripheral nervous system disorders (e.g., diabetic peripheral neuropathy and trigeminal neuralgia), central nervous system disorders (e.g., strokes and Parkinson's disease), spine disorders (e.g., spinal stenosis), musculoskeletal conditions (e.g., arthritis), and conditions not classified elsewhere (e.g., cancer pain, sickle cell disease pain) (Dworkin et al., 2016).

TREATMENT OF CHRONIC PAIN

The treatment goal for chronic pain is to reduce pain to a tolerable level and to promote patient function and ability to perform activities of daily living (ADL). A multimodal approach to chronic pain treatment includes both pharmacological and nonpharmacological pain-relieving techniques. Opioid therapy may be used in chronic pain situations. Still, there is a risk of dependency and tolerance to medication, as well as opioid-induced hyperalgesia (a form of pain sensitization related to the use of opioids).

The CDC Guidelines for Prescribing Opioids for Chronic Pain recommend the following principles for the treatment of chronic pain (Dowell et al., 2016).

- Use nonopioid therapies to their fullest extent.
- Address and treat any coexisting mental health conditions, such as depression, anxiety, and PTSD.
- Use disease-specific treatments when available.
- Use first-line medications such as NSAIDs, acetaminophen, gabapentin/pregabalin, and tricyclic antidepressants/SSRIs, as well as topical agents such as lidocaine and capsaicin.
- Use multimodal approaches.
- Engage patients in their pain management plan.

Nursing consideration: An open dialogue with the patient experiencing chronic pain should include realistic and measurable treatment goals, which are reevaluated frequently. Different approaches to pain management may be necessary, as well as a referral to a pain specialist.

Scenario 5

Bart works in an urgent care facility associated with a large university hospital. Bart's first patient today is Mrs. Simon, a 54-year-old woman. Mrs. Simon has come to urgent care because she has had shingles (herpes zoster), and although the vesicles are no longer fluid-filled, she complains of severe pain that she describes as burning and shooting. She complains to Bart during her admission assessment that she can no longer stand this pain, stating, "Nothing that I do helps. The doctor gave me pain pills, and they don't seem to do anything." Bart asks to see the prescription bottle and finds that Mrs. Simon has a prescription for acetaminophen with hydrocodone. Bart recalls that the type of pain Mrs. Simon is experiencing is a neuropathic pain and is a type of peripheral chronic nerve condition often experienced after the herpes zoster infection has resolved.

Self-Assessment Quiz Question #9

This type of pain often responds well to pharmacologic treatment with:
a. Corticosteroids.
b. Antidepressants.
c. Muscle relaxants.
d. NSAIDs.

Bart has a second patient, a 75-year-old woman who has a complaint of a sinus infection. While Bart is doing his assessment, this patient complains that she has arthritis pain that has been bothering her for years.

Self-Assessment Quiz Question #10

Which of the following questions should Bart ask this patient about her pain?

a. Are you currently taking any medications for pain?
b. Have you met with a pain specialist to discuss your chronic pain condition?
c. What have you tried or used to treat the pain, and did it help?
d. All of the above.

BARRIERS TO THE TREATMENT OF PAIN

Pain impacts all strata of society, but because of age, gender, socioeconomic status, and lack of access to health services, pain may be undertreated. In addition, evidence suggests that people of specific backgrounds or histories experience more pain (Craig et al., 2020). These include the homeless population, torture victims, refugees, and those who are socially marginalized (Craig et al., 2020). While the evidence is limited, these individuals likely experience more pain and receive less treatment due to stigmatization and lack of access (Craig et al., 2020).

Disparities in pain occurrence, assessment, treatment, and outcomes exist in various vulnerable populations in the U.S. because of the following factors (HHS, 2020).

- Stigma.
- Lack of healthcare access.
- Insufficient pain education for healthcare providers.
- Lack of clinical practice guidelines for specific conditions and conflicting guidelines for other conditions.
- Insufficient scientific research on pain management.

Conclusion

Pain is a universal experience but is highly subjective. Therefore, to properly assess and manage pain, nurses must communicate extensively with the patient, be understanding of the various influences that make pain subjective for each individual, and be vigilant about the assessment and reassessment of pain for the patient in their care.

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MICHIGAN NURSES PAIN ASSESSMENT AND MANAGEMENT

Self-Assessment Answers and Rationales

1. The correct answer is B.
Rationale: It is nociceptive pain because he can localize the pain and there is evidence of tissue damage. Nociceptive pain results from an injury and is characterized by tissue damage. It can be easily localized and is initially described as sharp but then becomes throbbing (Montgomery et al., 2018).

2. The correct answer is A.
Rationale: Many patients are like Mr. Ellis and reluctant to seek care until they cannot function. Because of barriers to healthcare access and other factors such as reluctance to seek care, pain prevalence is likely higher (Cooney et al., 2018).

3. The correct response is C.
Rationale: Pain perception is unique for everyone, and pain threshold varies with gender, culture, age, and previous experiences. Pain perception makes the pain experience unique to every individual. Pain tolerance varies from person to person and is influenced by genetics, culture, gender, age, and previous experience with pain (Cox, 2018).

4. The correct answer is A.
Rationale: The gate control theory of pain by Melzack and Wall (1965) assumes that perceived pain could be either increased or decreased via a gate closing or opening at the dorsal horn of the spinal cord. Melzack (2005) postulates that multiple dimensions influence human beings' interpretation of and reaction to pain. An individual must first become aware of pain, synthesize the experience within the neuromatrix, and then respond with actions. Cognition, sensory signaling, and emotions interact in the brain to impact perception, stress regulation, and voluntary and involuntary musculoskeletal responses to pain.

5. The correct answer is C.
Rationale: Visual pain scales are useful for children over age three or four and for children with cognitive impairments (Tsze, Hirschfield et al., 2018; Tsze, von Baeyer et al., 2018). An example of a visual pain scale is the Wong-Baker Scale, which utilizes a series of faces, from a smiling face indicating no pain to a crying face showing the most severe pain (Wong-Baker Faces Foundation, 2016).

6. The correct answer is D.
Rationale: The PACSLAC-II is the Pain Assessment Checklist for Seniors with Limited Ability to Communicate (PACSLAC-II), which is reliable and valid for assessing pain in adults who have cognitive impairments and chronic pain (Ruest et al., 2017).

7. The correct answer is A.
Rationale: The National Inter-Agency Task Force recommended that this approach be used for acute pain. Multimodal pain management reduces the reliance on opioids (HHS, 2019).

8. The Correct answer is C.
Rationale: Mr. Jones has a BMI of 35. Risk factors for respiratory depression in patients on opioid therapy include the following (Jungquist et al., 2020).
- *Pulmonary disease, cardiac disease, or need for supplemental oxygen.*
- *Known or suspected sleep-disordered breathing.*
- *STOP-BANG total score of >3 of 8.*
- *Diagnosis of either obstructive or central sleep apnea.*
- *Previous or current smoker.*
- *A history of opioid-induced respiratory depression or obesity hypoventilation syndrome.*
- *Obesity with BMI >30.*
- *Impaired renal or hepatic function.*

9. The correct answer is B.
Rationale: Antidepressants can be useful for patients with chronic pain conditions, even if they do not suffer from depression (ACPA, 2020). They tend to work better for patients experiencing certain types of pain—such as that related to fibromyalgia, headache, and neuropathy—than for patients with acute or musculoskeletal pain (ACPA, 2020).

10. The correct answer is D.
Rationale: The nurse should assess all pain treatment modalities used in the past and evaluate the degree of effectiveness. The treatment goal for chronic pain is to reduce pain to a tolerable level and to promote patient function and ability to perform activities of daily living. Chronic pain treatment should include a multimodal approach using a variety of including pharmacological and nonpharmacological pain-relieving techniques.

Crisis Resource Management for the Healthcare Professionals

3 Contact Hours

Release Date: January 31, 2022 **Expiration Date:** January 31, 2025

Faculty

Pamela Corey MSN, EdD, RN, CHSE, has been a registered nurse since 1984 with a clinical background in pediatrics, pediatric critical care, and neonatal critical care. She has a master's in nursing education and a Doctorate in Education. Her specialty area includes simulation-based education, and she is certified as a Healthcare Simulation Educator. Her dissertation was on adult and pediatric team training and crisis resource management. Pamela developed and implemented code team training at a major teaching hospital utilizing CRM techniques to prepare staff for safe and efficient responses to emergent situations within the hospital setting.

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

Peer reviewer:
Scott Tilton MSN, AGACNP-BC, CCRN, is a board-certified adult-gerontology acute care nurse practitioner with a clinical background in emergency medical services, trauma critical care, neurocritical care, and rotor-wing transport. He works as an advanced practice provider in a cardiovascular intensive care unit that specializes in the resuscitation of patients recovering from cardiac surgery and those requiring mechanical support or extracorporeal membrane oxygenation (ECMO). As he pursues his Doctorate in Nursing, his clinical interests are point of care ultrasound training and standardizing the response to ECMO clinical emergencies within the intensive care unit.

Scott Tilton has disclosed that he has no significant financial or other conflicts of interest pertaining to this course.

Peer reviewer:
Brad Gillespie, PharmD, is trained as a clinical pharmacist, Dr. Brad Gillespie has practiced in an industrial setting for the past 25+ years. His initial role was as a Clinical Pharmacology and Biopharmaceutics reviewer at FDA, followed by 20 years of leading Early Development programs in the pharma/biotech/nutritional industries. In addition to his industrial focus, he remains a registered pharmacist and enjoys mentoring drug development scientists and health professionals, leading workshops, and developing continuing education programs for pharmacy, nursing, and other medical professionals.

Brad Gillespie has disclosed that he has no significant financial or other conflicts of interest pertaining to this course.

Course overview

Understanding Crisis Resource Management (CRM) and utilization of the concepts within team emergent responses can improve patient outcomes. The course will outline CRM concepts and demonstrate the application within emergent situations in healthcare. CRM concepts discussed will include leadership and followership, role identity and clarity; effective communication strategies; situational awareness; resource allocation; and dynamic decision making. Physicians, advanced practice providers, nurses, respiratory therapists, pharmacists, and other health team members should understand CRM to improve their performance in emergent team responses and ultimately improve patient outcomes. CRM framework is also applicable in medical and environmental emergent situations where teams work together to ensure patient safety.

Learning objectives

After completing this course, the learner will be able to:

- Examine the history of crisis resource management (CRM) and its application in healthcare.
- Examine the major realms of the CRM framework and how they are incorporated in team responses.
- Compare the communication techniques used in CRM.
- Examine resource allocation during an emergent event.
- Apply the process of dynamic decision making in an emergent situation.
- Demonstrate the importance of role clarity in team management through case study analysis.

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.

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INTRODUCTION

The ability to respond to an emergency in a timely and efficient manner is essential for all healthcare professionals regardless of their practice setting. However, many may lack formal training and education in best practices for dealing with various emergencies that can occur in professional settings. Patient outcomes improve when healthcare providers work efficiently as a team.

Crisis resource management (CRM) is a set of behaviors derived from evidence-based practice that aims to promote safety, improve teamwork behaviors, and decrease the incidence of adverse events during an emergency response (Alsabri et al., 2020; Fanning et al., 2013). Healthcare providers in all areas of practice can be responders to critical events involving medical or environmental emergencies and benefit from learning about CRM concepts and applying them to their practice.

The purpose of this course is to provide evidence-based knowledge on CRM principles and how healthcare providers can utilize these concepts within their practice setting and effectively respond to an emergent situation as part of a team. Cardiac arrest, anaphylaxis, fire, weather emergencies, and mass casualty disasters are situations where CRM knowledge can improve patient safety and outcomes. This course is designed for nurses, Licensed Independent Providers (LIP) such as medical doctors, physician assistants, and nurse practitioners, pharmacists, respiratory therapists, and support staff practicing at all levels and in all practice settings. Those who incorporate CRM principles during an emergency will understand role identification; the purpose of clear, concise communication; situational awareness; and dynamic decision-making for an effective, coordinated response.

History of crisis resource management

There are many industries where staff preparedness for an infrequent event can prevent adverse events. The aviation industry was the first to use the concept of "crew resource management" to train and prepare all airline employees for an aviation disaster. Aviation research from the '70s and '80s demonstrated that many adverse events were related to human error in communication, awareness of the situation, and delegation and workload management (Helmreich & Fousbee, 1993). This research led to specific pilot and airline staff training that incorporated simulations of rare events requiring the use of technical skills and cockpit/crew resource management behaviors. Each session was followed by a debriefing that reviewed the performance of the individual and the team and reinforced the concepts.

Healthcare is another area where a lack of knowledge in responding to rare events can cause adverse outcomes. While the aviation industry was exploring human factors, the healthcare industry, specifically anesthesiologists, also explored behaviors and performance in high-acuity, low-volume events. High acuity – low volume events are those emergent critical situations that occur infrequently, but staff need to respond to competently. Through analysis and debriefings of actual patient events, it was discovered that even experienced physicians lacked the optimal knowledge and skills necessary for effectively managing

a crisis (Gaba et al., 2001). As this topic gained more attention through continued analysis of unexpected adverse events that negatively impacted patient outcomes, it was revealed that all teams who responded in crisis situations needed to be educated and trained in the behaviors that lead to improved and effective responses. Although crisis resource management (CRM) in healthcare first started in complex areas, such as operating rooms and emergency departments, these skills apply to all healthcare team members. For example, educational programs that focus on CRM and team interactions have been used in obstetrics training for emergent delivery and maternal cardiac arrest (Bracco et al., 2018). CRM training has improved team dynamics and performance in pediatric rapid response teams (Siems et al., 2017) and improves leadership, problem-solving, situational awareness, and communication in trauma and emergency teams (Parsons et al., 2018).

CRM is defined as a set of behaviors that can reduce adverse events during emergencies when combined with skills and evidenced-based knowledge (Corey & Canelli, 2018). When teams incorporate teamwork and communication interventions in response to emergencies, this core set of behaviors results in an effective and improved response, including improved patient safety and a reduction in adverse events (Alsabri et al., 2020; Moffatt-Bruce et al., 2017). Knowledge of these behaviors can assist the healthcare provider who responds to the inevitable crises that occur in all areas of practice.

Evidence-based practice! Crisis resource management (CRM) is a set of behaviors derived from evidence-based practice that can decrease the incidence of adverse events during an emergency response (Fanning et al., 2013). Teamwork and communication training and interventions improve patient safety to improve patient outcomes by reducing adverse events, including medical errors (Alsabri et al., 2020).

Self-Assessment Quiz Question #1

Aviation research from the '70s and '80s found that many adverse events were related to:
a. Mechanical failure.
b. Weather.
c. Human Factors.
d. Terrorism.

THE CRM FRAMEWORK

High-acuity and low-volume crises are areas where healthcare providers have historically demonstrated gaps in knowledge and practice necessary to respond efficiently and effectively. The Institute of Medicine report "To Err is Human: Building A Safer Health System," published in 2000, prompted health systems to look at internal response processes, identify areas where human factors could cause patient harm, and strategize for implementing training and systems improvements to prevent further harm (Kohn et al., 2000). In the aftermath of this report, the healthcare education field started exploring ways to teach all healthcare disciplines the necessary skills and behaviors to reduce preventable adverse outcomes. CRM training became one method to increase knowledge and skill for those responders to high-acuity, low-volume clinical situations. By definition, a low volume crisis, such as a hospital evacuation, rarely occurs but involves extreme risk to the patient.

Components of the CRM framework

There are multiple components in the CRM framework that, when combined and implemented, lead to an effective team response. The behaviors are classified in multiple realms:

- Team management - Leadership and followership, role clarity, and workload distribution.
- Communication - Task-oriented and information sharing.
- Resource allocation and environmental awareness.
- Dynamic decision-making.
- Cognitive aids.

The team management realm of behaviors includes identifying the situation leader, identifying other responding team members, and clarifying roles among all who are on the responding team. Also included in this realm are workload distribution of all the tasks needed (what needs to be done and who will do it) and the ability to get help promptly. When all responding team members are aware of the importance of these behaviors, there is cohesiveness to the response. Effective, concise communication, including information sharing, are behaviors that allow for safe and effective team responses. There are multiple communication techniques used during team responses that allow members to communicate needs and address inquiries effectively.

Situational or environmental awareness requires that the healthcare provider anticipates and plans for all possible trajectories. Knowledge of the environment and the ability to effectively mobilize resources allows all members of the responding team to perform at their highest level. Utilization of these behaviors reduces delays in care, leading to the ability to improve outcomes.

Another integral concept within the CRM framework is making decisions in a dynamic and evolving situation. The behaviors specific to this concept include awareness of the situation and using that knowledge to identify and use all available information in real-time decision-making. Within this concept, a key behavior taught in CRM education is to avoid fixation. Fixation is a situation in which a specific idea is the only driving decision-making concept. When a team gets fixated on one aspect of the response, there is an increased potential for an adverse response. Teams need to be aware of all factors influencing the situation. Fixation can delay the correct treatment because of misdiagnosis or the missing of key data to drive decisions and cause adverse patient outcomes.

The final concept includes the use of cognitive aids. Some examples of cognitive aids that will be discussed later include advanced cardiac life support (ACLS) algorithms, emergency medication dose cards, and prepared evacuation plans. These tools can assist all healthcare team members in remembering specific information without relying on memory during an intensely stressful moment. Knowing what aids are available and familiarity with the content is valuable during an emergency, allowing staff to respond more effectively (Goldhaber-Fiebert & Howard, 2013). When all the concepts and behaviors are trained together, teams can respond to the best of their abilities, and patient outcomes are improved.

Self-Assessment Quiz Question #2

The team management realm of the CRM framework includes identifying the leader, identifying other team members and:
a. Clarifying roles.
b. Rotating roles.
c. Allocating resources.
d. Coordinating data.

Team management

The team management realm includes the behaviors that assist the responding team in having a coordinated, effective response that leads to an outcome. The main concepts are leadership and followership, role clarity, workload distribution, and requesting timely help.

What defines a team? A team is a group where individuals bring varied strengths, and a common goal can be attained when combined. Teams can be permanent/ dedicated or temporary. Some hospitals have dedicated code response teams where they train together and master their skills as a team. Many hospitals have temporary code response teams where the team comes

together to resolve the issue (cardiac or respiratory arrest; city wide disaster responses). These temporary teams often cannot train together. An element of both categories of teams is that all the necessary skills be present to achieve a positive outcome.

Leadership refers to the need for one distinct leader for the emergency response team. The leader directs the team throughout the emergent event toward the common goal. For cardiac arrest teams, the goal is successful resuscitation; in disaster management, it is the safe evacuation of all in the disaster's path; in a fire, it may be the safe removal of patients and extinguishing the fire. The goal will vary depending on the exact situation. In CRM, the leader is considered an oversight role, not an active participant; the leader decides, prioritizes, and delegates to the team members the tasks to be completed to achieve the desired outcome (Fanning et al., 2013). The leader coordinates team members' activities by ensuring that the team has the resources needed, communicates clearly, and acknowledges that directions are understood and changes in goal attainment are shared in real-time (Gangaram et al., 2017). Leaders are encouraged to also empower all team members to speak up with any pertinent information they have that can assist in patient care and decision making.

The leader can be determined by skill set or institutional hierarchy. In medical situations such as a cardiac arrest, the leader is usually a physician or licensed independent provider (LIP), such as a nurse practitioner authorized to implement ACLS care. In some institutions, the leader may be the most experienced provider present but could also be a provider-in-training with an experienced provider or supervisor providing close supervision and support. The most critical point of leadership is that there must be one clearly identified person in charge. The leader needs to state this when assuming the role so all those responding are aware. Team training courses teach leadership skills emphasizing how to clearly articulate that they are filling the leadership role. For example, the leader declares in a loud voice, "I am Dr. Jones, and I will be leading this code blue." This statement clarifies for all involved who is in charge.

For any team with a leader, there must be followers. What defines the role of followers in an emergency? Followers also have distinct responsibilities based on their roles. The leader will direct all team responders in the follower role, and the roles will vary depending on the type of response. In a cardiac arrest, responders perform different standardized roles to administer ACLS protocols: performing cardiopulmonary resuscitation (CPR); assessment of pulses; timing of tasks; medication administration; performing medical procedures; and documentation/scribing of the event. For a fire, the roles may include extinguishing the fire, removing patients, activating the emergency response (911, code red, etc.), or shutting off the main oxygen. During a weather emergency, the responsibilities include ensuring adequate staffing, securing replacement staff, utility, and facility management, and troubleshooting issues that may arise. All followers should be adequately trained and competent to fulfill their roles; for example, skilled in using a fire extinguisher or appropriately licensed and knowledgeable for the role. For example, pharmacists are the knowledge experts on medications; from administration to ensuring that the medications are used appropriately during a cardiac arrest.

Role clarity, which is when responders are aware of their responsibilities during the emergent situation, is necessary to organize the team and minimize chaos. Roles may be assigned by a leader, self-assigned by the team member, or designated by a specific skill set. The leader must know that all essential roles are filled by a competent team member. These roles are dynamic depending on the emergent situation and the responding staff.

The leader must clearly identify who specifically should be performing a role/task. When a leader states, "can someone please monitor the patient's pulse" there can be confusion on who should be completing the task, leading either one person, four people, or no one (if everyone assumes that someone else filled the role) to monitor the pulse. The leader must specifically identify someone by name or by some descriptor. It is common that temporary formed responding teams may not know each other by name, especially in rarer emergencies such as disasters. For example, if you state, "Can you in the red sweater please write down all the patients that we send to the evacuation unit?" The person in the red sweater must then close the communication loop by acknowledging that they received the message. These small steps will help reduce confusion in chaotic situations and prevent delays in achieving the common goal.

Occasionally the roles are defined by the task being performed. Most cardiac arrest teams include a respiratory therapist and an anesthesiologist, who position themselves at the patient's head during the response. For example, some hospitals have standardized locations for where each responder should stand during a cardiac arrest in relation to the patient. When a standard role map is used in an institution, the leader can assess visually when a role is not filled and reassign someone to that task.

Workload distribution addresses the performance of multiple critical tasks that must be completed simultaneously. The leader is responsible for ensuring that all delegated tasks occur effectively by those most competent for the role. Workload distribution includes appropriate role delegation in an ever-changing emergent situation. Role delegation is not intuitive for many healthcare providers and is one reason why CRM behaviors are taught and practiced (Fanning et al., 2013). Leaders must continuously reassess the situation and confirm that the tasks are performed by the most competent person present at the time. Leaders also must consider the need to adjust roles within the emergency. Reassigning staff when a person's skill set may be better utilized in a different role falls to the leader. If a nurse is needed during a cardiac arrest to administer medications, the leader may ask the medical student who is BLS-certified to perform cardiac compressions and move the nurse to the nursing specific role. If the leader is the only provider competent in a specific task, then the role of the leader must be filled by another competent provider during the time the leader is otherwise occupied. This may occur when the leader is the only one present to perform a procedure such as a needle decompensation of a pneumothorax. The leader should ask another physician to assume the role of leader. For example, "Dr. Jones, can you assume the role of leader, while I perform this procedure." By stating this out loud, the entire team is aware that the leadership of the situation has changed. The leader understands that the concentration needed to perform the procedure precludes him from monitoring the entire team response.

The final concept under teamwork is requesting help in a timely manner. The hesitation in calling for help has been shown to increase adverse outcomes (Leonard et al., 2004; Ozekcin et al., 2015). Barriers to calling for help include personal (I may come across as not being smart), interpersonal (the person needed may have yelled at the leader in the past), cultural (I am in charge, and it is my job; SWAPNet, 2018). Calling for help early allows for the arrival of others who can offer second opinions, extra hands to complete all the tasks, and skilled team members to fill specialty roles.

One example of improved patient outcomes is the initiation of rapid response teams (RRT) to respond to situations immediately once a clinician suspects a subtle or noticeable decline in patient status. Hospitals that utilize RRT responses demonstrate improved patient outcomes by intervening before the patients experience cardiac or respiratory arrests (Jackson, 2017). An important skill is knowing when to call for help and which level of response is needed.

Many institutions have an internal disaster and emergency response plan. In today's changing world, there is a need for emergency responses of healthcare teams, for situations such as natural disasters (earthquakes, hurricanes, tornadoes), mass casualty events (train derailments, plane crashes, mass shootings, terrorist attacks) and infectious disease epidemics (COVID, Ebola). Internal disasters include events such as a power outage, infant abduction, or a combative patient. The Joint Commission requires hospitals receiving Medicare and Medicaid reimbursements to have established disaster planning and health system readiness, for disaster management (Al Harthi et al., 2020; Lagan et al., 2017). Plans can be developed

locally at the institution level or the state, county, and city-wide level. Leadership at all levels will provide direction to individual responders in disasters that involve more than one institution. The City of Boston instituted many levels of disaster responses during the Boston Marathon bombing. Each hospital that had casualties implemented its disaster plan, and the city itself implemented a city- and statewide response to move all injured to appropriate facilities.

Self-Assessment Quiz Question #3

What must be done to ensure effective leadership if the leader is the only person competent to perform a procedure?

a. The charge nurse must verify the credentials of the leader to perform the procedure.
b. All team members are consulted to choose the new leader.
c. The leader must identify a replacement leader and announce the change in leadership to the team.
d. The leader continues in the leadership role while performing the procedure.

Staff education on their role in various scenarios is necessary to assess and respond to the situation appropriately. Often, emergency response teams are activated when current resources may not provide the bandwidth to accomplish the necessary tasks. Local staff nurses must understand when to call for assistance and the appropriate level of help needed. The level of help will vary depending on intrinsic factors, such as the situation itself, location, time of day, levels of experience of caregivers/responders, situational complexity and institutional limitations. For example, a teaching hospital may have more resources available during the day when attending MDs and more support services are present. At night, resources are scarcer, often consisting of less experienced staff, and a call for help should be initiated sooner to allow for resource mobilization. Several persons should be trained in each role to allow for absences during an emergency situation.

Some institutions have layers of responses, and all staff must be educated on the appropriate response at a given time.

When a patient is decompensating, does the situation require a response from a physician, a rapid response level team, or the full response for an impending life-threatening event? This varies depending on the institution's policies and responding teams available. For example, if a patient is having increased work of breathing and the institution's rapid response activation brings a respiratory therapist and critical care nurse, this may be the appropriate team. However, if an imminent airway collapse occurs, the need for an anesthesiologist would require the activation of the cardiac arrest team, which includes the anesthesiologist, respiratory therapist, and critical care nurses. In the event of a disaster, the call for assistance may extend to external resources given the extent of the crisis. Knowledge of the institution's policies on when to utilize internal versus external resources is important.

Evidence-based practice! Since the implementation of rapid response teams, a level of team activations called at the first sign of patient decompensation, there has been a demonstrated decrease in cardiac arrests (Jackson, 2017). Implementation of a special team to respond to patients presenting with signs of sepsis has been shown to reduce mortality rates from sepsis (Simon et al., 2021).

Healthcare Professional Consideration: Responders to an emergent event need to either verbally state their role in the response or solicit from the leader what their role should be.

Self-Assessment Quiz Question #4

Emergency response teams are often called when current resources may not provide the bandwidth to accomplish the tasks needed. Therefore, local healthcare professionals must understand when to call for assistance and:

a. The location of the nearest telephone.
b. The level of help needed.
c. The increased cost to the patient.
d. When the family typically visits.

Communication

Communication is vital in any situation where multiple responders converge to remedy a situation. Human error is a common contributing factor in communication failures during emergent situations. When an error leads to an adverse event, a root cause analysis may be performed. A root cause analysis is the process used by an institution to find the cause of an adverse event and identify potential solutions. Root cause analyses of adverse events related to emergent situations often find either a lack of or ineffective communication as the cause. Emergent situations, by nature, are often chaotic. Often, multiple conversations occur simultaneously as responders attempt to either obtain or share pertinent information. Research on the effective attributes for team leaders ranks communication as the most important aspect in the successful management of an event (Mo et al., 2018). A leader's ability to communicate needs/directions concisely with closed-loop techniques increases success (El-Shafy et al., 2018). Closed-loop communication is the technique when the person making the request clearly states all elements of the request to a specific person who confirms that the request is received and, after completing the task, states it back to the leader or person who initially gave the request. A leader shouting orders into the room without identifying the recipient can lead to unattended tasks or over-allocation of resources to one task, leaving another important role unattended. For medication requests, the best practice is to request the medication, including all pertinent elements – medication, dose, concentration, and route. The person preparing and administering the medication should restate the medication, dose, concentration, and route to prevent errors. It is also important for medication administration to verify that the medication is still needed before administration as most emergent responses are dynamic, and the patient's condition may have changed.

One example of effective closed-loop communication is the following exchange between the Licensed Independent Provider (LIP) and the nurse treating a patient who is experiencing an anaphylaxis type event:

LIP: Nurse, please prepare a dose of epinephrine 0.3mg of the 1mg in 1 mL, for IM administration.

Nurse: Preparing epinephrine 1 mg./ mL 0.3 mg for IM administration.

Nurse: Epinephrine 0.3 mg is ready to be administered IM. Do you want me to administer now?

LIP: What is the concentration?

Nurse: 1 mg in 1 mL.

Physician: Yes. Please administer now.

Nurse: Epinephrine 0.3 mg of 1 mg/1 mL has been administered IM at 3:10 p.m.

Documenter records time of administration: Epinephrine (1mg/1 mL) a dose of 0.3 mg IM administered at 3:10 p.m.

In the example above, all the elements of a safe medication administration were addressed during the exchange, preventing an error of the wrong dose, concentration, or route. Epinephrine is one medication that is prepared based on concentration and administered differently depending on the situation – anaphylaxis versus cardiac arrest and supplies on hand.

Closed-loop communication should also be used when asking for tasks to be accomplished. For example, when needing to assign a new role:

Leader: I need someone to contact the cardiac cath lab. Joe, can you contact them?

Joe (*medical student*): Yes.

Joe (*after calling cardiac cath lab*): I called the cardiac cath lab and they stated they want us to call back when patient is stable to travel.

Leader (*acknowledging receipt of message*): Thank you, Joe.

Another form of communication used in CRM is known as "state of the response." The state of the response involves the relay of information between the leader and team members on the activities and status of the response. These communications occur at frequent intervals and provide the team with the specifics on what has occurred, allowing the team members who arrive at different times to be updated on what has happened and the current status. The state of the response communication can also be used to solicit input from any team member on tasks completed or ideas on future interventions.

The following is an example of this state of the response, or state of the union, communication by the leader during a cardiac arrest:

MD Leader: "We are at 4 minutes. Patient Doe was found unresponsive and pulseless. CPR was initiated at that time; initial rhythm was identified as PEA (pulseless electrical activity). One dose of epinephrine administered at 2 minutes. We are now going to reassess the cardiac rhythm and pulse; CPR will continue if rhythm unchanged. We will explore the H's & T's to identify the cause of the PEA. Does anyone have anything to add?"

RN: I sent the morning chemistry and the lab just called. The potassium is critically low at 2.2.

MD Leader: Thank you, let's consider hypokalemia as part of the issue and initiate some treatment. Pharmacist, can you prepare for an infusion of potassium? Also, we need to check magnesium level and should anticipate replenishing that as well."

During a cardiac arrest caused by PEA, the best way to treat the PEA is to identify the cause. The causes of PEA arrest are often referred to as the H's & T's.

H's	T's
• Hypovolemia.	• Tension pneumothorax.
• Hypoxia.	• Tamponade, cardiac.
• Hydrogen ion (acidosis).	• Toxins.
• Hypoglycemia.	• Thrombosis-pulmonary.
• Hypo/Hyperkalemia.	• Thrombosis-coronary.
• Hypothermia.	• Trauma.

In this case, the nurse added that lab abnormalities potentially caused the situation. This technique allows for controlled conversations to occur among the team in a succinct way so that important information is not lost in the chaos of an emergent situation. Also, the summarization of events, and the naming of the situations like PEA for a rhythm or active shooter for an environmental response, gives all responders a shared mental model of the situation. All cardiac arrest team members usually have ACLS knowledge and know that the PEA algorithm is different from the ventricular fibrillation algorithm.

Those in an environmental response know that an active shooter response differs from a fire response. In each situation, the leader may eventually become a person from outside the institution, such as the fire chief or the police responders. Attention to their instructions can be lifesaving.

Experienced leaders may state something such as, "I am going to summarize the events so far; please keep performing your assigned tasks while I speak." This prevents the disruption of crucial tasks but gains all members' attention. This open sharing of information allows all members to actively be involved despite any preconceived hierarchy.

Some institutions have a process called "stop the line" or CUS (concerned, uncomfortable, safety issue) in their emergent response procedures to give all members of the team a chance to pause actions if they feel something unsafe may be occurring (Cammarano et al., 2016; Hunt, et al., 2007). An example of this may be ordering a medication for a situation that is not appropriate (an allergy, incorrect dose, or misidentification of the cardiac rhythm) to prevent an adverse outcome. "Stop the line"/CUS should trigger a conversation where the leader explains the rationale for a specific action or clarifies the action. Stopping the line is a critical method of communication for nurses, who often have knowledge and experience in emergent situations, but may feel restricted in speaking out in a hierarchical team setting with those they perceive to have higher authority. An example may be in a teaching institution where the relatively inexperienced MD leader orders a dose of medication that is incorrect, and the experienced pharmacist responding to the situation states that the correct dose of that medication in this situation is different.

Universal time-outs in the operating room and procedural settings were developed to equalize all team members around patient safety (Van et al., 2017). By stopping to check for the accuracy of the surgical site, correct procedure, and patient identification, serious errors may be prevented. Universal time-out procedures are an important safety process that allows for conversations that impact patient safety during critical situations when a patient may not be able to speak for themselves. This process allows all involved to speak up and raise concerns and is supported by the Joint Commission in the National Patient Safety Goals as a safety component helpful in reducing wrong patient and wrong side procedures (Gonzalez et al., 2018).

Self-Assessment Quiz Question #5

What form of communication allows any responder to an emergent situation to pause action for clarification?

a. Shared mental model.
b. Equal hierarchy.
c. Stop the line.
d. Closed-loop communication.

During a time of chaos, as in emergency responses, all responders must be aware of what they are communicating. During emergencies, a type of common communication that can occur is termed "collateral communication." Collateral communication occurs when important conversations happen among multiple team members and may or may not be necessary for the situation's outcome. An example of an important conversation may be one between the RT and anesthesiologist on the difficulty of placing the endotracheal tube.

Anesthesiologist: I have the tube in place, but I did not have clear visualization of the vocal cords, are you meeting resistance in bagging?

RT: I am meeting some resistance. I am going to check breath sounds. (RT listens to the chest and abdomen).

Anesthesiologist: Are they equal?

RT: There are diminished sounds on the left. You may be in the main stem.

Anesthesiologist: I am going to pull this ET out and retry. Prepare AMBU ventilate.

This conversation may impact the situation and should be shared with the leader:

Anesthesiologist: We had difficulty with the first attempt at intubation. We are going to try again after re-oxygenation.

Leader: Thank you for the update. Can you maintain the airway?

Anesthesiologist: Yes, bag mask ventilation is effective.

Leader: Let me know when you secure the airway.

Another example is the conversation between the nurse and the pharmacist about the calculations for a drug dosage.

RN: The leader wants us to prepare a dopamine infusion at 5mcg/kg/min.

Pharmacist: The standard concentration of this infusion is in the code cart and is 400mg in 250 mL. Will you be administering via the infusion pump?

RN: Yes, I will be using the smart infusion pump medication programming.

This conversation does not need to be shared with the leader but is necessary for the responder's role. The participants must assess collateral conversations as to their necessity and whether they need to be brought to the entire team and leader's attention.

Patient safety is the goal in emergent situations, and effective communication skills directly impact patient outcomes. Closed-loop communication combined with verbal read back of medication and procedural orders from the leader ensures that the entire team is aware of the progression of care in an often-chaotic situation. Followers are integral members of the response team, and their communication throughout the situation can add to successful outcomes and reduction of adverse events.

Evidence-based practice! Universal time-outs are an example of safe communication practices that ensure all systems are in place to prevent adverse outcomes. These protocols allow for equalization of all team members in providing for patient safety (Van et al., 2017).

Healthcare Professional Consideration: Healthcare providers must ensure that all verbal orders for interventions and medications are communicated in a closed-loop format, using a verbal read-back format to the ordering provider to verify the correct order.

Self-Assessment Quiz Question #6

The participants must assess collateral conversations regarding their necessity and:
a. Whether or not they delayed treatment.
b. If they need to be documented.
c. If the patient's family should be included.
d. Whether they should be brought to the leader's attention.

Resource allocation and environmental awareness

Knowledge of the environment is crucial for effectively managing an emergency. All team members who respond or can be involved in an emergency must know where equipment, medications, or supplies are located and how to use them. Many institutions provide the orientation to environments at the start of employment; however, periodic refresher training is essential. All staff should learn where the crash/code cart is for cardiac arrest response. Staff should be aware of the location of fire extinguishers and oxygen shut-off valves in case of a fire, as this is necessary for effective responses and part of their role. Healthcare providers in hospital and non-hospital settings should know the evacuation route, fire safety plan, and medical emergency equipment (AED, for example). All staff should also be aware of the internal and external disaster plans and their roles in the response. Knowing how to access response teams is another component of resource allocation. Knowledge includes understanding how the response team activation changes at different times (weekends, holidays, and off-shift times).

CRM behaviors include anticipation and planning for all potential outcomes of an emergent situation. An example of the variable nature of CRM is how the response to a cardiac arrest within a hospital has different steps than a similar situation in an outpatient or other setting. Outpatient cardiac arrests or medical emergencies may include the stabilization for external transport. Staff must know the steps to follow in these low-volume, high-acuity situations. For example, staff in an outpatient setting should know the procedure for contacting the ambulance service – is the policy to call them directly or activate the community 911 service? Training for this type of situational response should include earlier activation to enhance better patient outcomes in the hospital setting.

Resource allocation includes the appropriate use of trained and untrained personnel and the use of all available equipment. An example of using untrained staff may be asking the clinic's non-medically trained receptionist to go to the main entrance and show the EMS responders to the correct room. Inadequate use of available resources is a significant cause of adverse events in healthcare in CRM research (Abualenain, 2018). Team members' knowledge of how to access the resources and understanding potential barriers or reasons for personnel or equipment delays can make a difference in patient outcomes.

Self-Assessment Quiz Question #7

Knowledge of the protocols for responding to a fire is an example of:
a. Collateral communication.
b. Shared mental model.
c. Closed loop communication.
d. Resource allocation.

Dynamic decision-making in a crisis

Dynamic decision-making occurs when decisions are made related to the information presented and responses to actions performed and environmental factors. These complex decisions must occur in real-time and are influenced by the experience level of the decider (Edwards, 1962). The elements of dynamic decision-making include situational awareness, implementation of all available resources, use of cognitive aids, and avoiding fixation errors. Responding to an emergency is stressful, and the stress and urgency can impact the ability to function effectively during the situation. When the responder uses all available resources during a crisis, it improves their ability to make effective decisions during an ever-changing event (Fanning et al., 2013). This section will explore the concepts of dynamic decision-making as used in team settings.

A team, as defined by Salas (1992), is "two or more people who interact dynamically, interdependently and adaptively toward a common and valued goal/object/mission, who each have been assigned specific roles or functions to perform, and who have a limited lifespan of membership" (p. 4). Teams that respond to codes, rapid response, medical emergencies, and disasters all fit this description. The teams must function effectively to meet the shared goal. Each individual who is part of a team in healthcare brings their specialty-specific knowledge and training to the situation to achieve the desired outcome. The leader of the team uses knowledge of the individual members' skills to achieve a positive patient outcome.

Situational Awareness

An individual's situational awareness is the perception of critical information and data from the environment based on both past experiences and expectations. Each team member must be able to perform their specific tasks. The information utilized during the situational awareness process comes from the person's working memory, leading them to decide on the actions best suited to the event at hand (Salas et al., 2017). When applying situational awareness to a team, the process becomes more complex as both communication and information sharing affect all members present. As the central point person, the leader integrates all the data collected from the members and then communicates to the team their decision-making process to achieve the shared goal. The process is dynamic as there is a constant reassessment of the situation and adjustment of actions based on the data perceived. An example of this would be sharing of information related to a patient's current status during a pulse check during a cardiac arrest.

RN: Patient is still without pulse and lab just called up a potassium of 2.1.

MD: The current rhythm is still PEA.

Leader: Thank you, please continue CPR. We have given 2 rounds of Epi. Prepare for the third dose, and given the potassium, let's prepare to administer some potassium, Pharmacy do you have some suggestions?

The leader in this example gathered information, summarized, and dynamically decided an action based on the information shared. This leader also demonstrated the use of expert knowledge in formulating the plan.

Self-Assessment Quiz Question #8

The implementation of available resources, situational awareness, and use of cognitive aids are concepts utilized in what process?

a. Stop the line.
b. Dynamic decision-making.
c. State of the union.
d. Collateral communication.

Situational awareness in healthcare is enhanced when team members notice the subtle cues presented and reassess these cues to prioritize actions specific to the situation (Fanning et al., 2013). An example is when a team is responding to a medical emergency of a person found unresponsive in a lobby located in the building where the diabetic and nutrition clinic is located, and the team leader uses data to evaluate the situation. This dialogue represents the clinical team's use of situational awareness:

Security guard: I did not see anyone nearby when I walked into the lobby and called the alert. It does not appear that this man was assaulted.

RN: When I arrived, I found this person on the ground, unresponsive to touch and voice, low respirations and heart rate of 50. There is no one who knows this person.

MD: Do we know if this person is wearing any medical condition alerts? Perhaps they are a diabetic since we are in the same building as the clinic. Nurse can you support respirations and security can you call for transport to ED?

RN: No alert bracelet is on the patient.

Security: There is a prescription bottle in this pocket for oxycodone.

MD: Okay, let's reconsider what may be happening. Nurse, can you get a blood sugar, monitor respirations, and consider the possibility of an overdose of narcotics? Let's get him to the ED so we can give Narcan.

The MD leader needed to adapt to new information presented and adjust actions to the situation. In this example, the lack of a medical alert bracelet and discovering a prescription bottle steers the physician from further assessment for critical alterations in blood sugar levels to potential opioid overdose. Medical dynamic decision-making uses patient observations of patient presentation and status and incorporating new data into making the appropriate decisions. Continued adaptation is necessary as priorities and interventions will constantly change throughout the situation.

Members of the Royal College of Physicians and Surgeons in Canada (2017) have produced a comprehensive document on CRM in which they have divided the concept of situation awareness into three levels, including their corresponding definitions and potential risks (see Table 1). Level One is attention to diagnostic cues and prioritizing those cues most relevant to the situation. A practiced clinician will successfully hone in on essential cues based on experience and retain the relevant ones while disregarding less important or irrelevant ones. In this process, one must avoid fixation and overlooking other relevant cues that will aid in decision-making and potential alternative diagnoses. Level Two is synthesizing all cues, critically thinking about, and integrating, all presenting information to understand the situation completely. Novice clinicians will be less capable of pulling cues and information together to gain a comprehensive picture of the patient situation. These skills emerge and evolve with experience. Level Three of situational awareness, which builds upon the previous two, is a prediction of outcomes. This process entails pulling together relevant cues, patient history, and clinician experience to predict what happens next. Again, more experienced clinicians will draw on their prior experiences and knowledge to minimize errors in prognosis and continue to react to new information and cues as they arise.

Table 1. The Three Levels of Situation Awareness

Level	Pros	Cons
One: Recognition of Cues	• Attention is focused more quickly on important cues. • Irrelevant cues are discarded to facilitate more efficient decision-making.	• Attentional blindness or fixation errors can cause premature cognitive closure because of reliance on assumptions and/or prior knowledge.
Two: Synthesis of Cues	• Prior experience and knowledge is used to more quickly and efficiently synthesize information.	• Tendency to favor common and easily retrievable patterns may result in misdiagnosis.
Three: Prediction	• Future events can be anticipated and planned for (i.e., being proactive rather than reactive). • Additional resources can be prepared earlier in the treatment sequence.	• Errors in predication can result in under- or over-cautious responses.

Note. Adapted from Brindley, P.G., & Cardinal, P. (2017). *Optimizing crisis resource management to improve patient safety and team performance: A handbook for all acute care health professionals*. Royal College of Physicians and Surgeons of Canada.

Resources

Responders to a crisis must rely on multiple facets of information, including memory, past experiences, and established standards of care, to provide the necessary interventions during the emergency. Each team member needs to be able to obtain and process the information to prioritize care. Information sources used in an emergency include medical records (hard copies and electronic for past medical history, laboratory data, current hospitalization data) and internal and external internet resources (policies and procedures, protocols, medication guidelines, and standards of care). The leader may assign a responder to research data from these resources; a skilled leader may often ask a less technically skilled staff member to perform this task. Medical students at a code may be asked to review the patient's record for lab results or pertinent history. The leader should know the non-technically skilled person's knowledge level and ensure that the person assigned this task understands the context. When assigning the task of looking for pertinent lab values, the leader may need to provide guidance- "please look for all abnormal electrolyte values and report back". Leaders of other members may need to provide more direction to the less experienced staff. The leader in the example above stipulated that they wanted a review of recent electrolytes for the potential diagnosis of cardiac arrhythmia.

Cognitive aids

Using cognitive aids is a common practice in emergent situations. Cognitive aids are tools developed to assist in decision-making during a crisis, and their purpose is to provide pertinent information necessary to formulate a plan of action related to the context of the situation. Cognitive aids ensure consistent delivery of evidence-based care based on research and practice, and teams that use them have more appropriate, efficient decision-making (Goldhaber-Fiebert et al., 2016). Cognitive aids used in emergencies have been established for life-saving protocols, including BLS, ALCS, and PALS (pediatric advanced life support), malignant hyperthermia protocols, surgical safety checklists for the ORs, and OB hemorrhage and emergent C-section pathways (Alidina et al, 2018).

Cognitive aids must be evidence-based and approved by the institution as best clinical practice or standard of care. Some cognitive aids are well-known and accepted; for example, all the American Heart Association (AHA) protocols for life support and advanced life support. They are updated based on evidence-based research every five years, with the last update occurring in 2015 (Hazinski et al., 2015; Merchant et al., 2020). Most institutions accept these algorithms for responding to cardiac arrests.

The individual institution can develop other cognitive aids. An example is a map of where responders are expected to stand when responding to a cardiac arrest. The "Where Do I Stand" figure was developed by a large academic medical center and shows the key roles of responders and their functional position centered on the patient. The figures provide a visual representation of responders and can assist other team members to notice if any members are absent, allowing someone to assume the role. The anesthesiologist and respiratory therapist deal with the airway and always stand at the head of the bed. The pharmacist and medication nurse stand at the code cart to prepare the medications. If the event is documented within the electronic medical record, the nurse or scribe who records the event will be at the computer.

Where do I stand diagram for code blue responders at Jones Medical Center. CPR represents three staff who alternate every 2 minutes. Code Whisperer supports code leader. Defibrillator is located on code cart, but is placed so code leader can view monitor screen at all times. If family present, they are supported by social worker, Clergy or nurse manager.

Notice on this figure (Corey, 2016) that there is also a role called the "code whisperer." This institution has a person assigned to support the leader. The institution is an academic facility, and often less senior and inexperienced staff may act as the leader in an emergency. The code whisperer may be a more senior or experienced staff member with a cognitive aid such as the AHA ACLS card, providing cues and protocols to the leader of the event.

Evidence-based practice! ACLS, BLS, and PALS are cognitive aids developed and updated every 5 years by the American Heart Association to assist a responder in life-threatening events such as cardiac arrest, choking, and pediatric emergencies (Merchant et al., 2020).

Healthcare Professional Consideration: Health Care providers, in their role in a response, collect data through assessment of the patient. It is imperative that pertinent data is shared with the leaders of the response so that timely decisions can be made incorporating all the data points.

Self-Assessment Quiz Question #9

"Where Do I Stand" is an example of a:
a. Cognitive aid.
b. Response algorithm.
c. Mnemonic device.
d. National response tool.

Fixation errors

Situational awareness, necessary for managing a crisis, requires the team to be cognizant of what is going on in the immediate environment. Fixation errors occur when a team member stalls on only one aspect or detail and may miss other pertinent data, and there is a failure to change the course of action without consideration of any new information (Fioratou et al., 2010). Fixation can be related to tasks or diagnosis (SWAPNet, 2018). There are three main types of fixation errors: *This and only this;* **Everything but this; and Everything is OK** (Ortega, 2018).

This and only this is the inability to see any other possible solutions to a situation except the one the person is doing. An example is when a leader may believe that the patient's symptom of desaturation is related to an airway issue (misplaced endotracheal tube) when the issue may be circulatory collapse. The interventions for these causes are very different. Time spent focused on the airway and reinserting a perfectly functioning airway while not focusing on the low perfusion and shock state could negatively affect the patient's outcome. Communication to the leader on new information is critical in preventing this type of fixation error (Ortega, 2018). This type of error can be avoided by the leader stating what they see as the cause or diagnosis during the state of the response updates and then allowing other respownders to provide input.

The **Everything but this** fixation error is when the responder pursues irrelevant data and does not choose the best course of action for the issue (Miller et al., 2014). An example is when, after inserting an endotracheal tube, the anesthesiologist meets resistance when ventilating the patient and explores the possibility of tube misplacement, rather than that of a foreign body, pneumothorax, or chest wall rigidity. The time spent reinserting the tube caused the patient to be hypoxic longer than necessary and delayed searching for the actual cause of the desaturation. This error is often seen when a provider has less experience in the presented situation. Communication among team members and asking the team for input allows the entire group to play a part in the decision-making on a course of action for this type of error.

The final type of fixation error is **Everything is OK**. This is when an abnormal finding is attributed to an artifact or the failure to recognize signs of deterioration (Fanning et al., 2013). For example, the vital sign finding of low oxygen saturation is attributed to a detached probe when the patient may be in

respiratory arrest or recycling the BP because no blood pressure was registered. Utilizing assessment data from multiple sources can prevent this error. For example, in this situation, a clinician should be assessing the respiratory rate and effort as well as using the cardiac/respiratory monitoring systems. All three of the fixation errors can cause delays in treatment and increased mortality and morbidity. Using team members for alternate solutions is one strategy in preventing or identifying fixation errors early. Another strategy is to conduct team training that includes examples of these errors in a simulated event and to have the team members practice the communication techniques of closed-loop, state of the response, and stop the line.

Evidence-based practice! Fixation errors are something that crisis responders want to avoid. A fixation error is failure to change course of action without considering any new information (Fioratou et al., 2010). There are three main types of fixation errors: The and only this; Everything but this, and Everything is OK (Ortega, 2019).

Self-Assessment Quiz Question #10

The fixation error of not being able to see any other possible solution to a situation is known as:

1. This and only this.
2. Everything but this.
3. Everything is OK.
4. Where Do I Stand?

SPECIALTY TEAM MEMBER ROLES

Nursing

There are multiple roles for nursing in a crisis. The role will depend on the situation, whether it is medical in nature or a response to an environmental issue. The roles in a medical response will be related to a nurse's professional scope of practice as designated by the Board of Registration in the state of practice. Nurses who practice at advanced levels, such as nurse practitioners, may function at the higher level as a licensed independent practitioner. Typical roles for the staff nurse in a hospital-based cardiac arrest response include the bedside nurse, medication nurse, scribe, and circulator. Nurses in outpatient facilities, school nurses, prison nurses, or nurses in extended-care facilities may be expected to carry out extended CPR and disaster management roles according to established protocols. However, limited resources in these environments do not allow nurses to function beyond their legal scope of practice.

The patient's nurse should always stay in the room with the patient. This nurse knows the patient's history, most recent baseline state before any change in status, and may also have a relationship with the patient and family and can offer the additional relevant information as a result. For example, in response to a suspected active acute stroke, the bedside nurse will likely know the last well time, what medications the patient is on, and when they last had something to eat or drink. This can also apply to the outpatient setting, where the staff member or family member who is most familiar with the person having an emergency remains at their side to detail the events leading up to the situation.

Medication administration is one major nursing role during a crisis. Medication administration is within the scope of practice for nurses under LIP orders. Nurses in this role must practice closed-loop communication and verbally read back to verify the order given and understand the typical medications they are administering. Nurses in outpatient settings will need to know common situations that may occur in their setting and what the institution has on hand to assist the patient. For example, in an outpatient day surgery setting, the nurses would be trained for anesthesia-related emergencies or post-operative recovery situations. They would be familiar with narcotic reversal medications and medicines used for airway situations under the direction of the anesthesiologist. All nurses who work in inpatient or outpatient areas where medications are administered should also be aware of the treatment for severe allergic reactions, common medications used for them, dosing, and administration methods.

As administrators of medication, nurses should be aware of the resources available for them in this role. Pharmacists are also resources for medication storage, preparation, dosing, and administration. Medication guidelines may be stored with the emergency equipment/go-bag or available links for online resources. Some institutions have internal medication guidelines for their code teams on the crash/code cart. Others rely on commercial resources like the Broselow tape, which lists by color and weight the medication doses and equipment sizes for pediatric patients (DeBoer et al., 2005) or the AHA's ACLS, PALS, NRP (Neonatal Resuscitation Program) algorithm cards.

The scribe documents all the care and data during an emergent situation, including the time of treatments, medications, actions, and other important information, such as vital signs and patient assessments. There is often a scribe during situations such as fire and environmental disasters where patients are evacuated. To accurately account for the safety of all patients, there must be a record of all patients leaving the impacted unit and arriving safely to the planned evacuation unit. The scribe in this situation will also document the departure and arrival of all personnel and visitors.

In hospital settings, the nursing leadership will fulfill the role of bed manager. For medical emergencies, they will ensure that the patient is in the unit to provide the correct level of care. For environmental emergencies, they may oversee the relocation of affected patients with respect to the patient's acuity and staff resources. Decisions for the transfer of patients that are necessary for internal or external disasters are made by nursing management. Immediate rescue of patients may be made by the nurse first responding.

Pharmacists and respiratory therapists

Another resource that may be available in the hospital setting for code responses is a pharmacist. When a pharmacist is a code team responder, there has been a reduction in medication errors during resuscitation (Bolt et al., 2015; Ferguson et al., 2019). Pharmacists should be comfortable using the emergent drug systems on the code/crash cart and have a familiarity with the preparation of emergency medications.

When a pharmacist is part of the stroke response team, their knowledge of the preparation and administration of tPa is useful to the quick response of treatment for the patient. Respiratory Therapists have a specialized role of assisting in maintaining a patent airway partnering with the anesthesiologist. They provide bag-mask ventilation, assist with endotracheal intubation and support.

Pharmacists and Respiratory therapists will need to know the standards and regulations of both the institution and state where practicing related to their specific role in responding to an emergency.

Case study #1

Sarah is a nurse working in a subacute care facility. She has been working there for slightly over one year. Today she has a typical patient assignment and has also assumed the charge nurse role of her 25-bed unit. She is working with two other nurses: Jane, an LPN studying for her RN license and Ken, a per diem RN employee; and three nursing assistants: Dotty, a long-term employee in the nursing assistant role; Jeanne, a new nursing assistant who started less than a month ago; and Helen, a nursing student who works per diem as a nursing assistant. It is the 11 p.m. to 7 a.m. shift on a weekend night. The patients are

all stable, and the shift has been uneventful so far. At around 3 a.m., there is a burning odor coming from the kitchen area on the unit. Helen yells out that the coffee maker is on fire and that the flames are all over the table in the middle of the room. She runs into the hall and leaves the kitchen door open.

As the charge nurse, Sarah knows that she has a lead role in this emergency and has responsibilities related to fires. She cannot remember the specifics of her responsibilities but recollects that there is a manual on the unit at the nurse's station that has the disaster plans. As she runs to the desk, the R.A.C.E mnemonic immediately comes to mind. The following dialogue starts among the team:

Sarah calls out to Helen: Is the fire small enough to use a fire extinguisher on?

Helen: No, it is all over the room.

Sarah: Helen, please shut the door.

Sarah: Can someone call 911? Let's all shut the patient doors.

Jane and Ken start running down the hall shutting doors. Dotty and Jeanne also start closing all the other doors. Sarah runs for the extinguisher. It is another minute before Sarah realizes that the call to activate 911 did not occur. At the same moment, Ken realizes that no one activated the fire alarm and pulls the alarm. Smoke is starting to fill the hallway near the kitchen.

Jane: Do you think we need to move the residents in the two rooms near the kitchen?

Sarah: I think we might need to. Where do we move them to?

Jeanne: In orientation, they told me that there is an evacuation route for each unit, and it should be located at the nursing station.

Dotty hears this and runs to get the evacuation plan.

The night supervisor arrives after hearing the fire alarm and, realizing that there is a fire, asks what the situation is. Sarah immediately tells the night supervisor that they smelled smoke and Helen noticed the fire in the kitchen. The fire was too big to extinguish, so they closed the doors to all the rooms and pulled the fire alarm. She explains that they were just deciding if they need to move the residents in the rooms near the kitchen and where to move them.

Question:
What actions in the above scenario would be classified as components of CRM?

Discussion:
The scenario in the case study included the following components of CRM:

- **Leadership**: Sarah realized that she was the charge nurse and had a role as leader in situations such as a fire on the unit per the institution protocol.
- **Role assignment**: Sarah was aware as the charge nurse/leader that she needed to make sure that certain roles were filled to complete the necessary tasks. She assigned Helen to close the door to the kitchen, and asked that other tasks be attended too, such as calling 911 and shutting patient doors.
- **Communication**:
  - ***Closed loop***: Sarah initiated closed loop communication with Helen, asking her specifically if the fire was too large for the extinguisher, and, based on her response, assigning her the additional task of closing the kitchen door.
  - ***State of the union***: Sarah demonstrated a state of the union communication when she filled the nursing supervisor in on what actions had occurred up to that point in a succinct manner.
- **Resource allocation**:
  - ***Cognitive aids***: Sarah remembered that there were resources available for her to use during this type of emergency. She remembered that there was a manual for fires, the R.A.C.E. mnemonic, and Jeanne mentioned there was an evacuation plan for the unit.
  - ***Human resources***: Sarah delegated tasks and assessments to all the members of her team that were present during the emergency.
- **Situational awareness**: Sarah was aware that there was a situation and she needed to be a leader, assigning tasks and anticipatory planning for further escalation (need for evacuation of certain residents). She used data given to her from the team members — the inability to contain the fire and the potential risk to some of the patients located close to the fire – to further her decision-making.

Question:
What could have been done differently in the above scenario to improve the response to the emergency?

Discussion:
Areas for improvement based on the different components of CRM:

- **Leadership**: Sarah realized she was the leader, but she did not explicitly state this to her coworkers, who had varying levels of experience and may not have been aware that the charge nurse assumed leadership during an on-unit crisis.
- **Role assignment**: Sarah assigned Helen a specific role, and herself the role of getting the fire extinguisher. She should have delegated this to a team member. She did not explicitly state who should call 911 or shut all the patient doors, and her staff responded by all moving to close doors and no one called 911. She also did not assign anyone to pull the fire alarm, which may have alerted internal responders sooner. Without naming a specific person to carry out an important task, the task may not be completed at all or in a timely manner.
- **Communication**:
  - ***Closed-loop***: Sarah should have used closed-loop technique to ensure her role assignment was conveyed. By making eye contact or asking the person if they understood her ask, the loop would be closed. Any person completing a task must close the loop by stating that the task is completed. Sarah also should have verified, verbally, that someone called 911 if she did not get confirmation from the person assigned.
  - ***State of the union***: If Sarah had done a brief state of the union with her staff earlier, she likely would have realized more quickly there was an evacuation plan for the unit. She should have asked at the end of the state of the union, "Does anyone have anything to add?" Jeanne would have then mentioned the evacuation plan.
- **Resource allocation**:
  - ***Cognitive aids***: The institution where this fire occurred had a mnemonic tool (cognitive aid) to follow in case of a fire.
  - ***R.A.C.E.***: The R stands for Remove or Rescue. There was no one in the room of the fire to remove or rescue. However, nearby patients and those with respiratory compromise may need evacuation. A is for activation. Sarah did ask for activation – calling 911 – but did not assign someone which resulted in a delay, and she did not assign anyone to pull the fire alarm. C is for contain. Sarah did have Helen contain the fire to the kitchen by closing the door. E is for extinguish/evacuation. The decision that the fire was too large to extinguish was explored and made early. Sarah was in the process of deciding on evacuation when the supervisor arrived, discussing the need to move some at-risk residents with Jeanne and Dotty and remembering and obtaining the evacuation plan (cognitive aid).
  - ***Equipment***: In this scenario, specific equipment that team members would need to know how to use include timely use of the fire extinguisher, knowledge of the different types and when to deploy and use the correct one. The fire was considered too large for a fire extinguisher, but Sarah ran for the extinguisher later in

her response. Also, how to activate help for a fire, by locating and pulling the fire alarm.
    - ***Human resources***: Sarah did not immediately call for the internal human resource available to her – the nursing supervisor who has expertise to help her make decisions.
- ***Situational awareness***: As the leader, Sarah needed to be aware of a lot of information. She needed to free herself from task completion which distracted her from noticing changes in the situation and adapting as needed to ensure safety on the unit. An actual fire in a health care institution is a low volume high acuity event. All staff should participate in drills and review their role in such an event.

Case study #2

Theresa is a nurse on a medical surgical unit in a community hospital. She has been a nurse for over three years and only recently started working at this hospital. She has been trained in BLS and ACLS. She is working with three other nurses and two nursing assistants. On this weekend day shift, the hospitalist just arrived on the unit to see a patient that Theresa's coworker, Liz, is worried about.

Liz's patient is an elderly woman with pneumonia and heart disease. She has had increased work of breathing and her oxygen saturation has dropped to 90% on 2 liters by nasal cannula. Before the physician gets to the room, Liz calls out that her patient is unresponsive.

Theresa tells the unit coordinator to call a code blue and grabs the crash cart on her way to the room. She tells John, the nursing assistant, to remain on the floor and direct the response team to the patient's room when they arrive, and then to answer any call lights from other patients.

When she gets to the room, Liz is performing cardiac compressions and telling the physician that the patient desaturated as low as 68% and was gasping right before she became unresponsive and pulseless. The physician has his ACLS card open in his hand to refer to.

He verbally states that he will be in charge, and then asks Theresa to prepare epinephrine and the defibrillator. Theresa tells the other nurse, Jo, to put the backboard under the patient and then place the defibrillator pads on the patient.

Some of the responding code team members enter the room (ICU MD, pharmacist, and medical students). The physician leader begins directing code team members. He points to the medical ICU MD and says, "Can you assess the pulse and monitor the heart rhythm as soon as the defibrillation pads are attached?" The ICU MD nods assent. He then points to the first medical student and says, "Can you relieve the RN and continue compressions, changing at least every 2 minutes?" The medical student states he will. The physician then addresses Liz. "Liz, can you document please?" Lastly, he speaks to the second medical student. "Can you relieve the other med student as needed in administering compressions?"

The respiratory therapist (RT) and anesthesiologist arrive in the room.

***MD leader**: "Can you, Respiratory and Anesthesia, secure the airway and manage ventilation?"*

RT confirms task assignment heard with a nod at the leader.

Anesthesiologist: "What is the patient history and situation?"

***MD leader**: "The patient is 80 years old with worsening respiratory distress and became unresponsive and pulseless. Compressions were started. We are approaching 2 minutes. We will assess rhythm and defibrillate if necessary and administer epinephrine. Does anyone have anything to add?"*

No one adds anything. Jo places pads on the patient and turns on the defibrillator.

***MD leader**: "Two minutes. Let's pause compressions and switch compressors."*

***MD leader** (speaking to the ICU MD monitoring the patient's pulse): "Is there is a pulse?"*

***ICU MD**: "There is still no pulse."*

***MD leader** (looking at the defibrillator screen): "The rhythm indicates VF. Please prepare to defibrillate. Resume compressions."*

Jo turns the defibrillator to manual mode and asks the MD leader: "How much do you want me to set the defibrillator for?"

***MD leader**: "200 joules. Pharmacy and Theresa can you prepare 1 mg of epinephrine (1 mg/10mL) for IV push?" I also want to prepare a dose of Amiodarone.*

***Jo**: "Defibrillator is ready to deliver. Do you want me to proceed?"*

***MD leader**: "Yes, clear the patient and deliver the shock."*

***Jo** (delivers shock): "Clear please, shock was delivered."*

Liz documents the time of shock.

***MD leader** (to med student): "Please continue compressions."*

The nursing supervisor arrives and states that she will work on obtaining an ICU bed. The anesthesiologist and respiratory therapist are having a whispered discussion at the head of the bed. The anesthesiologist is having trouble seeing the vocal cords and placing the endotracheal tube. He is getting ready to make a third attempt. The RT ventilates the patient between attempts. The MD leader notices that there is a conversation between the two and asks the RT if there is a problem. The anesthesiologist then states that he is having difficulty securing an airway.

The MD leader asks RT to continue bag mask ventilations after clarifying that bag mask ventilations are effective. The leader then asks the ICU MD if he would be able to attempt to intubate the patient if needed, should resuscitation continue. The ICU MD responds that he can attempt if needed.

The pharmacist and Theresa are also having a conversation at the code cart on the dose of epinephrine. They refer to the guidelines of ACLS medications located on the crash cart for dosing. The pharmacist then prepares the epinephrine bristojet for administration. The pharmacist hands the prepared epinephrine to Theresa stating that it is 1mg in 10 ml for IV push. Theresa then states that she has 1 mg of 1mg/10mL epinephrine ready to administer. MD states to administer the epinephrine dose. Theresa administers, and states "epinephrine 1 mg administered." Liz documents the time administered. One and half more minutes pass. The MD leader asks the compressor to pause and assesses the cardiac rhythm. "There is return of spontaneous circulation evidenced by a pulse," states the MD on pulse. Rhythm is stated to be bradycardia at a rate of 50. The MD leader then says, "Let's stabilize and see if we can get this patient into the ICU."

Question

What examples of communication were demonstrated in this case study?

Discussion

Communication techniques demonstrated:

- **Closed-loop communication**: This was effectively demonstrated throughout the case study. The MD leader, Pharmacist and Theresa demonstrated this during the entire process of epinephrine preparation and administration. It was also demonstrated in the defibrillation sequence when the MD leader was in communication with Jo.
- **State of the union**: The MD leader used this technique to summarize the situation after members of the response team arrived and the anesthesiologist inquired about what was occurring. In addition, the MD leader included an ask from the team for additional input. Later in the case study, the MD leader again summarized a brief statement of current situation and what the plans were going forward.

- **Collateral communication**: There was an example of collateral communication between the RT and the anesthesiologist. Their conversation about the inability to secure the airway was important to the overall care of the patient. This needed to be shared with the MD leader. The MD leader demonstrated situational awareness in that he was aware that the anesthesiologist had not confirmed a secure airway and there was a discussion occurring at the head of the patient's bed. Theresa and the pharmacist also had a conversation, but the MD leader did not need to be involved as they were utilizing cognitive aids to solve their dilemma of dosing of the Epinephrine. If the medication had been needed, they would need to ask in closed loop format the dose required from the MD and then dose prepared before administration for verification by the leader.

Question
What other team roles were demonstrated in this case study?

Discussion
Other Team roles demonstrated in the case study:

- **Anesthesiologist**: Secured the airway through endotracheal tube placement in collaboration with the Respiratory Therapist.
- **Respiratory Therapist**: maintained the airway providing ventilation.
- **Bedside nurse**: Liz, the nurse caring for the patient, filled this role and appropriately remained in the room, and performed cardiac compressions.
- **Medication nurse**: Theresa filled this role and prepared and administered the epinephrine.
- **Pharmacist**: Assisted in preparation of medication and as a resource for doses of medication.
- **Circulating nurse**: Jo filled this role. She placed the patient on the backboard and prepared the patient for defibrillation. She also administered the electrical shock.
- **Scribe**: This role was filled also by Liz. She documented the situation by recording times of treatments, and medications that were administered throughout the code.
- **Bed manager**: The nursing supervisor facilitated obtaining a bed for the patient in a higher level of care to which the patient would be transferred following the resuscitation.

Question
What are some other examples of CRM other than communication demonstrated in the case study?

Discussion
Other examples of CRM within the case study:

- **Identification of a leader**: The MD leader assumed the role and stated out loud that he was assuming this role; he also communicated this with all staff responding to the emergency response call.
- **Role assignment**: Some team members began assuming tasks while others were directed to tasks. Liz started with compressions but was relieved of this role when more staff responded to the situation. The MD acknowledged that as an RN, Liz's talents may be better utilized elsewhere on the team. The MD leader assigned other less skilled members (medical students) to assist with the compressions. The RT and anesthesiologist fulfilled the task of maintaining the patient's airway as appropriate to their clinical skill set. The MD leader potentially reassigned airway management to the ICU MD as needed when he was aware of complications. Theresa also assigned roles by asking Jo to place a backboard under the patient and place defibrillator pads on the patient. Theresa also assigned the unit coordinator to guide the responding team members and asked the nursing assistant to call a code and monitor patient call lights. The pharmacist assumed a role at the code cart in preparation of medications.
- **Cognitive aids**: The MD leader was using an ACLS evidence-based algorithm card as a cognitive aid to guide his management of the situation and all interventions. The pharmacist and Theresa used an emergency medication guideline for dose verification.
- **Situational awareness**: The MD leader did not perform any tasks but maintained close observation of all activities taking place including the patient's status throughout. He used clear communication and noticed when the airway team was having an issue. He anticipated that there may be a need for another form of action, by asking the ICU MD if he was able to secure the airway if needed. The MD leader or the anesthesiologist could have become fixated on the failed intubation attempt but did not. The MD leader remained focused on the next timely steps by asking Liz if she was ready to administer epinephrine and the next 2-minute pulse check.

Conclusion

Crisis resource management is a concept that all healthcare providers should understand and know when and how to employ its elements during an emergency. This concept has been adapted and refined from other industries to provide a framework for effective and efficient management of crisis situations. Healthcare providers are often responders in medical emergencies and environmental disasters, and knowledge of CRM behaviors is vital for safe practice and efficient responses. Healthcare providers can serve as responders to an event as team members and team leaders. The ability to effectively communicate data, instructions, and delegation of tasks is a priority in ensuring minimal adverse outcomes and patient safety. The healthcare provider should understand the CRM components such as delegation, resource utilization, effective communication techniques, and the use of cognitive aids. They should be aware of the protocols, policies, and procedures for emergency responses in any care setting in which they work. Training and practice drills on how to respond to an emergency using the CRM framework helps prepare all care team members to respond to emergencies and maximize patient safety and outcomes.

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CRISIS RESOURCE MANAGEMENT FOR THE HEALTHCARE PROFESSIONALS

Self-Assessment Answers and Rationales

1. The correct answer is C.
Rationale: Most aviation disasters were related to human error in communication, situation awareness, delegation, and managing workload.

2. The correct answer is A.
Rationale: Role clarity is necessary to organize the team and minimize chaos.

3. The correct answer is C.
Rationale: The leader's only responsibility should be leading the situation; when the leader's attention is divided, crucial details can be missed.

4. The correct answer is B.
Rationale: Many institutions have multiple levels of assistance available and calling for the most appropriate level of help at the right time leads to the best patient outcomes.

5. The correct answer is C.
Rationale: Stop the line allows all responders to have opportunities to alert the team to issues and pause actions for clarification.

6. The correct answer is D.
Rationale: Responders involved in discussions during an emergency need to assess the importance of their conversation. They should only share information that is relevant for the leader to be aware of and that can impact the situation and eventual outcome.

7. The correct answer is D.
Rationale: Resource allocation is the knowledge of resources available in an emergent event and the internal protocols, such as internal responses to a fire and how to use the equipment.

8. The correct answer is B.
Rationale: Dynamic decision-making is a process where an individual makes informed decisions based on an awareness of the situation, implementing the resources available and supported in knowledge by cognitive aids.

9. The correct answer is A.
Rationale: The "Where do I Stand" is an institutional internal cognitive aid that assists cardiac event responders in knowing where they should stand so that the leader is aware of their role and discipline.

10. The correct answer is A.
Rationale: The thought that the issue causing the situation can only be attributed to one specific cause and no other cause is explored, potentially causing delay in interventions.

Course Code: ANCCMI03CR

Documentation in the Electronic Age for Nurses

3 Contact Hours

Release Date: November 11, 2021

Expiration Date: November 11, 2024

Faculty

Catherine N. Turner, MBA, BSN, RN-BC Early in her career, Catherine Turner, BSN, MBA, RN-BC recognized the value that technology could bring to patients, care teams, and healthcare organizations. As an advocate of maximizing technology to provide safer care, she has lent her passion and expertise to the implementation, development, and marketing of MEDITECH's Electronic Health Record (EHR). Ms. Turner is well-known as a leader in the nursing informatics community. She is the Director of MEDITECH's Nurse Informatics Program and spearheads the annual Nurse Conference. She is an active member and current co-chair of the HIMSS CNO-CNIO Vendor Roundtable Summit, served previously on the Corporate Advisory Board for the American Nurses Foundation, is a current member of the Healthcare Information Management System Society (HIMSS) and the American Nursing Informatics Association (ANIA), and represents MEDITECH's Nursing Informatics Program for the Alliance for Nursing Informatics (ANI). Ms. Turner has been a reviewer for a number of publications as well as a popular presenter at nationwide conferences and past content expert for AHIMA publications. She is a lecturer at the Northeastern University Bouvé College of Health Sciences Health Informatics Program and worked previously at the School of Nursing, having taught both programs in the classroom and online, as well as having taught and developed the course "Introduction to Health Informatics" at the University of Miami, FL for their Master's in Health Informatics Program.

Catherine N. Turner has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Reviewer:

Jennifer Tucker, MA, RN, is a masters prepared nurse educator who graduated from Viterbo University in 2006 and St. Catherine's University in 2010. Currently she is serving as a telephone triage nurse for patients from age 1 day to 101 years. She also works in a Level 3 NICU in a large urban county hospital. She has a background in simulation education, holds a faculty position in a nursing program, and provides dialysis education and education leadership for a large rural health system.

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

Course overview

The purpose of this course is to identify various methodologies of electronic nursing documentation, explore dependency on standardized nomenclature to provide trending and analyzable data and outcomes for both the patient population and healthcare at large, as well as future innovations.

Learning objectives

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

- Describe the major advantages and disadvantages of performing the appropriate method of documentation based on data composition.
- Demonstrate how value-added documentation can result in incentive reimbursement as a by-product of electronic documentation.
- Realize benefits and best practices of using electronic nursing documentation while minimizing challenges.
- Discuss measures that protect privacy, confidentiality, security, and authenticity with the use of electronic documentation.
- Adopt future initiatives in electronic documentation to further facilitate quality, efficiency, and safety.

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.

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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.

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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

Every day, nurses face the challenge of caring for complex, acutely ill patients and their families while reflecting that care and their observations in their documentation. Numerous documentation methods have been developed and implemented in a variety of settings, attempting to accurately depict these observations, as well as meet regulatory and organizational requirements. As health information systems were steadily integrated into most healthcare facilities over the years, this gave rise to the electronic health record. As the value of this data was realized, technology has since leveraged the data collected from electronic documentation to improve patient outcomes. This course will discuss how nursing documentation has evolved in the digital age, the benefits to be realized, the ongoing challenges, and the landscape for the future.

THE EVOLUTION OF NURSING DOCUMENTATION

The importance of recording the clinical observations and discrete patient data via nursing documentation dates back to the late 1800s and is primarily attributed to Florence Nightingale.

Nightingale was the first to record her observations but, in the United States, it was nurse supervisor Linda Richards that transitioned what was then a verbal report to the physician of a patient's status to a written report, creating "a system for charting and maintaining individual medical records for each patient" (Michaels, 2018).

The recording of patient data not only results in a written recording of the patient's condition, but it also provides the ability to trend progress and ensure communication of the same. Historically a manual process, documentation was only available to those that had their hands on the physical patient chart and was dependent on good handwriting for accurate interpretation.

Fast forward to 100 years later and health information systems began to address the benefits of electronic documentation, providing both greater readability as well as accessibility.

While a variety of nursing terminologies exist, (Table 1), there are two major styles of documentation: a narrative/textual note (a discrete data entry via an instrument) or a measured observation, (standard data field). Some may argue that the narrative note tells a better "patient story", but the discrete data entry has more trending and analytical advantages (Bush et al., 2017). Potter and colleagues cite six principles of nursing documentation: factuality, accuracy, completeness, timeliness, organization, and compliance with standards (2016)

PURPOSE OF DOCUMENTATION

The American Nurses Association (ANA) states that "clear, accurate and accessible documentation is an essential element of safe, quality, evidence-based nursing practice".

"Charting should be factual", recording "what is actually seen, heard or done" (Michaels, 2020). It reflects a patient's current condition and response to treatment.

Nursing documentation has rich content that has evolved from the primary intent of depicting a patient's status and communicating that status to other healthcare providers, to many other purposes including compliance with regulations (CMS, Joint Commission), evidence in legal situations, reimbursement, research, analytics, and quality improvement. With nursing having the most direct contact with patients, they, in turn, contribute the most data to the electronic health record (EHR; Delaney et al., 2017). This demonstrates not only the contributions to patient care outcomes and the recording of this information, but also serves the important purpose of communication and interaction between nurses and other health professionals (Prasetyo, 2019).

This multi-purpose nature has resulted in what many have referred to as the burden of documentation. When another study or regulation is put into place, it is often nurses that are asked to enter the data, hence not only increasing the time it takes to document initial assessments, shift assessments, and discharge summaries, but taking time away from direct patient care.

STANDARD TERMINOLOGY

As many contribute to the EHR, the ability to trend the discrete data and use the data for clinical decision support or analytics requires some standardization of the data.

The American Nurses Association's (ANA) supports the use of recognized terminologies as valuable representations of nursing practice and to promote the integration of those terminologies into information technology solutions. Standardized terminologies have become a significant vehicle for facilitating interoperability between different concepts, nomenclatures, and information systems (ANA, 2018).

Table 1: Standard Nursing Terminologies

Interface Terminologies	Minimum Data Sets
Clinical Care Classification System (CCC)	Nursing Minimum Data Set (NMDS)
International Classification for Nursing Practice (ICNP)	Nursing Management Minimum Data Set (NMMDS)
North American Nursing Diagnosis Association International (NANDA-I)	Reference Terminologies
Nursing Interventions Classification System (NIC)	Logical Observation Identifiers Names and Codes (LOINIC)
Nursing Outcomes Classification (NOC)	SNOMED Clinical Terms (SNOMED CT)
Omaha System	
Perioperative Nursing Data Set (PNDS)	
ABC Codes	

Table adapted from ONC HIT, Standard Nursing Terminologies: A Landscape Analysis May 15, 2017.

TYPES OF DOCUMENTATION

There are a variety of nursing documentation methods, all of which approximate the nursing process. The two primary documentation styles for data entry in the EHR are: structured and unstructured. Structured data provides the user with a predefined list to choose from, while unstructured data is free form in a comment or note.

Structured data entry – (Query based)

Structured data provides a question or query to respond to with a list of choices. This standardizes the data (see Table 1) that can be used for several purposes, both real-time in caring for the patient at hand as well as retrospective studies to improve outcomes. By standardizing the responses to a specific query, data can be easily trended and a graphic representation of the data can also be displayed. This provides a longitudinal view of the data where improvement or deterioration is easily recognized. These standard data fields not only provide the ability to trend data across time, but they also provide the ability to use the data for clinical decision support. Clinical decision support (CDS) applies algorithms to the data and "requires computable biomedical information, person-specific data, and a reasoning or inferencing mechanism that combines knowledge and data to generate and present helpful information to clinicians, patients, and care team members as care is being delivered. This information must be filtered, organized, and presented in a way that supports the current workflow, allowing the user to make an informed decision quickly and to take action on that decision" (Tcheng et al., 2017).

Clinical Decision Support Systems (CDSS) can be accomplished with Expert System (ES) or Machine Learning (ML). Expert systems rely on "sophisticated rule-management system" (Sloane, 2020), using "if, then" logic. Ideally, both ML and ES prompt the user at the point of care and are based on "statistical inferences", matching relevant algorithms to similar "patients, treatments and outcomes" (Sloane & Silva, 2020). For example, a study by Trinity Health on structured data entry allowed an algorithm to be used against the data, thereby prompting prophylactic recommendations and preventing venous thromboembolism (VTE) (Delaney et al., 2017).

Flowsheet-based documentation can include time-based and semi-structured data (Delaney et al., 2017). This provides the ability to see this data across time and may be entered manually into the online flowsheet or brought in via an interface from patient care monitors, vents, IV pumps, etc. The ability to bring in data from instruments such as those mentioned here decreases documentation time, relieves the burden of documentation, removes the risk of transcription errors, and improves the accuracy of the data. In a study by Collins and colleagues (2018), documentation burden was quantified within EHR flowsheets with "mean rates of 633-689 manual flowsheet data entries per 12-hour shift in the ICU and 631-875 manual flowsheet data entries per 12-hour shift in acute care, excluding device data" (Collins et al., 2018). This equated to "a nurse documenting 1 data point every 0.82-1.14 minutes,

despite only a minimum data-set of required documentation. Increased automated device integration and novel approaches to decrease data capture burden (e.g., voice recognition) may increase nurses' available time for interpretation, annotation, and synthesis of patient data while also further advancing the richness of information within patient records (Collins et al., 2018).

Evidence-based practice! Beginner users of the structured clinical templates required at most 70.18% more time for data entry.However, as users became accustomed to the templates, they were able to enter data more quickly than free-text entry: at least 1 minute and 23 seconds (16.8%) up to 5 minutes and 42 seconds (27.6%; Hwang,et al., 2020)

Narrative notes

Narrative-style nursing documentation, also called narrative notes, nursing notes, or progress notes, is one of the oldest methods of nursing documentation. It is a diary or story format in simple paragraph form used to describe the patient's status and the interventions, treatments, and patient responses that have occurred during the shift. It is frequently used in acute, long-term, ambulatory, and home care settings.

The narrative note is the oldest and perhaps most familiar style of documentation. Though they easily tell the patient story, the narrative note is time consuming to document and to review. Primarily a subjective accounting, any discrete data within the note can be difficult to find and even harder to compare previous observations. Structured notes, using one of the styles identified in Table 3, do provide for a consistent format, but the comparative findings require additional effort to reveal trends. The adjunct of flowsheet documentation is a good supplement to the narrative note, though redundant documentation typically results from the use of both methods.

Before the development of flow sheets, narrative notes were the only method used for documenting nursing care. However, narrative notes may become lengthy and time consuming with routine care and normal assessment findings reported along with significant findings and identified problems. Narrative notes pose difficulties in reviewing patient charts and in accessing patient data. It is often difficult to quickly identify the most important information because there is no single correct order in which to document patient events. Although narrative notes are still one of the most used documentation methods, they are seldom the primary method and are more typically used as adjunct to structured data entry. Table 2 provides an example of a narrative note.

Table 2: Narrative Note

6/16/21. 1045: Patient found sitting on floor next to bed. States he does not know how he got there. VS = BP 142/89; P 76; R 20.

Oriented to time and place. Appears in no distress. Peter Downs, CNA, called to assist getting patient into chair. Patient able to move all extremities and stood up through own efforts. CNA assisted patient to bathroom.

Voided approximately 250 mL clear, pale yellow urine. Patient returned to chair with no assistance. No bruising, redness, or abrasions noted to hips or legs. Dr. Jones notified of patient's condition and assessment. No new orders received. Call light within reach. Patient instructed to call for assistance with ambulation.

Lori Johnson, RN

Note. From Western Schools, © 2019.

Structured narrative notes

There are a variety of nursing documentation methods, all of which approximate the nursing process.

While taking advantage of a narrative style, the note reflects structured narrative to reflect patient problems or diagnoses, observations, actions to be taken, and evaluation of those actions. Each note includes a signature and date and time. Some of these styles are identified in Table 3.

Table 3: Narrative Note Styles

SBAR	Situation, Background, Assessment, Recommendation.
PIE APIE	Problem Intervention Evaluation. Assessment Problem Intervention Evaluation.
SOAP SOAPIER	Subjective, Objective, Assessment, Plan. Subjective, Objective, Assessment, Plan, Intervention, Evaluation, Revision.
DARP	Data, Action, Response, Plan.

Charting by exception is another style of nursing documentation. With fear regarding the old adage "if you didn't document, you didn't do it", organizations that use this style of nursing documentation have specific guidelines on charting a finding when it is not normal (Lapum et al., 2020) and providing a list of normal ranges and activities. A note is only entered when findings are outside of these norms. For instance, if an incision showed no signs of infection, there would be no documentation of the site (Lapum et al., 2020).

Nursing Admission Assessment is a standard documentation practice to assess and "document a patient's current condition, previous medical history, allergies, prescription drugs and primary complaint at the time of their admission to the hospital" (Lapum et al., 2020). The process combines an interview style assessment as well as physical observations. The completed assessment forms the basis for the plan of care with electronic systems prompting the nurse with conditions or problems to be addressed as part of the care plan.

The Nursing Care Plan identifies problems to be addressed by nursing care and within nursing's scope of practice. Interventions that address the problem and outcomes to be achieved are documented in the plan of care. The interventions coupled with physician orders to be carried out by nursing may become part of the flowsheet documentation or narrative note, depending on the type of observations that are made. The care plan is modified as the patient progresses or declines and includes patient education and discharge planning.

Structured data entry

Discrete data that is documented either by entering data into the EHR or via an interface to monitors can automatically graph this data. Similar to the flowsheet that, at a glance, allows the nurse to see trends, the graph has visual cues identifying if the data is out of range. Common graphics include vital signs, daily weight, and intake and output (Lapum et al., 2020). This may also include medications in comparison to vital signs and lab results in order to visualize the impact of the treatment plan more easily. Surveillance tools available in an EHR can apply algorithms to the data and warn the clinician proactively of signs of deterioration in the patient's condition.

The medication administration record (MAR) has the most obvious value in point of care documentation. When combined with a bar-code verification, the EHR can provide safety assurances of the five rights as well as display related results to ensure safe administration.

A clinical pathway is a multi-disciplinary care plan with a series of steps based on evidence (Rotter et al., 2019):

1. It is used to translate guidelines or evidence into local structures.
2. It details the steps in a course of treatment or care in a plan, pathway, algorithm, guideline, protocol, or other "inventory of actions".
3. It aims to standardize care for a specific clinical problem, procedure, or episode of healthcare in a specific population.

Evidence-based practice! The Cochrane Collaboration, consisting of 27 studies and 11,398 participants, proved reductions in length of stay and hospital costs for those on critical paths compared with those not on pathways. Meta-analysis revealed reduced in-hospital complications and two studies reported improved professional documentation(Rotter et al., 2019).

Case Study 1

A 40-year-old female arrived to the ER via ambulance after a car accident. On a backboard and with cervical collar in place, the patient is moved to a bay in the ED. The patient is awake, able to answer questions, and complaining of pain in her right leg and a headache. The patient states that upon making a left turn, the other driver ran through a red light impacting her vehicle on the driver side. Vital signs are recorded with a temperature of 99, pulse of 92, respirations of 20, and blood pressure 124/88, lungs were clear bilaterally to auscultation. A neuro check is performed with a Glasgow Coma Scale of 15/15 and PERRLA within normal limits. There is bruising to the patient's forehead and leg, but no bleeding or open wound. Past history reveals no medical or surgical history. After an x-ray of the spine revealed no fracture, the backboard was removed.

Upon further questioning of the patient's headache, she reveals a worsening headache, ringing in both ears, and nausea. After several hours of observation, the patient reported no worsening of symptoms. She was discharged to her family with instruction to avoid exposure to bright lights, minimize TV and computer screen usage, rest, and to contact her primary care provider if symptoms worsened.

Self-Assessment Quiz Question #1

Which of the following data is best represented with a graphical appearance to easily recognize trending data?

a. Vital signs.
b. Description of headache.
c. Removal of cervical collar.
d. PERLLA.

Self-Assessment Quiz Question #2

If charting by exception (CBE), which observation does not need to be documented?

a. Description of headache.
b. Patient's report of ringing in ears and nausea.
c. PERLLA.
d. Discharged to patient's family.

Self-Assessment Quiz Question #3

Which of the following are present in a patient's plan of care?

a. Pain management.
b. Discharge instructions.
c. Activity tolerance.
d. All of the above.

To achieve the retrievability and CDS of a narrative note, natural language processing (NLP) pulls key words out and "standardizes" them. Once the text is converted to structured data, the data can then be used to enable algorithms to be run against the data, using it to achieve better outcomes. This can benefit future patients. In order to benefit patients currently being treated, the challenge is the real-time need of "deciphering that data" and providing the user with the CDS at the point of care (Chapman, 2019). This provides opportunities for other types of narrative notes such as voice dictation or voice to text, where the spoken word is converted to the written text.

OVERVIEW OF THE EHR

It is well known that healthcare is slow to adopt technology, lagging behind most other industries (Adler, 2016). Kandel et al. (n.d.) attribute this to safety and workflow. "Healthcare is conservative, but it is conservative for a reason: lives literally depend on it. Every new piece of technology needs to be bulletproof" (Kandel et al., n.d.). And with clinicians having an ever-increasing workload and higher patient acuity, a disruption in workflow can cause a great burden to the clinician and perhaps the patient.

The Electronic Health Record (EHR) is "a digital version of a patient's paper chart. EHRs are real-time, patient-centered records that make information available instantly and securely to authorized users"(healthit.gov, 2019). Information reflecting the patient's condition and progress inclusive of all tests, procedures, and clinical observations can be provided by and are available to be shared with other care providers across a single facility or throughout the healthcare organization.

EVOLUTION OF ELECTRONIC DOCUMENTATION

The tracking of admissions, discharges and transfers (ADT) were in use by medical institutions long before clinical data became part of the EHR. Demographic data were collected and usually tied to finances and billing. When computers first began appearing on nursing units, they were often used to order supplies, laboratory tests, and other diagnostic tests and procedures. Laboratory information systems were an early entry into the market in the late 1960s by MEDITECH and Cerner. Test results were then available online. The unit secretary usually handled the entries for orders and procedures, transcribed from the paper record, thus eliminating the paper Kardex and paper requisitions. Initially, the unit secretary was the most computer-literate person on the unit.

The beginnings of an electronic system for patient records were seen as far back as the 1970s, but it was in the mid-1980s when software was developed for use in nursing documentation. The earliest uses involved individualizing care plans for placement in a patient's medical record. In many cases, individual departments purchased computers and software specific to the department, referred to as a best of breed solution, specific to the needs of that one department. Challenges related to the incompatibility of systems resulted from the rapid development of an increasing number of software companies developing programs for a variety of services (Lee et al., 2020).

In the early stages of computerization of hospitals, laboratory and other test results were printed from their individual systems and sent to the nursing units to fill the paper chart, typically held in a binder. As systems progressed, these results became available online by viewing the computer system. As capabilities progressed, systems were then able to computerize patient supply charges, which led to more accurate hospital billing and supply management.

One of the next steps in computerizing the medical record during the 1990s was adding order entries by the clinicians themselves. Many physicians and nurses resisted order entry because they were uncomfortable with computer technology, could not type, or believed that direct entry was too time consuming. Computerized physician (or provider) order entry (CPOE), wherein physicians input orders directly into the computer, is the most desirable method of data entry. This process reduces transcription errors related to illegible physician handwriting (Agency for Healthcare Research and Quality, 2017). Historically depending on others to do this on their behalf, physicians saw this as an extra burden that they did not have time for. CPOE, however, can provide physicians with clinical decision support at time of entry instead of needing follow up for adjustments to the order after the fact. Additional details required to perform the test can be prompted right within the order and provide conflict checking for appropriateness for the patient.

Adding pharmacy systems to electronic capabilities further reduces the chance for error, removing not only the potential for a transcription error, but adding the ability to check for drug interactions and contraindications. Pharmacy systems initially provided a printed medication administration record, which reduced the risk associated with transcription of orders and provided a clear, legible record. As nursing information systems progressed and became integrated with pharmacy systems, the online MAR combined with bedside medication verification (BMV) provided an opportunity of assisting nurses with the five rights of medication administration.

As EHRs continue to improve the user experience and familiarity with the use of computers has become ubiquitous, devices at the bedside or on carts are commonplace. Although computers are easier to use and are quite common at the bedside, documentation has gone beyond just desktop computers. Currently available electronic documentation systems may also use wall-mounted (touch screen), handheld, or other portable devices to record patient data, including assessment information, routine care, medication administrations, treatments, and changes in condition. Bedside systems using standard keyboards, voice-activated systems, and other devices allow nurses to promptly document vital signs, routine care, and changes in status. These devices provide the ability to continually update patient information in addition to providing accessibility by multiple healthcare providers. Networking an entire hospital with compatible programs enhances the use of computers (D'Souza et al., 2019).

Some information systems recommend nursing diagnoses based on predefined assessment data previously entered into the system. Systems that are interactive prompt the nurse with questions and recommendations related to the entered information. These questions and diagnostic recommendations foster quick and thorough documentation. All the information is available in the computer program for individualization of the plan of care. Additional tools include the use of clinical guidelines incorporated into the EHR and clinical decision support that assists in guiding practice for physicians and nurses (Sloane & Silva, 2020).

Current developments include building a comprehensive system that uses various data collection components and broadening the scope of computer capabilities for multidisciplinary uses. Computerized documentation is flexible and expandable, making it capable of meeting the evolving needs of each clinical specialty and subspecialty. The development of the EHR must grow to account for expanding knowledge bases and sophistication of users, including the input of the professionals who are the end users. EHRs, even those that are evolved, are simply tools used; they do not replace the critical thinking and practice of healthcare professionals (Sloane & Silva, 2020).

SELECTING A DOCUMENTATION SYSTEM

Selecting a documentation method that ensures optimal communication, simplifies

the documentation process, and meets required regulations is difficult. It is important to con- sider the staffing mix of the hospital, specialty unit, or agency providing care. If unlicensed assistive personnel are part of the staff, their role in documentation must be evaluated. On an all-RN unit, staff are comfortable with a variety of documentation methods, whereas a unit staffed with a mix of educational backgrounds may need more guidance by using drop down lists and data field prompting.

Though the use of computers has become ubiquitous, the knowledge and skills of the staff must also be considered. Nurses have varying degrees of exposure to different types of documentation and age, educational background, and work experiences influence their documentation skills. Nurses may resist a new documentation method if they do not possess the knowledge and skills to understand the process.

Changing documentation systems can be costly; therefore, determining the financial outlay of a new documentation system is essential. Cost estimates should include planning and preparation time, printed materials, design and development of new forms, and educational time. With nursing staff being the largest volume of staff in an organization, this is a substantial effort.

Another critical consideration in the process of changing documentation methods is education. A sound educational program must be developed and repeated as often as necessary. Multiple methods of education including classroom training, e-learning and one: one support may be required. After implementation, the process will need monitoring for compliance and troubleshooting for any problems that may

develop. This is also an opportunity to optimize the system to better reflect workflow (Karp et al., 2019).

Regardless of the documentation method that is selected and whether documentation is via a paper or electronic health record, vital components must be included. The method must provide for clear communication and use standardized language. The components of the nursing process must be reflected, from assessment through evaluation. Patient progress and outcomes must be plainly described (Moghaddasi et al., 2017).

SUPPORT FOR ELECTRONIC NURSING DOCUMENTATION

The value of electronic documentation is recognized by nurses but has traditionally been hampered by software that lacks usability as well as a shortfall of available devices. If a computer is not available for documentation, it will result in retrospective documentation. While individual devices are often made available to physicians, nursing ends up sharing these devices on a shift. Although EHR vendors will often recommend that there be enough computers for the greatest number of staff on a shift (typically the day shift) that are then shared from shift to shift, this is rarely met. Mobile devices, often referred to as point of care (POC) devices can be less expensive and hence easier to supply the right numbers (McNicol et al., 2018). The most successful example of POC devices that quickly prove their efficacy are those used for bedside medication verification. The process of scanning the patient and then the drug compares against the medication administration record (MAR) and ensures the five rights of administration: right patient, right time, right dose, right drug, right form. A warning will display if any of these are not correct. Had a POC device not been in use, the wrong medication might have been administered and the error not found until after the fact. The first time the scanner prevents a nurse from making that error, they forever recognize the importance of POC, aiding in error reduction and adverse drug events (McNicol et al., 2018).

Case study 2

Mr. Bridgeman is a 78-year-old male with a history of CHF and diabetes. He is physically active and has no history of dementia. His wife heard a crash in the next room and found her husband on the floor after having fallen. Mr. Bridgeman is in extreme pain and unable to assist himself in getting up, so Mrs. Bridgeman calls an ambulance and he is taken to the ER. Mr. Bridgeman is triaged and initial assessment information is gathered, including the history of CHF and diabetes managed with diet and exercise. He is assessed for a suspected hip fracture and still complaining of severe pain on a scale of 9 out of 10. Mr. Bridgeman is given Percocet while waiting for his x-ray. Lab work is ordered in preparation for surgery, anticipating a fractured hip. Upon confirmation of the fracture, Mr. Bridgeman is prepped for surgery and taken into the OR 5 hours later. The surgery goes well, and post-op is taken to the recovery room and later transferred to the orthopedic unit. Handoff communication provides a narrative summary in the progress notes of Mr. Bridgeman's recovery room stay. New orders are provided but there are questions regarding which recovery room orders are to be discontinued. The physician is called for further instructions. In the meantime, the patient is complaining of pain (9 out of 10) and the electronic medication administration record (eMAR) is reviewed for pain medications. Both the recovery room medications and the new orders for pain meds are listed on the eMAR, but no recorded medications appear as given in the recovery room. The nurse checks the hand-off report and determines that IV morphine was given twice during recovery. Seeing both the NPO order and a diet as tolerated order, the nurse administers the oxycodone order to the patient for pain, but in a rush to try to relieve the patient of pain, administers the medication without the use of the barcode scanner. Having just given the medication to the patient, the nurse then scans her badge, the patient arm band, and the barcode on the unit dose and receives a dose warning regarding the medication. The warning indicates that the nurse has scanned less than the prescribed amount and she retrieves a second unit dose to achieve the ordered dosage. Now having confirmed the five rights of medication administration with the bedside medication verification process of scanning, the nurse, patient, and medication before medication administration, the nurse is prompted to also record the degree of pain (1-10 scale) as part of the eMAR documentation. Thirty minutes later, the nurse is alerted via the EHR and eMAR that a pain reassessment is due.

Self-Assessment Quiz Question #4

The recovery room had no recorded medication administration on the eMAR. The potential reasons for this include all of the following EXCEPT:

a. The recovery room uses a best of breed system and hence is on a different system than the inpatient units.
b. The recovery room still documents on a paper flow sheet and only enters narrative notes into the system.
c. The recovery room does not document medication administrations.
d. All of the above.

Self-Assessment Quiz Question #5

Medication administration using barcode verification with the eMAR provided all of the following clinical decision support warnings EXCEPT:

a. Wrong patient.
b. Wrong dose.
c. Documentation needed.
d. Reassessment needed.

Self-Assessment Quiz Question #6

In addition to the clinical decision support provided, what other advantages to electronic medication documentation exist?

a. By reviewing the eMAR, other nurses can quickly see when a next med is due.
b. By reviewing the eMAR, nurses can quickly and easily see when the last med was given.
c. Entry of clinical data can compare the pain level of the patient to the medication administration times.
d. All of the above.

Medication administration is not the only benefit for POC. The portability of the device makes it easy to use them for rounding and handoffs and they can also be used to engage the patient in their care by showing them their progress on the device. Previous studies have shown that patient's do not feel engaged in care with POC, but that when time is taken to include the patient in the documentation or the review of same, an opportunity for better patient engagement exits (McNicol et al., 2018). If this same device form factor is used by the EHR vendor for their patient portal, nurses can use this as an opportunity to review features and functions of the portal with the patient before discharge. Patients comfortable with POC-HIT concur

that it can "support their involvement and promote recovery" (McNicol et al., 2018).

Much of documentation still occurs at the nurse station and hallway, with documenting in patient rooms falling below the other two at 1/3 of the time spent, resulting in a lack of real-time documentation (Yen et al., 2018). This creates several drawbacks. If information was recorded on paper and then transcribed into the EHR, this results in redundancy as well as the possibility of transcription errors. If information is not recorded at the time of observation, this can also result in omission or incorrectly recorded data. In a study by Yanamadala et al. (2016), it was found that electronic documentation did not prove better quality outcomes if the documentation was used as a "recording mechanism after patient care" as opposed to point of care documentation (Yanamadala et al., 2016). A study by Ahn and colleagues (2016) found that some documentation is not even recorded during a nurse's shift. Nurses with more than 1 year of experience were more likely to document in a timely manner, as were those on evenings and nights compared to day shift nurses, with the assumption that a higher number of admissions and post-op patients impact timeliness (Ahn et al., 2016). A thorough search of studies done on electronic documentation by McCarthy and colleagues (2018) did not conclusively determine that electronic documentation improves quality of care or patient safety, but did find some evidence indicating that in acute hospital settings it is time saving and reduces rates of documentation errors, falls, and infections. Further evidence found (Hsieh et al., 2016) that providing nurses with tools such as "SmartPhrase" and visual cues for required data fields and/or errors has the potential to enhance the quality of documentation, facilitate data collection, and reduce rates of falls and infections. The prompting of relevant information at the time of documenting can reduce unnecessary documentation, and well-built templates can reduce documentation time (Hsieh et al., 2016). What must be stressed is the opportunity for clinical decision support available at the point of care with real-time documentation. Retrospective documentation eliminates this opportunity and potentially puts the patient at risk (Tcheng et al., 2017).

A study done by Liao and colleagues (2018) found a decrease in "recording time per shift" for both junior and senior (greater than 10 years' experience) nurses by 29 minutes and 15 minutes respectively.

Documenting at the point of care not only provides the opportunity for actionable clinical decision support, but it also provides the opportunity for other caregivers to have immediate access to this information. "Physicians and members of other interdisciplinary teams, such as therapists and dietitians, also benefit from the system as they can check the patient's relevant assessments or treatments online at any time and provide the patient with the timeliest and most accurate rehabilitation or nutrition prescriptions" (Liao, et al., 2018). In the absence of real-time documentation, discrete documentation used for clinical decision support cannot be triggered in a timely manner and hence prevents nurses and other clinicians from being able to act on the information.

The hesitancy to document at the bedside can be attributed to feeling it is disruptive to patient care (Ahn et al., 2016), poor system usability, interruptions by other care providers or family, and discomfort documenting in front of the patient, as well as patients themselves feeling that this can detract from effective communication (McNichol et al., 2018). The study by Ahn and colleagues (2016) did not reveal any differences in the timeliness of documentation when compared across different EHR systems.

Clinical Consideration: Some evidence from our review indicates that implementing electronic nursing documentation in acute hospital settings is time saving and reduces rates of documentation errors, falls, and infections (McCarthy, et al. 2019).

Though real-time documentation at the point of care is desired, there are instances where retrospective documentation still occurs. In those situations, the actual time of the observation should be identified as well as the time that the information was entered into the record.

REDUCING THE BURDEN OF DOCUMENTATION

"Over the last few decades, nurses have increasingly been burdened with documentation to meet regulatory and quality reporting requirements" (Karp et al., 2017). Required documentation is often expanded, yet rarely is any taken away. As Effken and Weaver (2016) stated: "the house of nursing documentation needs cleaning". A research study by this team (Karp et al., 2017) identified 40 data elements as essential to a quality patient admission assessment, hypothesizing that limiting documentation to these would:

- Increase the proportion of essential items completed.
- Decrease the documentation time required to complete the admission assessment.
- Reduce the number of mouse clicks.

While it may seem obvious that reducing the number of data elements would provide these results (the research site decreased their minimum data element from 215 to 58 data elements--a 73% reduction; Karp et al., 2017), the importance of reviewing documentation templates to ensure data fields are essential was not emphasized enough. If an organization sees that the easiest way to comply with a new regulation or reporting requirement is to add data elements to the nurses' workload, rarely do they take the time to simultaneously review what is no longer needed. This results in a "more is more" mentality instead of looking at the scope of the documentation. This study also compared the quality of the documentation before and after reducing the required data elements. While efficiency and reduced mouse clicks are obvious, it is the quality that is of most interest here. Interestingly, the study proved that, given the same data fields in the pre vs post surveys, a higher percentage of completion of these essential data fields occurred, increasing from 48% to 54% (Karp, 2017). In this case, less was more.

One method of decreasing the burden of documentation is to decrease non-meaningful documentation and increase meaningful documentation. To successfully do that, three things must be examined (Englebright, 2021:

1. Is each data element necessary for patient care?
2. How is each data element used? Reports, Alerts, Reminders?
3. How often do the reports, alerts, and reminders create actions?

Documentation then needs to be timely, concise, actionable, and delivered to the appropriate decision-maker when needed (sharable; Englebright, 2021). Both actionable and deliverable depend on point of care documentation to make an impact.

Over the years, there have been many time and motion studies to determine how to provide for more efficient foot traffic to and from patient rooms for nursing staff, e.g., where supplies should be located, configuration of the nursing unit, etc. More recently, time and motion studies have been performed to determine the amount of time spent on nursing documentation vs direct patient care. Baker and colleagues (2019) conducted a time and motion study recording various tasks, the location performed, and duration of each. "The workflow of nurses and patient care technicians, constantly in and out of patient rooms, suggests an opportunity for delivering a tablet to the patient bedside" (Baker et al., 2019). This would provide joint review of information via the tablet between patient and nurse. The average time between visits to a given room is consistent with bringing the tablet to a patient in one visit and retrieving it at the next. However, the relatively short duration of direct patient care sessions could potentially limit the ability of nurses and

patient care technicians to spend much time with each patient on instruction in the technology platform or the content (Baker et al., 2019).

Another time and motion study monitored documentation time post implementation of an EHR. In this case, the transition from paper-based to an EHR did not significantly change the amount of time at the bedside, but there was an increased time spent in documentation (Walker, 2019). What was not evaluated in the study was the location of the devices, nor was the comparison of documentation requirements on paper vs electronic. Implementing a new documentation system can often result in additional data recorded to satisfy other use cases. For instance, The Patient Protection and Affordable Care Act (ACA) reimbursement models, Meaningful Use (MU) mandates of specific EHR requirements, along with other regulatory requirements have altered documentation in a manner not conducive to efficient documentation or workflow (Moy et al., 2021). Commonly referred to as the burden of documentation, this has led to increased medical errors increased time spent documenting, and burnout, without resulting quality improvement (Moy et al., 2021). An effort to reduce the documentation burden has been the focus of the 25×5 Symposium, which was "developed to establish strategies and approaches to reduce clinician documentation burden on US clinicians to 25% by 2025" (Collins et al., 2021).

Their goals included:

1. Engage a diverse group of key stakeholders and leaders focused on reducing documentation burden.
2. Assess the likely potential for burden reduction within categories of documentation burden, including identifying 'low hanging fruit' for 'quick wins' without adversely impacting quality or access to care.
3. Establish approaches for immediate (less than 3 months) and short-term (6 months) reduction in clinical documentation burden.
4. Generate approaches to longer term (10 years) elimination of clinical documentation burden .

(Collins et al., 2021)

Suggested solutions include taking advantage of other data – other clinicians' entries, monitor data, and referring to data instead of redundantly entering data. Successful efforts by Hospital Corporation of American (HCA) followed "an evidence-based design that aligns minimum documentation requirements with ideal workflow" (Michel, 2018). This included having specialists such as dietitians and therapists record their own documentation without nursing redundantly entering the same information. Screening questions resulted in the identification of these clinicians' role in the patient's health; this relies on trusting each other's documentation. Results of this have included saving up to 2 hours of documentation time per nurse per shift (Michel, 2018).

Evidence-based practice! An evidence-based design that aligned minimum documentation requirements with ideal workflow resulted in saving up to 2 hours on documentation per nurse, per shift (Michel, 2018)

VALUE-ADDED DOCUMENTATION

The benefit of being able to utilize the data for clinical decision support was mentioned previously, but additionally, charges for procedures, time spent, or materials used can also be a by-product of documentation. Any additional use of the information that can take action behind the scenes creates a value-add opportunity. Other have long benefited from nursing documentation, anything else that can be done on behalf of that documentation can not only help diminish the burden of documentation, but it can also replace other documentation. For example, many acuity systems rely on a separate form that is filled out depicting a patient's level of care. If, instead, documentation can record a degree of severity as a byproduct of the documentation, this would eliminate bias and redundant documentation. Supplies and timed charges can also be a byproduct of documentation. When fully integrated with inventory and billing, these are components that benefit others while not adding burden to documentation. Moy and colleagues (2021) scoping review also identified streamlined documentation as a byproduct of the EHR.

Case Study 3

Mrs. Smith is a 50-year-old female with a history of hypertension and high blood pressure. She has no family history of heart or lung disease and is a current smoker. Mrs. Smith experienced sudden chest pain described as an "elephant sitting on my chest" with pain radiating to her arm and back. She is diaphoretic and feeling weak. Upon calling an ambulance, Mrs. Smith was transported to the Emergency Room.

Initial assessment revealed vital signs of 128/80, with a normal heart rate and rhythm, no murmur detected. Blood pressure rose to 158/82, then returned closer to initial recording of 130/82. Vital signs were recorded and automatically alerted the physician in the EHR. Upon receipt, the physician ordered an EKG. The charge for the EKG was automatically sent to billing and supplies used automatically depleted inventory upon completion of the EKG. The initial EKG showed slight changes compared to an earlier EKG available in the EHR for comparison. Cardiac enzymes were normal as was a chest x-ray, both requiring entry of suspected diagnosis at time of ordering with repeat of cardiac enzymes reflexed (automatically ordered). Charges were automatically sent to billing upon completion of the test.

Nursing documented the vital signs and triage assessment with the emergency severity level auto-calculated at a level of 2. Nitroglycerin drip, aspirin, and beta blockers were ordered and administered via eMAR BMV, alerting the nurse of the need to enter pulse and blood pressure before administration as well as a display of the last set of vital signs. The system prompted the nurse with vitals being within acceptable range to administer the nitroglycerin.

The patient was admitted to the cardiac care unit and scheduled for a cardiac catheterization the following morning. The patient was placed on a cardiac monitor and data automatically populated the EHR, trending the data along with the recordings taken in the emergency department. The admitting nurse was able to review all information documented in the emergency room and reference that information, confirming it with the patient instead of re-entering the information.

Mrs. Smith was glad that the nurse was familiar with her information and she did not have to repeat the same answers that she had provided in the ER.

An echocardiogram was ordered and revealed left ventricular hypertrophy with normal systolic function and aorta. The patient's pain persisted, and vital signs continued to populate the EHR via monitor interface every 10 minutes per protocol. When the patient's blood pressure suddenly dropped to 70/60 with a heart rate of 136, the monitor alarmed, and results were immediately and automatically alerted to the nurse's electronic flowsheet and the physician via EHR and text message. Quick action by the team avoided a code.

Self-Assessment Quiz Question #7

Which of the following does not reflect clinical decision support prompts?

a. Required data entry at time of order.
b. Required data entry at time of medication administration.
c. Monitor data sent to the EHR.
d. All of the above.

Self-Assessment Quiz Question #8

Which of the following is not an example of value-added documentation?

a. Automatically charging for tests upon completion.
b. Reflex ordering of cardiac enzymes.
c. Automatically charging for supplies and decrementing inventory.
d. Calculation of severity level based on documentation of patient status.

Self-Assessment Quiz Question #9

Which of the following reduce the burden of documentation?

a. Auto-calculation of severity level.
b. Referring to previous documentation instead of re-entering data.
c. Monitor interface sending data to the her.
d. All of the above.

Self-Assessment Quiz Question #10

Which method of documentation is best suited for inclusion of patient's description of her chest pain?

a. Pain scale of 1-10.
b. Narrative note with exact words of patient's description.
c. Flowsheet documentation.
d. None of the above.

INCENTIVE REIMBURSEMENT

The Patient Protection and Affordable Care Act (ACA) reimbursement models, Meaningful Use (MU) mandates, and a regulatory-rich environment have drastically altered clinical documentation workflow and communication in routine healthcare via the EHR. The Patient Protection and Affordable Care Act, also known as the Affordable Care Act, and the American Recovery and Reinvestment Act of 2009 identified many necessary changes for healthcare, including the use of the EHR. As part of these programs, incentive payments from the Centers for Medicare & Medicaid Services (CMS) were available to eligible providers and hospitals to increase the interoperability and flexibility of certified health information technology products. Promoting Interoperability (PI); formerly known as Meaningful Use Stage 3 is a mandate for providers and hospitals to improve safety, quality, coordination of care, and communication in healthcare. PI in EHR is using certified technology to improve quality, safety, and effectiveness; reduce health inequalities; involve patients and their families; enhance care coordination; and preserve the privacy and security of protected health information. It consists of the use of an EHR in a significant or meaningful manner, use of the technology of the EHR for the electronic exchange of information, and use of EHR technology for submission of clinical quality measures (formerly called core measures; Centers for Disease Control and Prevention, 2017).

PI has three stages: Stage 1 of the PI program was announced in 2010 and concentrates on data sharing and tracing clinical conditions for better coordinated care. Stage 2 of PI began in 2014 and broadens the use of EHR software for health information exchange. Stage 3 began in 2016 through the federal Health IT Policy Committee (now Health Information Technology Advisory Committee) and focuses on a more collated information network, from labs to immunization information (Centers for Disease Control and Prevention, 2017; CMS, 2021).

The requirements for PI, including deadlines for completion of its stages, are dynamic. Goals for PI include a focus on safety and high-quality patient outcomes, use of decision support for conditions identified as high priority, patient access to tools for self-management, access to comprehensive patient data, and improvement in population health. For PI, eligible hospitals must comply with four out of six measures (Centers for Disease Control and Prevention, 2017; CMS, 2021).

Components of PI through the EHR include (CMS, 2021):

- Patient demographics.
- Vital signs.
- Advance directives.
- Medication reconciliation.
- Drug interactions.
- Allergies.
- Smoking status.
- Computerized physician order entry.
- Clinical decision support.
- Interdisciplinary communications.
- Confidentiality.
- Transitions of care.
- Public health.
- Clinical data reporting.
- Patient education.
- E-prescribing.
- Send Summary of Care from one EHR to another.
- Request/accept summary of care from one EHR to another.
- Interdisciplinary plan of care.
- The ability of patients to obtain a copy of their EHR.

As the criteria of PI evolve, involvement of nurses as key stakeholders in all phases of the optimization of health information technology is essential (Healthcare Information and Management Systems Society, 2020). In 2015, the Merit-based Incentive Program (MIPS) was passed to address problems that occurred with the PI program. MIPS became effective January 1, 2018. This program changes the rules for PI and how providers must attest their EHR to receive reimbursement for services provided to the patients. MIPS consolidates three existing programs: the Physician Quality Reporting System, the Physician Value-based Payment Modifier, and the Medicare & Medicaid EHR Incentive Program for eligible providers. The focus is on the quality of care provided to patients (CMS, 2021). The combination of PI and MIPS drives incentive programs to require documentation to be completed in the EHR.

IMPLEMENTATION AND EDUCATIONAL REQUIREMENTS

The transition to electronic documentation presents a unique challenge to nurses and nursing education. The successful implementation of a computerized documentation system requires preparation, involvement, and commitment from the entire nursing staff. It also requires thoughtful, deliberate planning as well as recognition of a learning curve. Real-time nursing documentation can provide nurses the opportunity to document patient care data on a tablet at the bedside. The purchase and availability of devices for the nursing staff Is essential. Knowledge of change theory is helpful when implementing new documentation methods. The classic change theory developed by Kurt Lewin is often applied. This model of change requires prior learning to be rejected and replaced. Lewin stated that change occurs in three phases: unfreezing, moving, and refreezing (as cited in Burke, 2017).

During *unfreezing*, a disruption in the balance or equilibrium occurs within the system. Dissatisfaction with current documentation practices provides the need for change. Data regarding the strengths and limitations of the current documentation method should be gathered. During the *moving* phase, a move to a new goal occurs and, because most are uncomfortable with change, resistance also occurs. Development and implementation of new ideas occur as committees are formed, goals are developed, systems are redesigned, and pilot studies are conducted. This phase is the longest in the change cycle.

Finally, in the *refreezing* phase, consolidation and adoption of new ideas occur. Monitoring and evaluation of the changes take place and resource people must be available for user support. As staff members become more comfortable with the new documentation method, acceptance of the method increases and resistance decreases (Lewin, as cited in Burke, 2017)

A plan must be developed to provide the institution a clear understanding of the changes involved in computerized documentation. Implementing a new system requires collaboration and communication among employees of all levels. Establishing goals and time frames keeps the project on target (Bastable, 2017).

Staff development is a critical part of implementing computerized documentation. Staff members must be kept informed about the progress of the change, stages of implementation, and timeline for "going live" with electronic documentation. Their input is necessary to ensure that all questions and concerns are addressed. Institutions must offer specific, detailed classes and provide all staff members the opportunity to attend in-service sessions. Self-learning modules and videos of class presentations are necessary to educate people who are unable to attend classes or for those seeking to review the process leading up to a go-live.

Small-scale pilot projects may be used to implement the new system. Specific units may be selected for the pilot study or all units may go live simultaneously. When transitioning from one system to another, a big-bang go live (all go live at the same time) may be required rather than maintaining disparate systems. Because of the number of nurses to be trained, education offered occurs weeks or even months before go-live. E-learning modules can assist in keeping knowledge fresh as the live date approaches. Communication and follow-up are key elements in the success of implementation.

The process does not stop at go live. Continued monitoring and evaluation are necessary to determine the degree of compliance of system usage and identify unforeseen problems. Audit of documentation content and timeliness "can be used to identify practice guideline adherence" and can evaluate nursing performance metrics (Karp et al., 2017). Ongoing education, refresher courses, and introduction to new software enhancements help maintain compliance and keep staff up to date (Bastable, 2017).

LEGAL AND SECURITY CONCERNS

The security needs of an electronic documentation method differ from those of handwritten methods. EHRs require additional security measures to ensure reliability and authenticity of user input. Security for EHRs includes the protection of documents, files, systems, and network areas from unauthorized access and damage or loss from fire, water, theft, mutilation, or unauthorized alterations or destruction. Unauthorized access can be obtained in a variety of ways and diligence must be sustained to prevent cyberattacks. One such attack known as ransomware (malicious malware; Jarrett, 2017) takes a system hostage by encrypting files unless money or bitcoin is paid to the attacker. Systems can be down for days or weeks as a result.

Computerized medical records present new challenges to nurses' ethical and legal obligations to safeguard confidential patient information that differ from paper documentation. Security measures must be developed to strictly control the ability of others to access computerized records from distant sites. Even the placement of computer screens must be taken into consideration. Likewise, medical and health records must be protected from destruction by computer viruses introduced via external devices, the Internet, or cyberattacks (Jarrett, 2017). In addition, contingency plans must be in place for other unexpected events, such as natural disasters or the afore- mentioned cyberattacks. A backup system must be in place for recovery of EHRs and to prevent downtime that may disrupt usability (HHS, Office of Inspector General, 2016). Downtime forms must also be available in case manual documentation needs to be implemented and education on their use must be provided to decrease disruption in documentation and patient care

A variety of federal laws protect credit information; however, few laws protect the computerized medical record. The Health Insurance Portability and Accountability Act (HIPPA) regulations require increased security for computers and computer users. With the rapid growth of the Internet, an explosion of high-technology crime and related illegal activities has occurred. Increases in cybercrime have necessitated development of technologies and systems to combat these problems. Breach of security is a very serious concern and users should be given only the level of access necessary to perform their jobs. Most often, use of codes, passwords, fingerprint, or badge scanning are all methods that allow staff to access only information necessary for patient care and preclude access to every patient in the hospital. Hospitals terminate personnel for providing their passwords to unauthorized individuals, and it is a crime to illegally obtain someone's password (Gordon et al., 2017).

The proliferation of EHRs requires a redefinition of specific roles in healthcare, such as records managers and archivists. Plans must be made for the preservation and accessibility of records beyond the useful life of the systems that created them. Decisions regarding storage of electronic records, ease of retrieval, and length of time of record retention must also be made. Electronic data consume much less space than paper records; however, accessibility to records over time requires reproduction of the record in a reliable and authentic format. The length of time for which medical records must be retained varies from state to state. Therefore, when an institution decides to use computerized documentation, all parties involved, as well as legal counsel, must work together to ensure fulfillment of all requirements from every healthcare provider, department, and regulator (Adler, 2021).

FUTURE TRENDS

As the importance of nursing documentation continues to be realized, technology continues to advance to ease the burden of documentation. Voice to text, virtual assistants, and ambient listening (Drees & Dyrda, 2020) are already in use for physicians and will be applied to nursing documentation in the near future. Nursing documentation contributes to the EHR and the big-data initiative. Healthcare big-data has enormous potential for improving health by mining the data with machine learning and artificial intelligence with evidence that outcomes can be improved (Tai, 2020). "It can be used to improve the efficiency and effectiveness of prediction and prevention strategies or of medical interventions, health services, health policies, and even prevent healthcare fraud" (Midha, Ngafeeson, & Ghosh, 2017, p. 95). Big data lays the groundwork for Artificial Intelligence (AI) and genomics, which in turn can offer precision medicine to deliver expert care to a patient. This approximates a learning health system (LHS) that the Health and Medicine Division of The National Academy of Sciences (formerly the Institute of Medicine) has promoted and includes integrated EHRs, the ability for information exchange, and data analysis (Booth et al., 2021).

With the attention to social determinants of health (SDOH), there is a recognized need for understanding the "ethical and social implications of the LHS and for exploring opportunities to ensure that these implications are salient in implementation, practice, and policy efforts" (Platt, 2020). The emergence of telehealth and virtual care (Dress & Dyrda, 2020) may assist in reaching those that are in remote areas without easy access to healthcare. This has also proven to enhance the consumer experience as convenience reigns high as well as access to their own medical records via health portals. New systems are constantly being developed and refined to support a completely computerized medical record. Goals include the development of a computerized system that fully integrates medical records across systems and healthcare organizations and acts as a repository for lifelong medical information.

This should improve the communication between systems throughout the continuum of healthcare. The State Health Information Exchange Cooperation Agreement Program funds states' efforts to rapidly build capacity for exchanging health information across the healthcare system, both within and across states. Health information exchange organizations assist with the interchange of electronic health information across different technologies used for EHRs. The ability of various systems to communicate with one another can have a positive impact on timeliness of receiving patient EHR information in order to treat the patient according to their care needs (Parker, Reeves, Weiner, & Adler- Milstein, 2017).

As technology unfolds, nurses are encouraged to consider the role of EHRs, wearable technologies such as remote monitoring and person generated health data (PGHD), big data and data analytics, and increased patient engagement as key areas to enhance the delivery of patient care.

Conclusion

Each documentation method has its advantages and disadvantages. Institutions, specialty units, and agencies must select the method that works best for their specific needs. The emphasis on measuring outcomes may require many institutions to make changes to their current documentation methods. When a documentation system is being selected, accreditation standards, state and federal regulations, and legalities must be considered. Because healthcare reimbursement fluctuates, with continual changes of supervisory bodies and regulations, new documentation systems must be designed with care. Feedback must be obtained from risk management and legal counsel to ensure the changes are legally sound. Computerized records have increased in popularity over the years and have numerous benefits. EHRs, compared with paper charting, free up physical space in an institution, provide healthcare providers ready access to patient data, and are more legible, which reduces errors. Electronic documentation results in better standardization of care plans and lends to more efficient use of nurses' time. Bedside devices using standard keyboards, touch-sensitive screens, handheld units, palm-sized terminals, voice-activated systems, and other devices now allow nurses to promptly document vital signs, routine care, and changes in status in real time. Implementing electronic medical records as part of a complete electronic patient management program can significantly improve patient safety and ultimately reduce errors.

Glossary

algorithm: Rules or calculations applied for problem solving and clinical decision support.

American Nurses Association (ANA): Organization of professional nurses in the United States that focuses on standards of healthcare, nurses' professional development, and the economic and general welfare of nurses.

(A)PIE charting: A method of documentation that focuses on assessment, problem, intervention, and evaluation.

artificial intelligence: Computer systems that are able to perform tasks typically requiring human intelligence.

block charting: Method of documentation that covers a broad time frame, frequently a whole shift.

breach: Neglect or failure to fulfill the duties of a job appropriately and properly.

care map: A type of documenting that is based on an integrated treatment plan, identified services, patient outcomes, and length of stay.

care plan: A statement of goals and objectives of nursing care provided for a patient and the interventions required for accomplishing the plan, including the criteria to evaluate the effectiveness and appropriateness of the plan.

Centers for Medicare & Medicaid Services (CMS): Federal agency that coordinates participation in the federal government's Medicare and Medicaid programs; previously known as the Health Care Financing Administration.

certification: Examination developed by a professional organization that provides verification of a claim to competence at a certain level of practice.

charting by exception (CBE): A charting method in which data are entered only when there is an exception from what is normal or expected. Reduces time spent documenting.

clinical pathway: A series of sequential steps in a process that is required to ensure a satisfactory out-come.

clinical practice guidelines: The clinical steps for patient management.

code of ethics: A set of values and standards regulating a profession.

computerized documentation: The use of a computer for long-term collection of an individual's healthcare information over a lifetime; the electronic chart used to collect information about a specific patient in a healthcare institution; replacement for manual documentation.

confidentiality: Privacy; a nurse must maintain the confidentiality of information related to a patient's healthcare.

critical pathways: A multidisciplinary care plan through which diagnoses and interventions are sequenced on a timetable.

current procedural terminology codes: Five-digit codes used in billing insurance companies by which services, treatments, and procedures are classified.

cyberattack: Attempt by hackers to disable or destroy a computer system.

discharge summary: Part of a medical record that summarizes a patient's initial complaints, course of treatment, final diagnosis, and suggestions for follow-up care.

documentation: Act of authenticating events or activities by keeping written records.

electronic health record (EHR): An electronic health record is a digital version of a patient's paper chart. Electronic health records are real-time, patient-centered records that make information available instantly and securely to authorized users.

e-MAR: Electronic Medication Administration listing the medication, amount, route, and time of administration.

evaluation: Category of nursing behavior in which a determination is made and recorded regarding the extent to which a patient's goals have been met.

evidence: Pertinent information surrounding the patient, the scene, or the suspect that might substantiate claims of innocence, guilt, or responsibility for outcomes.

evidence-based practice: A process founded on the collection of, interpretation of, and integration of valid, important, applicable, patient-reported, clinician-observed, research-derived evidence. The best available evidence, moderated by patient circumstances and preferences, is applied to improve the quality of clinical judgments.

expert systems: Broad term encompassing artificial intelligence techniques.

flow sheets: Form of documentation on which frequent observations or specific measurements are recorded.

focus charting: A charting method for structuring progress notes according to the focus of the note, such as symptoms and nursing diagnoses. Each note includes data, actions, and patient response.

graphic sheet: Record of repeated observations and measurements, such as vital signs, daily weight, and intake and output.

guidelines: Recommended nursing practices designed to meet standards of care.

healthcare provider: A member of the multidisciplinary treatment team who renders healthcare to a patient – for example, a physician, an advanced practice registered nurse, or a nursing assistant.

Health Insurance Portability and Accountability Act (HIPAA): The 1996 act that establishes privacy and security standards to protect patient healthcare information. In December 2000, the U.S. Department of Health and Human Services issued final regulations governing privacy of this information under HIPAA.

implementation: Category of nursing behavior in which the action necessary for achieving projected outcomes of a healthcare plan are initiated and completed.

interdisciplinary: Reliant on the overlapping skills and knowledge of each team member and discipline, resulting in synergistic effects whereby outcomes are enhanced and more comprehensive than the simple aggregation of the team members' individual efforts.

interventions: Part of the nursing process involving all aspects of actual care provided to a patient, which requires full knowledge of the assessment and planning stages.

machine learning: Type of artificial intelligence that analyzes data and enables self-learning

medical diagnosis: Identification of a specific disease or pathologic process.

medical record: Documentation designed to provide a summary of all observations made regarding nursing and medical diagnosis and to accurately reflect measures taken to alleviate identified problems as well as a patient's response to interventions.

medication administration record (MAR): A record listing the medication, amount, route, and time of administration.

minimum data set (MDS): A specific form used in long-term care to collect the minimum information needed for assessing a resident's needs to develop a plan of care.

multidisciplinary treatment team: A team of healthcare providers that monitors and determines all aspects of the security, diagnosis, treatment, and rights of a healthcare patient through shared decision making.

NANDA International: Formerly known as North America Nursing Diagnosis Association, an organization involved in developing and promoting the use of nursing diagnoses.

narrative notes: Notes regarding a patient's status written in the nurse's own handwriting that provide an overview of patient care for a shift.

natural language processing: Deciphering of human language into codified data.

nursing care plan: Written guidelines of nursing care that document specific nursing diagnoses, goals, interventions, and projected outcomes for a patient.

nursing diagnosis: A statement that describes a patient's actual or potential response to a health problem that a nurse is licensed and competent to treat.

nursing history form: Data collected about a patient's present level of wellness, changes in life patterns, sociocultural role, and mental and emotional reactions to illness.

nursing intervention: Any action by a nurse that implements the nursing care plan or any specific objective of the plan.

nursing process: Systematic problem-solving method by which nurses individualize care for a patient. The five steps of the nursing process are assessment, diagnosis, planning, implementation, and evaluation.

nursing-sensitive indicators: Indicators that reflect the structure, process, and outcomes of nursing care. Structure indicators measure aspects of the supply, skill level, and education and certification of nursing staff. Process indicators measure aspects of nursing care such as assessment, intervention, and registered nurse job satisfaction. Nursing-sensitive patient outcome indicators (e.g., pressure ulcers, falls, and intravenous infiltrations) are those that improve with a greater quantity or quality of nursing care.

objective data: Data relating to a patient's health problem that are obtained through observation or diagnostic measurement.

outcome indicators: Condition of a patient at the end of treatment, including the degree of wellness and the need for continuing care, medication, support, counseling, or education.

patient: A person who is receiving or has received healthcare, including the deceased.

patient medical record: Written form of communication that permanently documents information relevant to healthcare management.

plan of care: A comprehensive outline of the components of care that need to be addressed to attain expected outcomes.

Precision medicine: Treatment selected for a patient based on their genetic makeup, environment, and lifestyle

privacy: A condition of information about aspects of a person's life over which they claim control and may wish to exclude others from knowing about; may be upheld by laws.

problem-oriented medical record: Method of recording data about the health status of a patient that fosters a collaborative

problem-solving approach by all members of the healthcare team.

protocol: A set of rules governing a required process or procedure.

reimbursement: Payment for services rendered to a patient by a third-party payer, such as Medicare, Medicaid, managed care organizations, or insurers; depends on individual fee schedules, laws, and policies of each third-party payer.

responsibility: Carrying out duties associated with a particular role.

review of systems (ROS): A systematic method for collecting data on all body systems.

risk management: Process used to monitor and improve the quality of healthcare through prevention of injuries by monitoring healthcare equipment and through early, prompt identification of negligent injuries by healthcare providers.

scope of practice: The nursing diagnosis and treatment of human responses to health and illness, defined by the knowledge base of the nurse, the role of the nurse, and the nature of the patient population within the practice environment.

SOAP(IER) notes: A method of charting that documents the subjective findings, objective findings, nursing assessment, and planned nursing interventions. In some cases, interventions, evaluations, and revisions are also included.

standard: Measure or guide that serves as a basis for comparison when evaluating similar phenomena or substances.

standardized care plan: Plan based on an institution's standards of nursing practice that is preprinted; established guidelines used to care for patients who have similar health problems.

standards of care: The minimum level of care accepted to ensure high-quality care of patients.

standards of practice: Serve as the framework for statements about competency levels and form the basis for outcomes for education and standards for the delivery of nursing care.

standing orders: Written and approved document containing rules, policies, procedures, regulations, and orders for the conduct of patient care in various stipulated clinical settings.

subjective data: Data relating to a patient's health problem described in the patient's own words.

telehealth: The provision of healthcare remotely by means of telecommunications technology. May also be referred to as virtual care.

The Joint Commission: A not-for-profit, independent organization dedicated to improving the quality of healthcare in organized healthcare settings.

timely documentation: Documentation that is recorded shortly after observation, intervention, or evaluation of a patient.

triage: A process by which a group of patients is sorted according to their needs for care. The kind of illness or injury, the severity of the problem, and the facilities available govern the process.

twenty-four-hour patient care record: A documentation method that consolidates the nursing record into a system that accommodates a 24-hour period.

U.S. Department of Health and Human Services (HHS): The federal agency in charge of Medicaid and Medicare programs.

variance: An event that occurs during patient care and that differs from what is predicted. Variances or exceptions are interventions or outcomes that are not achieved as anticipated. Variance may be positive or negative.

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DOCUMENTATION IN THE ELECTRONIC AGE FOR NURSES

Self-Assessment Answers and Rationales

1. The correct answer is A.
Rationale: Vital signs are discrete data that can be trended and/or graphed.

2. The correct answer is C.
Rationale: Charting by exception assumes that only findings that are out of the normal range are documented.

3. The correct answer is D.
Rationale: Following a concussion, tolerance of activity and pain management are monitored. Patient education and discharge instruction are all part of the plan of care.

4. The correct answer is C.
Rationale: Documentation of medication administration is required for all patients regardless of method of documentation.

5. The correct answer is A.
Rationale: Clinical decision support with eMAR and BMV revealed a potential wrong dose, need for recording of the pain scale and reassessment.

6. The correct answer is D.
Rationale: The online medication administration record can be viewed on any device and presents with medication times due and medications times given. Documented data can be trended.

7. The correct answer is C.
Rationale: Clinical decision support can prompt the user of required information or provide available information to assist in decision making.

8. The correct answer is B.
Rationale: While reflex ordering does add value by eliminating the need to order additional tests, ordering is not considered documentation.

9. The correct answer is D.
Rationale: Each of these can eliminate the need for redundant or duplicative documentation.

10. The correct answer is B.
Rationale: When documenting a patient's own words, it is important to do this verbatim and include in a narrative note.

Management of Anxiety and Depression for Healthcare Professionals

3 Contact Hours

Release Date: July 28, 2021

Expiration Date: July 28, 2024

Faculty

Karen S. Ward, PhD, MSN, RN, COI, received BSN and MSN degrees in psychiatric-mental health nursing from Vanderbilt University and a PhD in developmental psychology from Cornell University. She is a professor at the Middle Tennessee State University School of Nursing, where she has taught in both the undergraduate and graduate programs. Dr. Ward's work has been published in journals such as Nurse Educator, Journal of Nursing Scholarship, Journal of Emotional Abuse, and Critical Care Nursing Clinics of North America. She has also presented her work at local, regional, and international conferences. Dr. Ward's research interests include child and adolescent maltreatment, mental health, and wellness issues (stress and depression), leadership variables, and survivorship.

Karen S. Ward has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Debra Rose Wilson, PhD, MSN, RN, IBCLC, AHN-BC, CHT, received an MSN in holistic nursing from Tennessee State University School of Nursing and a PhD in health psychology with a focus in psychoneuroimmunology from Walden University. She has expertise in public health, psychiatric nursing, wellness, and disease prevention. In addition to being a researcher, Dr. Wilson has been editor of the International Journal of Childbirth Education since 2011 and has more than 150 publications with expertise in holistic nursing, psychoneuroimmunology, and grief counseling. Dr. Wilson has a private practice as a holistic nurse and is an internationally known speaker on stress and self-care. Dr. Wilson was named the 2017-2018 American Holistic Nurse of the Year. She is on the faculty at both Austin Peay State University School of Nursing and at Walden University.

Debra Rose Wilson has disclosed that she has no significant financial or other conflicts of interest pertaining to this course.

Reviewer: Cindy Parsons, DNP, ARNP, BC, is a Psychiatric Mental Health Nurse Practitioner and educator. She earned her Doctor of Nursing Practice at Rush University, Illinois and her Nurse Practitioner preparation from Pace University, New York. Dr. Parson's is an Associate Professor of Nursing at the University of Tampa and maintains a part-time private practice. She is board certified as Family Psychiatric Nurse Practitioner and a Child and Adolescent Psychiatric Clinical Specialist and her areas of specialization are full spectrum psychiatric mental healthcare with a focus on family systems, community health and quality improvement. Dr. Parson's currently serves as the chair of the QUIN council, is the membership chair for the Florida Nurse Practitioner Network, and in 2009, she was inducted as a Fellow of the American Association of Nurse Practitioners.

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

Course overview

Mood disorders are common and often mistreated. The purpose of this course is to help healthcare workers in their treatment of patients with mood disorders such as anxiety, depression, and bipolar disorder, and to provide patients with access to treatment options. The treatment of mood disorders includes therapy and medication. This course helps to prepare healthcare professionals to differentiate the various mood disorders patients are exhibiting and their causes, identify risk factors for these disorders, recommend treatment options, provide a calm and supportive environment for patients, explore holistic considerations, and use evidence-based complementary therapies to assist patients.

Learning objectives

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

- Examine the possible causes and precipitating events of anxiety in patients.
- Evaluate the different levels of anxiety in patients.
- Apply evidence-based healthcare interventions for patients with anxiety.
- Differentiate the theories of causation and risk factors associated with depressive and bipolar disorders.
- Implement healthcare interventions commonly used with patients experiencing depressive and bipolar disorders.

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

Lisa Simani, APRN, MS, ACNP

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

It is common for patients to experience some anxiety about their health status. The need for hospitalization creates stress for everyone. Each patient experiences anxiety and responds to it uniquely. When patients have difficulty coping with their level of anxiety, certain strategies can help them reduce it by maximizing their coping abilities and using other stress reduction techniques (Halter, 2018; Townsend & Morgan, 2017). Both psychological and physical stress can precipitate feelings of anxiety. These feelings may be coped with in a variety of ways, or they may be overwhelming. When they are overwhelming, the person's coping mechanisms may be insufficient to manage the anxiety.

Depressive and bipolar disorders are general categories for illnesses that influence behavior, mood, and thoughts and are classified as mood disorders. They affect the way people eat and sleep, the way people feel about themselves, and how they think. Mood disorders are considered relatively common (Halter, 2018). Although almost everyone has periods of sadness and joy, people who have experienced major depression, such as bipolar, know that it is much more than "the blues." For people with bipolar, the other end of the spectrum, known as mania, is more than just being really happy. These disorders can be detrimental to patients and often are treated with therapy and medication.

Healthcare Professional Consideration: Healthcare professionals who are not used to dealing with patients experiencing high levels of anxiety may begin to feel anxious themselves as they interact with these individuals. In fact, the healthcare professional may become anxious simply as a result of trying to calm an extremely anxious patient. If this begins to happen, remembering that interaction with a patient who is anxious can cause anxiety symptoms is helpful. If that does not work, asking another clinician to care for the patient for a while is prudent behavior. If the healthcare professional is anxious, the patient will sense the healthcare professional's anxiety, and the situation will escalate. Healthcare professionals should feel comfortable asking for help from one another when caring for patients with anxiety (Rasheed et al., 2019).

CAUSES AND PRECIPITATING EVENTS OF ANXIETY

Almost everyone experiences dread and fear of the unknown at one time or another. Often the specific cause of anxiety and the precipitating events that lead to it may be unclear or unknown. Anxiety is generally related to situational, maturational, or other factors related to the patient's basic needs for food, air, comfort, and security. When these feelings escalate, the individual often experiences moderate or higher levels of anxiety.

As people go through maturational stages and their required role changes as part of normal growth and development, psychological disequilibrium can occur. Adolescence, marriage, parenthood, career changes, and retirement are examples of maturational turning points that might trigger a crisis (American Psychological Association, 2016).

Changes to a person's status are generally perceived as stressful. The event can be negative (an illness) or positive (the 1st day at a new job). These events and feelings may culminate in a crisis when a person's normal coping mechanisms fail, and they can no longer cope effectively with day-to-day tasks (Halter, 2018; Townsend & Morgan, 2017).

Situational crises may be related to a specific external event that causes the loss of a person's psychological equilibrium. Examples are the death of a significant other, divorce, school problems, and illnesses. A hospital admission is a stressful event in most cases and can often cause a crisis (International Society of Psychiatric-Mental Healthcare professionals, 2020). The precipitating stressors are different for each person. Having an illness diagnosed or being injured can provoke an identity crisis. In addition to coping with the fear of the disease or injury itself, people who are ill or injured may have to change their views of themselves.

Healthcare Professional Consideration: If a patient is having difficulty dealing with stressful situations and anxiety begins to be a common symptom, there are many coping strategies that the healthcare professional might suggest. Physical activity, particularly in the form of a regular exercise program, is helpful for stress management and provides significant health benefits. Walking, swimming, yoga, and biking are a few examples of activities that require movement. Patients should be encouraged to find something they enjoy and can continue with on a regular basis. Hobbies are also useful in combating stress. Regular participation in activities such as baking, photography, art of various kinds, scrapbooking, gardening, and many more all provide relaxation and a time to focus on something the person enjoys. Many times, there are community groups made up of people who are all interested in the same hobby. Attending meetings with like-minded people provides socialization, which can also benefit someone who is anxious.

Evidence-based practice! Just by surfing the Web, individuals can research and learn about their health conditions without consulting any healthcare provider. Researchers wondered if these Web searches were beneficial or harmful (Brown et al., 2019). Their findings were dependent on the individuals and how high their "health anxiety" was. For some people with high health anxiety, looking on the Internet caused an increase in anxiety. For others, anxiety was lowered as a result of the search. Another factor the researchers considered was how easy it was for the individuals to access their personal healthcare providers. Those with easy access were less likely to have increased anxiety after an Internet search. These findings point out how important it is to help healthcare consumers understand which sites are reliable and how best to use the information available.

LEVELS OF ANXIETY

How anxiety affects a person's abilities varies with the level of anxiety experienced (Table 1). Four levels of anxiety are generally recognized (Halter, 2018; Townsend & Morgan, 2017). They range from mild anxiety to panic. Some anxiety is good for people because it serves to motivate them to action. When patients experience mild anxiety, their perception and attention are heightened, and they can learn. However, if patients' anxiety is at the panic level, they cannot learn and are unable to function (American Psychological Association, 2016). High levels of anxiety in patients may also cause anxiety in healthcare professionals (See Table 1).

Table 1. Levels of Anxiety

Level of anxiety	Changes in cognition, perception, and tension	Effects on learning
1. Mild	• Seemingly heightened sensory input • Increased alertness • Attentive • Slight muscle tension	• Logical problem-solving skills • Able to achieve and succeed in specific tasks • Can solve problem that is causing anxiety
2. Moderate	• Narrowed perception • Misperception of stimuli • Reduced ability to communicate • Difficulty in concentrating • Increased nervousness and tension • Moderate muscle tension • Increased pulse, blood pressure, and respiration	• Some coping skills are still functional • Can follow directions • With some help, the anxiety can be dealt with successfully
3. Severe	• Narrowed perceptual field • Distorted perceptions • Disoriented • Focused on the short term • Shortened attention span • Physical discomfort, if present, adding to a sense of emotional discomfort • Delusions with hallucinations if anxiety is prolonged • Extreme muscle tension	• Ineffective reasoning • Ineffective problem-solving skills • Difficulty focusing on problem solving even with assistance

Table 1. Levels of Anxiety (continued)		
Level of anxiety	**Changes in cognition, perception, and tension**	**Effects on learning**
4. Panic	• Disorganized perceptions • Feelings of being overwhelmed, being out of control, and terror • Unfocused, random, fleeting, irrational, and incoherent thoughts • Severe cognitive impairment	• Inability to learn • Disorganized or irrational reasoning or problem solving • Difficulty with minimal functioning • Unable to reduce anxiety or solve the problem • Cannot function at this level for long periods

Levels of Anxiety. (2021). The Recovery Village Drug and Alcohol Rehab. https://www.therecoveryvillage.com/mental-health/anxiety/related/levels-of-anxiety/

Box 3-1. Anxiety Is Contagious

Healthcare professionals who are not used to dealing with patients who are experiencing high levels of anxiety may begin to feel anxious themselves as they interact with these individuals. In fact, the healthcare professional may become anxious simply as a result of trying to calm an extremely anxious patient. If this begins to happen, remembering that interaction with a patient who is anxious can cause anxiety symptoms is helpful. If that does not work, asking another clinician to care for the patient for a while is prudent behavior. If the healthcare professional is anxious, the patient will sense the healthcare professional's anxiety, and the situation will escalate. Healthcare professionals should feel comfortable asking help from one another when caring for patients with anxiety.

Anxiety Is Contagious. Here's How to Contain It. (2021). Harvard Business Review. https://hbr.org/2020/03/anxiety-is-contagious-heres-how-to-contain-it

It is important for healthcare professionals to accurately assess their patients' anxiety levels, respond accordingly (Halter, 2018; Townsend & Morgan, 2017), and understand that there are effective treatment options (Anxiety and Depression Association of America, 2016).

Case study 1

Judy Norris, a 45-year-old woman, came to the outpatient clinic complaining of difficulty breathing and feeling incredibly nervous. She said her nerves were out of control and that she needed help immediately. When the healthcare professional began the preliminary interview, she asked Judy if there was anything different happening in her life at this time. Judy said she wanted treatment right away because she had a job interview the next day and did not want to mess it up.

Self-Assessment Quiz Question #1

Which response by the healthcare professional would be the most therapeutic?

a. "It sounds like this interview must be very important to you."
b. "Where is your interview?"
c. "Oh, I don't think you will mess it up."
d. "Perhaps the physician can prescribe something to help you."

Case study 2

Judy tells the healthcare professional that it is an important interview for her. It is with a larger company than she currently works for. Her responsibilities would be expanded, and her pay would be significantly higher. The best part about this potential new job to Judy is that she could really use all of her skills in a meaningful way; she calls it her dream job. As she talks about the job, the healthcare professional notices that Judy has already calmed down significantly. She is able to communicate her thoughts in a coherent fashion, and she is having no difficulty breathing.

Self-Assessment Quiz Question #2

What level of anxiety is Judy experiencing while talking to the healthcare professional?

a. Mild.
b. Moderate.
c. Severe.
d. Panic.

PHYSIOLOGICAL RESPONSES

In addition to the many emotional changes that happen when a person is feeling anxious, several physical signs and symptoms may occur. As an individual begins to experience anxiety, the body starts a process commonly known as "fight or flight." Hormonal responses are stimulated to provide protection to the individual by physiologically programming the body to give priority to those functions that are the most necessary. Briefly, the hypothalamus sends adrenocorticotrophin-releasing hormones to the pituitary gland, which in turn secretes adrenocorticotropic hormones. From there, adrenaline and cortisol are released by the adrenal and sub adrenal glands. The physical effects that individuals with anxiety experience are the result of the accelerated production of these hormones on the body (Jameson, 2016). These effects are generally negative and may include the following:

- Abdominal distress
- Chest pain or discomfort
- Choking or smothering sensations
- Cold, icy hands
- Diaphoresis
- Dizziness
- Dry mouth
- Dyspnea
- Elevated blood pressure
- Faintness
- Frequent urination
- Headaches

- Increased respiratory rate
- Insomnia
- Nausea
- Palpitations
- Queasiness
- Restlessness
- Tachypnea
- Trembling
- Voice tremors

Case study 3

Penny, a healthcare supervisor for a large hospital unit, had a discussion with Anna, the head of continuing education at the hospital, about why the staff seemed to pay little attention during in-services and had mediocre performance on the final testing. Although coming to the in-service itself was mandatory, the healthcare professionals received credit for attending regardless of their final test scores, as long as they turned in a testing form.

Self-Assessment Quiz Question #3

What level of anxiety are the staff healthcare professionals most likely experiencing regarding their mandatory in-services and the tests?

a. Mild.
b. Moderate.
c. Severe.
d. None.

Case study 4

Both Penny and Anna agreed that there should be some consequence attached to the test performance at the in-services, if only to motivate the staff to pay closer attention and to do better on the tests.

Self-Assessment Quiz Question #4

What anxiety level would Penny and Anna want to see in the healthcare professionals attending the in-service?

a. Mild.
b. Moderate.
c. Severe.
d. Panic.

DIAGNOSTIC ASSESSMENT

The following are the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5) diagnoses and the North American Healthcare Diagnosis Association (NANDA) healthcare diagnoses that might be applicable to patients with emotional or psychological issues related to anxiety. Of course, circumstances may warrant additions to the list of diagnoses for any specific patient, but those listed here are likely for anyone experiencing anxiety symptoms or disorders.

DSM-5 psychiatric diagnoses

The psychiatric disorders generally associated with anxiety are as follows (American Psychiatric Association, 2013):

- Specific phobia (marked fear or anxiety about a specific object or situation)
- Generalized anxiety disorder (symptoms of anxiety present for at least 6 months with extensive worry but without panic attacks)
- Panic disorder (repeated experiences of terror, feelings of impending death, inability to breathe comfortably), with or without agoraphobia (marked fear or anxiety of being in open spaces or enclosed places)
- Substance/medication-induced anxiety disorder (symptoms of panic attacks or anxiety develop during or soon after a substance intoxication or withdrawal or after exposure to a medication)

NANDA healthcare diagnoses

The possible NANDA healthcare diagnoses may include one or more of the following (Herdman & Kamitsuru, 2018):

- Anxiety (e.g., mild, moderate, severe, panic)
- Decisional conflict
- Deficient knowledge
- Confusion (e.g., acute, chronic)
- Coping (e.g., ineffective, readiness for enhanced, compromised family, defensive)
- Fear
- Ineffective coping
- Impaired memory
- Post-trauma syndrome or risk
- Powerlessness
- Ineffective role performance
- Health-seeking behavior
- Self-care deficit
- Self-esteem (e.g., chronic low, situational low, risk for low)
- Disturbed sleep pattern
- Impaired Social interaction
- Social isolation
- Spiritual distress, risk; readiness for

HEALTHCARE INTERVENTIONS

Healthcare professionals can help patients cope effectively with mild or moderate anxiety by having them use (a) strategies that have been helpful in the past and (b) other problem-solving methods as needed. Patients who are experiencing severe anxiety or panic need help coping and reducing their level of anxiety so that their problem-solving abilities can be effective. It is important for the healthcare professional to remain calm.

Possible healthcare interventions (along with their rationales) that may be appropriate for patients who are experiencing anxiety are listed in Table 2.

Table 2. Healthcare Interventions and Rationale for Patients Who Are Experiencing Anxiety	
Healthcare Intervention	**Rationale**
Establish trust, maintain a calm demeanor, and be nonthreatening.	To be effective with healthcare interventions, establish a trusting relationship with the patient. Additionally, it is well known that anxiety is contagious. A patient's anxiety can affect the healthcare professional and other staff members and vice versa. Maintain a calm demeanor to comfort the patient.
Reassure patients of their safety and security. Staying with the patients, just by being there, can provide comfort.	Patients may be experiencing a threat to their physical well-being or self-concept.
Communicate in a calm and clear manner with a succinct message and simple language, particularly when the patients have a high level of anxiety.	When their anxiety levels are high, patients may be unable to comprehend at their usual level of awareness.
Explore the patients' perception of harm and assess the actual potential danger.	Clarifying the reality of the situation and assisting with the patients' coping mechanisms can reduce the patients' anxiety level.
Decrease external stimuli by dimming lights, lowering background noise, and limiting the number and frequency of visitors.	External stimuli can increase anxiety levels.
Encourage verbalization.	By talking through some events and precipitating factors, patients can • gain insight into the precipitating factor, • gain insight into their manner of coping with the anxiety itself, • enact new strategies for coping, and • verbalize the problem.
Assist patients with skills they currently cannot use because of their anxiety.	When anxiety is especially high, usual tasks are more difficult, and learning new tasks is harder.
When the patients' anxiety level has been reduced, explore the precipitating events that led to anxiety.	A recurrence of anxiety may be prevented or reduced in severity when the patients can recognize its early signs and begin using strategies to reduce it.
Teach patients to identify and describe feelings of anxiety.	When patients understand their experience of anxiety, they can • recognize the early signs and symptoms, • perhaps reduce the level of or thwart the episode, and • be receptive to adopting new coping responses.
Demonstrate and review available anxiety-reducing techniques, and help patients choose techniques and strategies to reduce their anxiety levels. These include • relaxation techniques (e.g., breathing techniques, visualization, muscle tension reduction), • physical exercise, • meditation and yoga, • occupational activity, and • diversional activity.	By reducing the level of anxiety, restoration of homeostasis is more obtainable.
Include the patient in setting goals and planning care.	Allowing patients a choice increases their chances of success, their independence, and, therefore, their self-esteem.
Administer anxiolytic medications as prescribed, assess the need for medications to be given as needed, assess the effectiveness of the drug, and monitor the patient for potential adverse side effects.	Antianxiety medications prescribed for short-term use can reduce the patients' anxiety.
Teach the patients about the self-administration of anxiolytic medications.	The patients may benefit from anxiolytic medications and then continue taking them as outpatients.
Assess the patients' mood and observe for signs of depression and any possible suicidal ideation. If present, notify the patients' physician and refer for ongoing psychiatric treatment.	Severe anxiety can coexist with depression.
Teach the importance of sleep.	Sleep deprivation reduces the ability to cope with anxiety.
Encourage the patients to reduce caffeine intake.	Caffeine intake can induce higher levels of anxiety because it potentiates the fight-or-flight response, increasing heart rate, dilating pupils, and increasing feelings of jitteriness.
Teach strategies to quit smoking.	Having a cigarette may reduce the sense of anxiety for a short time, but this is because withdrawal symptoms are briefly quieted. Nicotine has anxiety-producing qualities.
National Center for Complementary and Integrative Health [NCCIH], 2016	

Table 3. Part of a Care Plan for a Patient with Anxiety	
Problem / Healthcare Diagnoses	The patient has anxiety related to change in body image as evidenced by tension, verbalized, and demonstrated helplessness, verbalized fear, uncertainty, expressed concerns, grimacing, perspiration, sobbing, and irrational behavior (e.g., pulling at intravenous line, shouting).
Treatment Plan / Approaches	1. Assess level of anxiety. 2. Establish therapeutic relationship. 3. Offer appropriate interventions on the basis of level of anxiety. ● Mild anxiety: Listen to the patient and redirect activities. ● Moderate anxiety: ○ Consider as-needed medications if prescribed. ○ Offer a choice between two things. ○ Try to decrease stimuli. ○ Offer an opportunity for physical activity. ○ Use a matter-of-fact approach. ● Severe anxiety: Ask a patient-care technician to stay with the patient or check on the patient often. 4. Help the patient recognize feelings and describe what preceded them. If possible, connect the feeling to the unmet need; describe the patient's behavior and connect it to the anxiety.
Colibri Healthcare, LLC, 2021.	

Healthcare Professional Consideration: Sometimes a patient is extremely anxious and unable to communicate successfully with a healthcare professional who is sitting and trying to have a face-to-face discussion. Such a situation might warrant trying an unconventional approach. One possibility is to try working a puzzle together. There are several reasons this might work:

1. Some silence would be expected while both parties are concentrating on finding pieces to the puzzle.
2. Conversation can initially be confined to comments about the puzzle itself.
3. The patient can be reinforced when a piece is successfully placed.
4. Verbal exchanges are nonthreatening as there is no eye contact because the healthcare professional and patient are both looking at the puzzle.

HOLISTIC CONSIDERATIONS

Today's healthcare professionals are encouraged to use evidence-based complementary therapies in the care of patients with anxiety. Guided imagery is a tool that healthcare professionals can use to assist patients who are anxious (National Center for Complementary and Integrative Health [NCCIH], 2016). Guided imagery involves using mental images to calm oneself, reduce the stress response, reduce pain, or blood pressure, and promote sleep. This relaxing visualization has been found to enhance healing and physical health in numerous studies. The power of the mind over biology is studied in the field of psychoneuroimmunology and is relevant to many disciplines besides healthcare; for example, athletes who use visualization techniques are known to improve performance. Psychologists teach patients these techniques to reduce panic attacks or phobic reactions. However, guided imagery is not recommended for people who are hallucinating or any break with reality (NCCIH, 2017).

To use guided imagery with a patient, the healthcare professional should ask the patient to recall a calm and safe place. Instructing the patient to begin with some slow breaths and lower or close their eyes, the healthcare professional should guide the patient to breathe mindfully. In a calming voice, the healthcare professional should describe what the patient might see, feel, smell, taste, or hear in this environment. With attention to each of the senses, it is easier for the patient to experience and remember that safe, calm place and begin to relax. Guided imagery scripts and recordings are available online to assist the healthcare professional in gaining competence with this practice.

Evidence-based practice! Many researchers are attempting to find scientific support for the use of alternative and complementary therapies. One area that has received a great deal of interest is in the use of aromatherapy. Essential oils have been used throughout history and in many different cultures to relieve pain, promote sleep, and reduce anxiety. Until recently, there was little evidence to support their use. A study conducted by a team of researchers (Lindgren, 2019) in a community magnet hospital was able to provide support for the use of essential oils in helping patients with anxiety and pain. It found that treating patients with a combination of essential oils (frankincense, blue cypress, lavender, and melaleuca) reduced anxiety and pain more than just the administration of medications. Such findings will assist with treatment planning for patients with anxiety.

Case study 5

Roberto Torres is a 22-year-old male patient who was admitted to the orthopedic unit of a general hospital with a fractured femur, an injury that occurred while he was playing football. It is the first time he has had a serious injury. Roberto recently had surgery to treat his injury, and his left leg is in a cast. He has an intravenous line and a urinary catheter in place. He is a big man and seems uncomfortable being confined to the hospital bed. He has a prescription for pain medication that does not seem to be meeting his needs for pain relief. The night healthcare professional reported that Roberto slept poorly and complained often.

Twenty-four hours after Roberto's surgery, his healthcare professional, Katrina Park, notices that he is extremely restless. He calls for Katrina often because of minor complaints and seems to want a healthcare professional to attend to him constantly.

When Katrina answers Roberto's call light once again, she finds him crying and difficult to console. She approaches him, and he startles her by jumping upright in the bed, pulling at his intravenous line, and shouting some obscenities. Then he yells, "You just don't get it! This is driving me crazy!"

Self-Assessment Quiz Question #5

What level of anxiety is Roberto experiencing at this point?

a. Mild.
b. Moderate.
c. Severe.
d. Panic.

DEPRESSIVE AND BIPOLAR DISORDERS

Depressive and bipolar disorders are general categories for illnesses that influence behavior, mood, and thoughts and are classified as mood disorders. They affect the way people eat and sleep, the way people feel about themselves, and the way people think. According to the American Psychiatric Association's (2013) Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5), these disorders may be characterized by (a) sadness, social withdrawal, guilt, and the expression of self-deprecating thoughts (depressive symptoms); (b) an elevated, expansive mood that includes hyperactivity, pressured speech, decreased need for sleep, poor judgment, and impaired impulse control, lasting most of the day every day for at least a week (mania); or (c) a combination of both. On either end of a continuum, from a mood so "up" that normal social and economic boundaries are forgotten to one so "down" that an individual is at risk for suicide, mood disorders include a spectrum of diagnostic categories and varying degrees of risk to the individual.

A specific diagnosis and appropriate interventions are naturally dependent on what the patient reports. The severity of the symptoms influences the determination of a diagnosis, the patient's desire for treatment, and the risk for suicide. Although patients often seek help during the depressive episode of a bipolar disorder, they frequently do not recognize that the times of high energy and excessive behavior are problematic. Specific criteria for these disorders are listed in the DSM-5. North American Healthcare Diagnosis Association (NANDA) healthcare diagnoses also vary for these illnesses, depending on the particular situation and symptom presentation (Herdman & Kamitsuru, 2018). Learning to recognize the symptoms and conduct a risk assessment for patients experiencing mood disorders is important for healthcare professionals in all healthcare settings.

PREVALENCE

Given the many different ways mood disorders can manifest in individuals experiencing them, they are considered relatively common (Halter, 2018). Although almost everyone has periods of sadness and joy, people who have experienced major depression know that it is much more than "the blues." At the other end of the spectrum, mania is more than just being really happy. Because of its frequency and potential risk to life, depression is often discussed as part of news coverage in the media or through storylines on popular television shows, and it is featured in advertisements for antidepressant medications. Because patients may exhibit any of the potential behavioral patterns, healthcare professionals should be aware of the other types of mood alterations as well.

Depression is poorly recognized and underdiagnosed. It is among the most treatable of psychiatric illnesses, with estimates that as many as 80% (and possibly more) of depressed patients respond positively to treatment consisting of "talk" therapy, antidepressants, or a combination of these (Mayo Clinic, 2018b). Depression is the most common mental disorder in the United States (National Institute of Mental Health [NIMH], 2019). However, depression is often mistakenly labeled as some other condition and therefore is not treated appropriately.

When patients describe their situation with words such as "sad," "hopeless," "nothing to live for," and "despair," they are indicating depression on some level. The healthcare professional should be alert for other assessment data that can confirm a mood disorder. Major depressive disorder is an alteration in mood – a disturbance in a person's feelings marked chiefly by sadness, apathy, and loss of energy – that makes it almost impossible to carry on usual activities, sleep, eat, or enjoy life (National Institute of Mental Health, 2016). Correct diagnosis is critical to initiating appropriate treatment and preventing the patient from sinking deeper into depression and, perhaps, attempting suicide.

Healthcare Professional Consideration: While conducting an initial assessment of a patient, intake healthcare professionals may become unusually tired and worn out and begin to feel that they cannot wait to get out of the room of this particular patient. Highly likely, this is a depressed patient. Taking care of patients who are depressed is often frustrating, stress-evoking, and tiring for the healthcare professional. Even if the patient has not described feeling depressed, the healthcare professional should ask the patient about it. Healthcare professionals must learn to trust their intuition when caring for a patient who is depressed. The holistic healthcare professional becomes intentionally self-aware and examines how caring for patients affects the self.

NIMH » Depression. (2021, July 23). NIMH. https://www.nimh.nih.gov/health/publications/depression/?NIMH+symptoms+of+depression=

Self-Assessment Quiz Question #6

A healthcare professional finds herself uncharacteristically snapping at a coworker. The healthcare professional should:

a. Take a deep breath and keep going.
b. Realize it is the coworker's fault.
c. Be mindful of her present mood and examine what might have triggered it.
d. Think mindfully about it before she goes to sleep that night.

Suicide is a serious problem and its connection with depression is strong; all depressed patients should be assessed for suicidal ideation. Contrary to common myth, asking a person if they are considering suicide will not put the idea into their head. If the healthcare professional suspects that a patient is contemplating taking their life, a thorough assessment needs to take place immediately.

Depression is a biological illness affecting individuals all over the world. It is a leading cause of disability in the United States and many other developed countries (Mayo Clinic, 2018b), although rates are often difficult to determine because of underdiagnosed and misdiagnosed cases. A depressive episode can occur once in a lifetime, or, as with many people, depression can recur several times. The most serious consequence of depression is

suicide, but there are many other consequences that influence social connections, general health, and well-being.

In the United States, 7.1% of all adults are diagnosed with depression, but many do not seek diagnosis and treatment. The prevalence of depression has not increased significantly since 2001 in the United States. Only 34.17% of persons with severe depression were diagnosed by a health professional. Although more people are receiving medical diagnosis and treatment than previously, symptoms reported remain severe, even with treatment (Mental Health America, 2017). Major depression affected an estimated 16 to 19 million adults aged 18 or older in the United States who had reported at least one major depressive episode in the past 12 months (Mental Health America, 2017; Substance Abuse and Mental Health Services Administration, 2020).

Depression is common in older adults and often goes undiagnosed. In fact, depression is the most common mood disorder in older adults. Estimates of depression among those older than 65 years range from 5% to 20% and perhaps higher (Centers for Disease Control and Prevention [CDC], 2016b; Mental Health America, 2017; NIMH, 2017). Depression is not part of normal aging. Older adults are at increased risk because they often have other chronic health conditions or are taking medications that contribute to the incidence of depression (Mental Health America, 2017; NIMH, 2017). Treatment for depression in older adults is often overlooked because of the false belief that depression is normal. Healthcare professionals should screen older adult patients for depression. If an older adult makes the decision to commit suicide, the rate of successful suicide on first attempt is much higher than in other age groups (Mental Health America, 2017).

Depression and suicide are also growing problems among youth. According to 2017 data, depression (low level and major depression) has been diagnosed in approximately 11.2% of 13- to 18-year-old adolescents in the United States (Child Stats .gov, 2020). Teenage girls have higher rates of depression than boys (Mental Health America, 2017). It is estimated that between 3.3% and 11% of the adolescent population has been diagnosed with major depressive disorder (NIMH, 2017). Suicide is now the leading cause of death for the 10- to 34-year age group (NIMH, 2021).

Younger children (aged 12 years and younger) can also be diagnosed with depression, and the rates of depression in undiagnosed children are not known. It is estimated that approximately 5% of young children suffer from depression, although most are undiagnosed (American Academy of Child and Adolescent Psychiatry, 2018). Healthcare professionals should be especially alert for signs of depression in young children, knowing that they may not be as easily diagnosed. Obesity in children is on the rise and is associated with higher rates of depression (Ogden et al., 2016). Even young children are not immune to the potential for major depression.

Bipolar disorder (formerly known as manic depressive illness) is characterized by an alternating pattern of emotional highs (mania) and lows (depression); the disorder can range from mild to severe. An epidemiological study in 2005 estimated that 3% to 5% of the population has bipolar disorder (NIMH, 2017). It often begins in adolescence or early adulthood and may persist for life. Although it is not nearly as common as depression, bipolar disorder can also have life-altering effects. For example, in the manic phase, patients can deplete their life savings; then, as they plunge into depression, suicide becomes a risk. There may or may not be periods of normalcy that provide relief from this cyclical disorder. The cycles from mania to depression often become more rapid as the disease progresses. As with depression, bipolar disorder is seen in all age groups and appears more severe for younger patients. As with all mental health problems, early diagnosis, effective treatment, and careful monitoring are extremely helpful.

THEORIES ON CAUSATION

Different investigators have different opinions about the causes of depressive and bipolar disorders. There is no doubt, based on the past decade of research, that depression and bipolar illness are brain-based disorders caused by complex interactions between many biochemical, genetic, cognitive, behavioral, and environmental sources that affect people from all ages, races, and ethnicities (Depression and Bipolar Support Alliance, 2020). Some psychosocial and biological theories describe the more widely known and accepted causes of depression.

Psychosocial theories

The psychodynamic or psychoanalytic view of depression is that a loss or lack of love when the depressed person was a young child caused conflicting feelings and grief. When these feelings go unresolved, the result may be rage, hostility, bad mood, and anger turned inward. Thus, the person becomes depressed (American Psychoanalytic Association, n.d.).

Cognitive theory suggests that depressive feelings result from faulty thinking, ideas, and beliefs; a distorted view of others; and low self-esteem. When the person's thinking or cognition is corrected through cognitive therapy, the depression is alleviated (APA, 2013).

Interpersonal and environmental theories view depression as the result of a breakdown in communication with family and friends and problems with work, school, and carrying out general activities. Individual, group, and family therapies are used in this context (APA, 2013).

Biological theories

Research indicates that depression may result from variations in levels of the biogenic amines. This theory relates to the catecholamines, dopamine, norepinephrine, and serotonin, and their functioning at receptor sites on brain cells and nerves. There is increasing evidence that supports a chemical connection with depression, although researchers do not yet understand specific pathways that are altered in individuals with depression (Halter, 2018).

Genetic factors also play a role in mood disorders. The prevalence of depressive and bipolar mood disorders is higher among blood relatives than among the general population (Mayo Clinic, 2018a). There is some evidence of a stronger maternal genetic link to depression It has also been shown that the closer the genetic relationship, the greater the likelihood of the diagnosis.

Most recently, a link has been found between inflammation and depression. Patients with depression show slightly elevated C-reactive protein levels in their blood, indicating low-grade inflammation (Osimo et al., 2019). Also, people with chronic inflammatory illnesses seem to have a higher incidence of depression than patients with other chronic illness.

Ongoing scientific research is being conducted in the field of mental illness. Although no definitive cause of depression has been found, more is known about its biological markers, and treatments are being used successfully. Many patients benefit from antidepressant medications, indirectly pointing toward a biological cause. Certainly, more research is needed to pinpoint which medication is best for a particular patient. Right now, to a large extent, healthcare professionals rely on trial and error to discover the most beneficial medication.

RISK FACTORS

Risk factors for depression and bipolar disorders include some physical illnesses that can have a cause-and-effect relationship with depression. Having a chronic illness such as heart disease, stroke, or Alzheimer's disease puts patients at higher risk of developing depression. In these cases, it is necessary to first treat the underlying cause, if possible, to address the depression or other mood disorder (Halter, 2018; National Institute of Mental Health, 2016).

Illnesses

There is increasing evidence that depression is associated with changes in immune functioning. Many inflammatory chronic diseases are associated with high levels of cytokines leading to alterations in immune functioning. These messenger proteins trigger and promote inflammation. Patients with depression have been found to have high levels of cytokines and other inflammation markers. Cytokines and other inflammatory markers provide a link between depression and immune function (Liu et al., 2020). It makes sense that people with inflammatory chronic diseases also have a higher prevalence of depression compared with those who have other chronic diseases.

The prevalence of depression is generally higher in persons who have concomitant medical problems (CDC, 2019, 2016b; Deschênes et al., 2015; Halter, 2018; Kyoung et al., 2015). Table 4 lists some of the medical conditions associated with a higher prevalence of depression.

Table 4. Medical Conditions Associated with Depression

Neurologic Disorders	• Neoplasms • Stroke • Multiple sclerosis • Infection • Trauma • Migraine • Parkinson's disease • Epilepsy • Alzheimer's disease
Endocrine Disorders	• Adrenal disorders • Thyroid disorders • Menses-related disorders • Postpartum disorders
Infectious and Inflammatory Disorders	• Chronic fatigue syndrome • Pneumonia • AIDS • Tuberculosis • Rheumatoid arthritis
Other Medical Disorders	• Vitamin deficiency • Anemia • Cancer (especially pancreatic cancer) • Cardiopulmonary disease • Chronic pain • End-stage renal disease
Non-Mood-Related Psychiatric Disorders That Often Coexist with a Diagnosis of Depression	• Obsessive-compulsive disorder • Panic disorder • Substance-related disorders • Personality disorders • Eating disorders

Based on Centers for Disease Control and Prevention. (2019)/ Depression Statistics. https://www.cdc.gov/nchs/fastats/depression.htm ; Centers for Disease Control and Prevention. (2016a). Children's mental health. Anxiety and depression. https://www.cdc.gov/childrensmentalhealth/depression; Deschênes, S. S., Burns, R. J., & Schmitz, N. (2015). Associations between depression, chronic physical health conditions, and disability in a community sample: A focus on the persistence of depression. Journal of Affective Disorders, 179, 6-13. http://dx.doi.org/; Kyoung, K. W., Dayeon, S., & Won O. S. (2015). Depression and its comorbid conditions more serious in women than in men in the United States. Journal of Women's Health, 24, 978-985. 10.1089/jwh.2014.4919.

Medications

Long-term use of certain medications may cause symptoms of mania or depression in some people. Depression or mania is an idiosyncratic side effect of many medications, including the following (Halter, 2018: National Institute of Mental Health, 2016):
Antidepressants (may precipitate mania)

- Sedatives, tranquilizers, barbiturates, and central nervous system depressants
- Steroids (e.g., glucocorticoids, anabolic steroids)
- Cardiac medications (e.g., antihypertensives and blood thinners)
- Hormones (e.g., oral contraceptives, thyroid medications)

Stress

Stressful life events are difficult for some people, but the same events may not pose problems for others. When assessing patients, the healthcare professional should be aware of the patients' perceptions of their problems as a means of observing for signs and symptoms of depression. Getting a sense of the importance of a situation to the patient is crucial in determining its possible contribution to a depressive episode. Teaching stress management strategies is part of healthcare.

Grief reaction

Depression can be associated with real and imagined loss, such as anything a person valued or once had (or wanted) but is now absent. This includes losing a spouse, parent, child, other family member, or friend to death or even relocation. Situational grieving associated with events such as job loss, divorce, and financial loss commonly are associated with short-term depression. Clearly, some change in mood is considered normal when a loss is experienced, but when it becomes extreme, the patient's condition can turn into long-term depression categorized as bereavement (American Psychiatric Association, 2013; Halter, 2018).

Trauma

Some forms of disaster or physical trauma, such as an accidental injury or a major illness, can precipitate an episode of depression (Wheeler, 2017). Individuals who are injured in a motor vehicle accident and experience residual effects in the form of pain or loss of function may become depressed for some time. As with grief, some degree of sadness or unhappiness is clearly normal, but assessment for depression is in order if symptoms are prolonged.

Postpartum depression

Approximately one in nine women experience postpartum depression (CDC, 2016c). Many more mothers have "baby blues" during the 10-day postpartum period. Baby blues is transient and does not impair functioning. It should not be confused with postpartum depression or postpartum-onset mood episodes (American Psychiatric Association, 2013). It is caused by hormonal shifts or inner psychological conflicts over becoming a mother for the first time or once again (Halter, 2018; National Institute of Mental Health, 2016). Up to one in seven women experience postpartum depression (American Psychological Association, 2020). About half of these women had symptoms during their pregnancy that became worse after the baby was born. Healthcare professionals should encourage patients to report symptoms of depression early, and they should continue to monitor these patients.

Symptoms of postpartum depression generally occur 3 days after childbirth, usually within the 1st week (although they can also manifest much later), and include sleep disturbances, increased anxiety, fatigue, irritability, or negative or ambivalent emotions toward and about the baby. The severity of signs and symptoms varies (Halter, 2018). Perinatal depression, a more widely encompassing term, refers to depression resulting from issues during the pregnancy period through the first 12 months after the baby's birth. Less often, postpartum depression can lead to full-blown psychosis (Halter, 2018). These patients are profoundly depressed and suicidal, hallucinating, or delusional, and have homicidal thoughts or unreal feelings about the child (e.g., that the child is sick or dead). This is not a common problem; it occurs at an estimated rate of 0.89 to 2.6 in 1,000 births (VanderKruik et al., 2017). Because of the brief time new mothers stay in most maternity units and birthing centers, healthcare professionals working on those units may not see the full extent of these disorders.

New mothers may be irritable, anorectic, easily fatigued yet unable to sleep, and tearful. These episodes are usually self-limiting, lasting only a few days. However, these signs and symptoms occur frequently enough to warrant providing the new mother with bedside education about them while she is in the maternity unit. Healthcare professionals working in the community who may see new mothers in their homes 1 week or more after childbirth should be alert to the signs and symptoms of the "baby blues" and its related psychiatric disorder.

Age

An increase in depression has been noted in persons aged 60 years and older. Among older adults, the prevalence of depression is generally twice as high in women compared with men (National Institute of Mental Health, 2016). There has been an increase in the diagnosis of depression in the past 10 years for individuals who are 12 to 18 years of age (American Psychological Association, 2019).

Some of the other high-risk factors for depression include the following:

- Physical illness
- Recent significant loss (e.g., the death of a family member or friend)
- Events such as job loss and subsequent financial problems
- Unhappiness with one's occupation or having no job at all
- Low economic status
- Lack of social networks and social isolation

DIAGNOSTIC ASSESSMENT

Healthcare professionals and other healthcare team professionals conduct psychosocial assessments of each patient whom they encounter. Patients with depression may present with physical or psychological symptoms in various clinical settings. Through empathetic listening, healthcare professionals may uncover symptoms of depression or depressive disorders in patients.

DSM-5 psychiatric diagnoses

The DSM-5 diagnostic categories for symptoms of depression are listed under the two main categories of depressive and bipolar disorders. The healthcare professional may find one of the following psychiatric diagnoses for depressive disorders among the medical diagnoses in the patient's medical record (American Psychiatric Association, 2013):

- Major depressive disorder
- Persistent depressive disorder*
- Unspecified depressive disorder

The ways major depressive symptoms are demonstrated in patients will differ from person to person. To make a diagnosis of major depression, the healthcare provider must determine that a certain number of the following symptoms have been observed within a short time span. All patients must exhibit either one or both of the following (American Psychiatric Association, 2013):

- Depressed mood: feeling sad, empty, hopeless
- Loss of interest or pleasure in usual activities

The patients must also exhibit at least some of these additional indicators (American Psychiatric Association, 2013):

- Disturbance with eating: significant change in weight, a change in amount of food ingested
- Problems with sleep: difficulty falling or staying asleep, sleeping too much or too little, unable to feel rested after sleep
- Constant pacing and/or handwringing; an inability to stay still
- Slowed responses, extreme feelings of tiredness, avoidance of social interaction, and lack of energy
- Feelings of low self-esteem, unworthiness, unnecessary guilt
- Trouble with thinking, distorted thoughts to the point of delusions or hallucinations; cannot concentrate easily
- Obsessing on thoughts of death and/or suicide
- Decreased or absent sex drive

It is important for nonpsychiatric healthcare professionals to be aware of the significance of depression among general hospital

patients. These patients may complain of a variety of physical complaints, such as gastrointestinal problems (indigestion, constipation, and diarrhea), headache, and backache. Additionally, persistent physical symptoms that do not respond to treatment, such as headaches, gastrointestinal disorders, and chronic pain, may indicate depression.

Similarly, the healthcare professional may find one of the following psychiatric diagnoses for bipolar disorders among the medical diagnoses in the patient's medical record:

- Bipolar I disorder
- Bipolar II disorder
- Cyclothymic disorder*

Bipolar I disorder is a disorder in which the person experiences episodes of mania or hypomania (a less intense form of mania) alternating with periods of severe depression. Bipolar II disorder is a different diagnosis that is made when the patient has never had an episode of mania but has shown hypomanic behaviors accompanied by depressive symptoms (NIMH, 2020). The distinction between one of the bipolar categories and major depression can be difficult if the patient presents with only depressive symptomatology (see Table 5). The severity of signs and symptoms in each episode varies from person to person (Mayo Clinic, 2018c).

Table 5. Comparison of Major Depressive Disorder and Bipolar Disorder

Issue of concern	Major depressive disorder	Bipolar disorder
State of mind	Extremely sad, unhappy.	Periodic mood swings between extremely "up" and agitated to extremely sad.
Thought process	Cannot concentrate easily; difficulty with thinking; recall is problematic.	Easily distracted; cannot focus on one thing; racing thoughts; flight of ideas.
Speech pattern	Lack of interest in communicating.	Pressured speech; quick, clipped sentence fragments.
Sleep habits	Significant alterations in sleep patterns; sleeping a lot more than normal or a lot less.	Does not seem to require much sleep.
Energy level	Evidence of less energy.	Abundance of energy; seemingly in constant motion.
Interest in daily activities	Loss of interest in activities previously enjoyed.	Overinvolvement in numerous activities, even ones that are not healthy.
Weight	Changes in weight, either gain or loss.	Probable weight loss because of excessive activity level.
Level of self-esteem	Much lower self-esteem; feelings of unworthiness, guilt, and/or hopelessness.	Exaggerated sense of self.
Suicidal ideation	Frequent thoughts of death and dying; may not have energy to construct a plan.	Possible thoughts of suicide during depressive episodes.

Kempton, M. M. J., PhD. (2011). Structural Neuroimaging Studies in Major Depressive Disorder: Meta-analysis and Comparison With Bipolar. Jama Network. https://jamanetwork.com/journals/jamapsychiatry/fullarticle/1107416

To be diagnosed with mania, the patient has demonstrated an unusually high energy level along with an elevated mood for a week or more. Specific behaviors may include the following (American Psychiatric Association, 2013):

- Has thoughts of self-importance and eagerness to share this with others
- Experiences a seemingly inexhaustible energy level; does not seem to need sleep
- Is very talkative with an apparent "need to talk"; thoughts race from one topic to another
- Easily distracted
- Plans lots of projects to accomplish
- Engages in many various behaviors that are out of character for the individual

NANDA healthcare diagnoses

NANDA healthcare diagnoses for patients with mood disorders may include one or more of the following (Herdman & Kamitsuru, 2018):

- Anxiety (e.g., mild, moderate, severe, panic)
- Coping (e.g., ineffective, readiness for enhanced, compromised family, defensive)
- Grieving (e.g., anticipatory, dysfunctional)
- Hopelessness
- Noncompliance; nonadherence
- Nutrition, altered; more or less than body requirements
- Post-trauma syndrome or risk
- Role performance, ineffective
- Self-care deficit
- Self-esteem (e.g., chronic low, situational low, risk for low)
- Sleep pattern, disturbed
- Social interaction, impaired
- Social isolation
- Violence, risk for other- or self-directed
- Suicide risk

HEALTHCARE PROFESSIONAL INTERVENTIONS

Patients in a general hospital setting may experience a mood disorder. They may be receiving treatment for the disorder before or during their hospital stay. Assessment of suicide risk in these patients is critical. Healthcare interventions for patients who have mood disorders are quite effective in helping the patients maintain a psychosocial balance while in the hospital and perhaps in helping them take steps for ongoing care.

Healthcare professionals who administer care at the bedside can provide valuable assistance to these patients by using some of the healthcare interventions listed in Table 6.

Table 6. Healthcare Interventions and Rationale for Patients with Mood Disorders	
Healthcare intervention	**Rationale**
Be accepting. The patients may have a negative outlook and low self-esteem.	An attitude of acceptance enhances feelings of self-worth.
Be nonjudgmental, develop a trusting relationship, and be open with the patients.	Trust is basic to a therapeutic relationship.
Assess the patients often. Provide a safe environment.	Depressed patients need short, frequent contacts to assure them that they are supported, safe, and attended to, even when they may feel that they are not worth the healthcare professional's attention.
Screen patients for depression by asking: • "During the past 2 weeks, have you felt down, depressed, or hopeless?" • "During the past 2 weeks, have you felt little interest or pleasure in doing things?"	If the patients respond positively to the two questions, the healthcare professional can inform the physician, and the patients can receive appropriate treatment for depression.
Assess the patients for suicidal ideation and initiate safety checks and procedures as needed.	Patients with depression may have suicidal feelings and thoughts. They may need protection from harm.
Assess the patients for any indications of a thought disorder.	Some patients with depression have accompanying psychotic thoughts.
Assess the patients' ability to perform self-care tasks.	Depression may decrease the patients' ability to continue activities of daily living.
Assess the patients' sleep patterns and determine methods to either reduce or increase sleep, for example, by using relaxation techniques, decreasing stimulation at rest time, and drinking warm milk.	Disturbances in sleep patterns are common in patients with depression or bipolar disorder.
Reduce the environmental stimuli for patients experiencing a hypomanic or manic episode.	Patients are generally quite easily distracted when they are manic.
Provide structure and set limits as guides for patients with mania. Do not allow a patient with manic behavior to get exhausted.	Generally, patients with mania show poor judgment and impulsivity; they may need guidance.
Provide the patients an opportunity to express pent-up emotions or discuss problems (e.g., grieving a loss, internal mood, isolation, dysfunctional thinking).	If patients recognize possible precipitating events, they can take steps to: • reduce the occurrence of the events and • devise strategies that may reduce or eliminate the stressors.
Allow the patients to cry in a supportive environment.	The patients may relieve pent-up feelings by crying.
Help the patients determine appropriate ways of expressing anger.	Patients with a moderate amount of depression are often angry.
Assist the patients with problem solving.	Problem solving reduces stresses and increases the patients' self-esteem.
Encourage patients to make their own choices when they experience feelings of powerlessness.	Patients gain a sense of control and mastery when they make choices.
Encourage depressed patients to increase their interpersonal contacts.	Interpersonal relationships can reduce feelings of social isolation.
Administer prescribed medications: • Assess the effectiveness of the medication. • Monitor the patient for potential side effects.	Medications are frequently an effective treatment for depression or bipolar disorder. They need to be administered as prescribed and may take a while to work.
Teach the patients about the self-administration of prescribed medications.	Although beneficial for many patients, medications are quite potent and must be monitored carefully.
If the patients have experienced a loss, describe the stages of grieving, and teach the patients about them.	Knowledge of the process of normal grieving helps patients accept their own feelings.
Colibri Healthcare, LLC., 2021.	

TREATMENT OPTIONS

Different types of treatment are used for patients with mood disorders, and consideration is given to the patients' history as well as the severity of signs and symptoms. In general, a combination of some form of psychotherapy and psychotropic medication is the preferred treatment.

Psychotherapies

Psychotherapy, a goal-oriented approach aimed at helping patients deal with a specific issue, is used in both inpatient and outpatient settings on short- and long-term bases. Patients may be treated individually, within groups, or with family members.

Scientific evidence indicates that several forms of short-term psychotherapy (cognitive, interpersonal, and behavioral) are effective in treating most patients with mild or moderate depression. Psychotherapy can also be helpful to patients with bipolar disorder who are no longer experiencing acute mania. Group work, which involves education and support from professionals and from others with the same condition, has been shown to improve patient outcomes (Hubbard et al.).

Psychotherapy is based on a variety of theories, such as systems theory, communications theory, and interpersonal theory (American Healthcare professionals Association et al., 2014). Psychotherapy can help individuals understand some of the dynamics of their illness and promotes adherence to psychopharmacologic therapy.

Psychopharmacologic therapy

Beginning in the 1960s, the use of tricyclic antidepressants and monoamine oxidase inhibitors (MAOIs), in combination with psychotherapy, constituted the principal mode of treatment and remained so for many years. As research continues, newer forms of medication are introduced, providing more successful treatment and more options for individuals who experience depression.

Depression

Currently, selective serotonin reuptake inhibitors are the first-line treatment for depression because they work faster and have fewer serious side effects than the older drugs. These selective serotonin reuptake inhibitors include:

- fluoxetine (Prozac, Sarafem, Symbyax)
- paroxetine (Paxil, Paxil CR, Pexeva)
- sertraline (Zoloft)
- escitalopram (Lexapro)
- citalopram (Celexa)
- vilazodone (Viibryd)

Generally, tricyclic antidepressants take 2 or 3 weeks to produce initial therapeutic results. They are sometimes prescribed to treat moderate to severe depression. They include:

- amitriptyline
- desipramine (Norpramin)
- nortriptyline (Pamelor)
- protriptyline (Vivactil)
- trimipramine (Surmontil)
- maprotiline

Both tricyclic antidepressants and MAOIs, including phenelzine (Nardil) and tranylcypromine (Parnate), prevent the breakdown of neurotransmitters. Neurotransmitters such as serotonin and norepinephrine keep an individual calm and happy. These drugs allow the neurotransmitters to stay near the nerve cells longer by preventing their breakdown and reabsorption . A more recently introduced medication in the MAOI drug group, selegiline (Emsam), is administered through a transdermal patch and seems to create fewer unpleasant side effects than the earlier MAOIs. MAOIs are primarily used only when other options have failed because they have potentially serious side effects resulting from interactions with certain other medications and foods.

Often the patient's condition improves after the first few weeks of taking antidepressant medications; however, these medications must be taken regularly for 3 to 4 weeks (sometimes as many as 8 weeks) before the full therapeutic effect occurs (Townsend & Morgan, 2017).

Bipolar Disorder

People with bipolar disorder are generally treated with lithium carbonate (Lithobid), valproic acid (Depakene), divalproex (Depakote; Depakote ER), carbamazepine (Epitol, Tegretol, Carbatrol), or lamotrigine (Lamictal, Lamictal XR). These medications are effective in the management and stabilization of the illness 50% to 80% of the time. Patients who are taking lithium carbonate must have their serum drug levels monitored closely. The medication must be taken continuously; its effectiveness is contingent on maintaining a narrow therapeutic blood level. In addition, because lithium is excreted via the renal system, serum creatinine and blood urea nitrogen should be monitored as well. The antiepileptic medications carbamazepine and divalproex additionally require monitoring of hepatic function and platelets periodically because of the increased risk of hepatotoxicity, blood dyscrasias, and pancreatitis.

Electroconvulsive Therapy

Electroconvulsive therapy (ECT) can be an effective treatment for the alleviation of depression. Generally, it is used only after a trial of antidepressants has failed or for patients at extremely high risk for suicide.

During the procedure, the patient is anesthetized, and a seizure is induced. Six to 10 treatments are given in a series over 2 to 3 weeks. ECT is indicated primarily for major depressive disorder. Today patients are given lower doses of current and are sedated, so ECT is much safer than in the past.

Although the short-term memory loss associated with this type of therapy is well known, more profound and longer lasting adverse effects are rare. ECT is used for people whose depression does not respond to medications, for those at high risk of suicide, and for severely depressed older adults who cannot take medications because of heart disease (Halter, 2018).

In some healthcare settings, healthcare professionals may assist with the administration of ECT on an inpatient or outpatient basis and provide healthcare to the patient who has received ECT. On a home visit, at an outpatient clinic, or during an office visit, the healthcare professional needs to monitor the effects and side effects of treatment for patients who have had ECT.

Case study 6

Jackson is a 19-year-old college student who recently withdrew from all courses after a manic episode that resulted in a police investigation. He reports binge alcohol drinking, impulsivity, and several long periods of deep depression. His diagnosis of bipolar disorder is devastating to him and his family.

Self-Assessment Quiz Question #7

Teaching for this family should include all except:

a. The side effects of antipsychotic drugs.
b. The importance of staying on the medications, even after the symptoms are reduced.
c. The importance of avoiding all over-the-counter medications.
d. The importance of a gluten-free diet.

Self-Assessment Quiz Question #8

The healthcare professional should also teach the family that:

a. Jackson is not behaving appropriately.
b. If the treatment plan is too cumbersome, Jackson can stop.
c. There are community and online resources because group support has been found to be effective.
d. Jackson is old enough to manage his health independently.

Evidence-based practice! Diet matters in all things. As depression is thought to be part of an inflammatory process, eating an anti-inflammatory diet is worth trying (Tolkien et al., 2019). The Mediterranean diet includes foods high in antioxidants. Whole foods, fresh raw or slightly cooked vegetables, foods rich in omega-3 fatty acids, spices such as turmeric, and some teas are examples of these foods.

Additionally, there is strong evidence that specific vitamins and minerals are effective as part of an approach to reduce inflammation and depression and increase overall health. One study (Yeum et al., 2019) suggested supplementing with vitamins D, B12, B9, and vitamin C, as well as zinc, selenium, and omega-3 fatty acids.

Healthcare Professional Consideration: Self-care of the healthcare professional is an important part of treating patients with mood disorders. Patients with mania can be quite fun, though their behaviors and the consequences of their actions often go too far. Patients who are severely depressed are difficult to work with, and after the interaction the healthcare professional feels tired, slow, and perhaps irritated or depressed. Becoming more self-aware is a learned skill. Studies show that a self-aware healthcare professional is essential for developing the therapeutic healthcare professional-patient relationship that is needed (Rasheed et al., 2019). To become more self-aware, the healthcare professional can think back and reflect on the situation; talk out the experience with a trusted mentor or colleague; and focus on the positives and learn from the negatives of the experience.

HOLISTIC CONSIDERATIONS

Transcranial magnetic stimulation is a new noninvasive treatment for major depressive disorders that is the choice for patients who have not responded to the usual medications (Dubin et al., 2016). An alternative to medication, this treatment is considered safe, well tolerated, and effective (Mayo Clinic, 2018d). Magnetic fields are created around the brain with an electromagnetic coil placed against the forehead. There is no pain or seizures with this procedure though the patient may experience slight discomfort. Parts of the brain that are influenced by depression are activated, and the depressive mood lifts for the patient (Janicak & Dokucu, 2015). The procedure takes about 40 minutes and is often repeated every few weeks until depression symptoms are reduced.

Transcranial magnetic stimulation should not be confused with ECT, which involves anesthesia and the induction of a seizure with electricity and results in changes in brain functioning and chemistry. ECT is still used across the United States for severe depression (NIMH, 2019).

Case study 7

Mary Lincoln is a 47-year-old female patient who was admitted to a surgical unit of a general hospital for removal of an ovarian cyst. The procedure went well, and Mary is doing fine medically. She appears to be free from pain and is recovering well.

The evening healthcare professional who is taking care of Mary notes that she seems depressed. The healthcare professional observes that Mary has a sad mood and appears helpless or extremely lethargic when performing everyday tasks such as opening her juice or using the washcloth to clean her face.

On Mary's recorded psychosocial assessment, the healthcare professional learns that Mary and her husband divorced last year. Her second child, a daughter, has moved out of state within the past 2 months to attend college, and her oldest child, a son, is married and living 1,000 miles away.

When the healthcare professional inquiries about Mary's mood, Mary admits that she has felt somewhat sad for at least a month, has had frequent crying spells, has had a poor appetite, and has been more tired than usual. She claims that she falls asleep easily at about 11:00 p.m. each night at home but finds herself wide awake at 2:00 a.m., unable to return to sleep and feeling quite dreadful.

Mary says she knows that she should be feeling happy and excited; her surgery was successful, and she recently learned that her son and his wife are going to have a baby. She verbalizes that she cannot understand what is wrong with her because she is really looking forward to becoming a grandmother. Mary does confide that she would have liked to share the grandparenting experience with her ex-husband and wishes that her son lived closer to her.

Self-Assessment Quiz Question #9

The healthcare professional should be aware that depression is:

a. Usually a call for attention.
b. Underdiagnosed.
c. Related to an unhappy event.
d. Triggered by other depressed people.

Self-Assessment Quiz Question #10

This patient will likely be diagnosed with

a. Bipolar disorder.
b. Anxiety.
c. Depression and anxiety.
d. Depression.

Conclusion

This course has covered the levels of anxiety and depressive disorders, physiological reactions to them, specific medical and healthcare diagnoses that are appropriate, and possible healthcare options. Because healthcare professionals spend so much time with patients, they are in a strategically important position for assessing the patients' mood. Patients who have a mood disorder are seen regularly in the general hospital setting. Healthcare professionals can take the necessary steps to ensure that patients receive appropriate treatment for psychiatric and mental health conditions while in the hospital and after discharge. Being able to successfully intervene and curb a patient's escalating anxiety or help manage a patient's depressive disorder is a necessary skill for all healthcare professionals, in all specialties.

Glossary of terms

Anxiety: An unpleasant feeling of dread and apprehension. It may be caused by an unconscious conflict between an underlying drive and the reality of the environment, or it may be precipitated by a physical illness or a stressful situation. Patients who are anxious are often unaware of the specific cause of their feelings (Mayo Clinic, 2020).

Fear: A distressing emotion aroused by impending danger, evil, pain, and so on, whether the threat is real or imagined; the feeling or condition of being afraid. Fear is an unpleasant feeling caused by the realization and recognition that some event, occurrence, or other detectable source in the environment may bring harm.

Stress: The natural occurrence of wear and tear on the body as it responds and adapts to life's events. Classically described by Selye (1976), stress is generally recognized as a complex phenomenon. Accordingly, the understanding of stress must emphasize the relationship between the person and environment, the situation and the person's physiological state, and the current event and the person's history of stress and coping. To some extent, stress is a very individual experience: Something that is stressful for one person might be only mildly irritating to another. Likewise, responses to stress vary from one individual to another.

Coping mechanisms: Those behaviors that serve to reduce an individual's anxiety. They may be helpful or not, adaptive, or maladaptive. Healthcare professionals and other healthcare providers can teach patients to find healthy coping strategies (Halter, 2018; Townsend & Morgan, 2017; Riley, 2020).

Crisis: An internal disturbance that results from a stressful event or hazardous situation or a perceived threat to oneself. During times of crisis, the patient's usual coping mechanisms may become ineffective. At this point, a patient is more receptive to therapeutic influence and can often learn new coping mechanisms. Fortunately, a crisis is a time-limited event (Halter, 2018; Townsend & Morgan, 2017).

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Self-Assessment Answers and Rationales

1. The correct answer is A.
Rationale: This acknowledges Judy's concern about the interview and encourages her to talk more about it.

2. The correct answer is A.
Rationale: Judy is experiencing mild anxiety because of her upcoming interview. It is important to her, and she is excited about the possibilities of a new job that she thinks will be a great fit for her skills. She is alert and aware of her surroundings. She seems able to articulate her situation and think logically about her interview.

3. The correct answer is D.
Rationale: There is probably no anxiety attached to the in-service testing because there is nothing required of the healthcare professionals other than to go and sit in the room and fill out the testing form.

4. The correct answer is A.
Rationale: Mild anxiety creates the best learning environment. If any of the other levels of anxiety are present, the person cannot absorb new information as effectively.

5. The correct answer is C.
Rationale: Roberto is experiencing severe anxiety. He is focused only on his pain and has become verbally combative.

6. The correct answer is C.
Rationale: Being self-aware of one's feelings and behaviors is part of self-care. The American Holistic Healthcare Professionals Association recognizes self-care as essential to effective healthcare practice.

7. The correct answer is D.
Rationale: Antipsychotic medications are generally not part of medication protocols for patients with bipolar disorders. Education for this family should be centered on recognizing early warnings for mania and possible triggers and the importance of continuing to take the medication. In a manic phase, patients believe they feel great and often discontinue medications. The family needs to understand that this is a biological disorder, as they may believe this is only a behavioral issue. Gluten-free diet is unrelated.

8. The correct answer is C.
Rationale: The healthcare professional should consider referring the family to a support group and other resources in the community and online. The family does not need to be told how Jackson's behavior is. Stopping treatment is not recommended without some sort of follow-up. Jackson may need help even though he is considered an adult at 19 and the family is an excellent resource.

9. The correct answer is B.
Rationale: Many people are not yet diagnosed with depression but have all the symptoms. The Beck Depression Inventory is a quick checklist that anyone can use to check for symptoms, and it is often part of intake for hospital admissions.

10. The correct answer is D.
Rationale: More than likely, Mary is experiencing depression. She reports typical signs and symptoms (i.e., sad mood, feeling helpless and lethargic), and her situation, with multiple experiences of loss, would be one that might lead to depression. Asking about previous episodes of depression or similar symptoms and whether she has a history of depression, as well as her response to the symptoms and treatment, if any, would be helpful in creating a plan of care for Mary.

Staying Healthy: Vaccine Preventable Diseases

10 Contact Hours

Release Date: July 7, 2021

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Faculty

Author: Adrianne Avillion, DEd, 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.

Content Reviewer: Mary C. Ross, RN, PhD, is an experienced nursing educator with extensive clinical experience in multiple areas of nursing. She is a retired Air Force flight nurse and previous chair of a national Veterans Administration Advisory Council. She has extensive experience in nursing and has numerous publications.

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

Course overview

The purpose of this course is to provide nurses with information that will enhance their knowledge of vaccine preventable diseases and how to work with patients and families to reduce the threat of acquiring such diseases.

Learning objectives

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

- Identify diseases for which vaccines are administered.
- Discuss why some parents and other individuals are reluctant to immunize. Identify potential consequences of not obtaining recommended immunizations. Identify factors that contraindicate immunization.
- Describe the pathophysiology of various vaccine-preventable diseases.
- Evaluate treatment initiatives, including prevention strategies, for various vaccine-preventable diseases, including COVID. Discuss nursing considerations related to vaccine-preventable diseases.

How to receive credit

- Read the entire course online or in print which requires a 10-hour commitment of time.
- Complete the self-assessment quiz questions either integrated throughout or all at the end of the course.
  - These questions are NOT GRADED. The correct answer is shown after you answer the question. The questions are included to help affirm what you have learned from the course.
  - The correct answer is shown after the question is answered. If the incorrect anser is selected, a rationale for the correct answer is provided.
- 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.

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Activity director

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

Disclosures

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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 burden of contagious diseases has been significantly reduced through the use of successful vaccination programs in the United States. However, outbreaks of contagious illnesses continue to occur throughout the country. Vaccinations are the most important tool available to United States healthcare providers to maintain low levels of contagious diseases. Immunization rates in the United States are high, but gaps in care exist throughout the country. Economic and racial disparities exist, leaving vulnerable populations at a higher risk for contracting and transmitting contagious diseases.

The majority of vaccines are administered to healthy babies, children, and adults. It is essential that vaccines are demonstrated to be safe as well as effective. Ensuring their safety and effectiveness is among the top priorities of the Food and Drug Administration (FDA; FDA, 2019)

Vaccines have been administered as a disease-prevention strategy for centuries. For example, attempts to inoculate people against smallpox were noted as long ago as the 1100s, when dried scab material from smallpox patients was transferred to healthy children and adults. Centuries later, in 1796, Dr. Edward Jenner inoculated an 8-year-old boy with matter from a fresh smallpox lesion and concluded that protection from the disease was complete (Immunization Action Coalition, 2021). Today, vaccines have been developed to prevent numerous, potentially deadly, diseases, yet a considerable number of people do not receive recommended immunizations.

Why do some people refuse vaccination while others do not? What vaccine-preventable diseases pose a threat in the 21st century? What are the potential consequences of such diseases? This education program addresses these questions as well as important nursing considerations for dealing with vaccine-preventable diseases.

DISEASES FOR WHICH VACCINES ARE ADMINISTERED

Historically, vaccine development progressed at a fairly slow rate until the last several decades, when dramatic advances in technology and scientific discoveries led to amazingly swift advances in molecular biology, virology, and immunology. These advances have helped to facilitate significant progress in developing new vaccines (Immunization Action Coalition, 2021).

A number of factors influence vaccine recommendations, including new discoveries pertaining to diseases and their prevention, advances in treatment, and vaccine trials. Healthcare professionals would be wise to consult the Centers for Disease Control and Prevention (CDC) website (https://www.cdc.gov) for the latest information on immunization schedules, recommendations, catch-up recommendations for children and adolescents who have not received immunization according to recommendations, and changes in recommendations.

Vaccines are recommended in children from birth to 18 years of age to prevent the following diseases (CDC, 2020i; CDC, 2020q):

- Acellular pertussis.
- Diphtheria.
- Haemophilus influenzae type b.
- Hepatitis A.
- Hepatitis B.
- Human papillomavirus (HPV).
- Influenza.
- Measles.
- Meningitis.
- Mumps.
- Pneumonia.
- Polio.
- Rotavirus.
- Rubella.
- Tetanus.
- Varicella (chickenpox).

Vaccines for adults include the following:

- Boosters for childhood vaccines as needed.
- Shingles.
- Pneumonia.
- Influenza.
- Tetanus.

COVID vaccines are discussed later in this course.

WHY DO PARENTS REFUSE OR DELAY VACCINATING THEIR CHILDREN?

Laws regarding immunization and school attendance were first enacted to control smallpox outbreaks. As time went on, such laws have subsequently been used to prevent epidemics of vaccine-preventable diseases such as measles, mumps, whooping cough, and polio (National Conference of State Legislation, 2021).

In most states unvaccinated children may attend school or day care if they acquire appropriate exemptions. However, if an outbreak of vaccine- preventable diseases occurs, children who have not been vaccinated are often prohibited from attending school or day care until the risk of contracting the diseases is over (National Conference of State Legislation, 2021).

Although the majority of children in the United States receive recommended immunizations, significant numbers still do not. The most recent available data from CDC show that the percent of children aged 19 to 35 months receiving vaccinations is as follows (CDC, 2020g):

- Diphtheria, tetanus, pertussis (4+ doses DTP, DT, or DTaP): 83.2 %.
- Polio (3+ doses): 92.7%.
- Measles, mumps, rubella (MMR; 1+ doses): 91.5%.
- Haemophilus influenzae type b (Bb; primary series + booster dose): 80.7%.
- Hepatitis B (Hep B; 3+ doses): 91.4%.
- Varicella (1+ doses): 91%.
- Pneumococcal conjugate vaccine (PCV; 4+ doses): 82.4%.
- Combined seven-vaccine series: 70.4%.

According to CDC, 2019 data regarding the percentage of persons of all ages who received the influenza vaccine shows the following (CDC, 2020h):

- Percent of children aged 6 months to 17 years who received an influenza vaccination during the past 12 months: 50.4%.
- Percent of adults aged 18 to 49 who received an influenza vaccination during the past 12 months: 34.2%.
- Percent of adults aged 50 to 64 who received an influenza vaccination during the past 12 months: 46.8% .
- Percent of adults aged 65 and over who received an influenza vaccination during the past 12 months: 68.7%.

CDC also reported that in 2019 there were 5,902 influenza-related deaths, or 1.8 per 100,000 population (CDC, 2020b).

In 2018, 68.9% of adults 65 and older received a pneumococcal vaccination. The number of pneumonia-associated deaths was 43,881, or 13.4 per 100,000 population. Additionally, 1.5 million visits to the emergency department recorded pneumonia as the primary hospital discharge diagnosis (CDC, 2020o).

Vaccination is considered to be one of the most cost-effective ways of avoiding the spread of disease. An estimated 2 million to 3 million deaths a year are prevented by vaccinations. An additional 1.5 million deaths could potentially be avoided if the global coverage of vaccines were to improve (World Innovation Summit for Health, 2019).

But vaccine hesitancy (defined as the reluctance or refusal to vaccinate despite availability and access to vaccines) is a serious threat to the progress that has been made in reducing the occurrence of vaccine-preventable diseases. In 2019, the World Health Organization (WHO) named vaccine hesitancy as one of the world's top 10 global threats. Diseases that were once considered to be eradicated in the US are coming back. For example, measles was considered to be eradicated in the US in 2000. However, in 2019, one of the worst measles outbreaks in recent years occurred (World Innovation Summit for Health, 2019). Measles cases were reported in 31 states with more than 207,000 deaths.

Even though there are no federal laws regarding vaccine immunization, each state has enacted laws dictating which vaccinations are required for children before entering schools. All 50 states have legislation requiring specified vaccines for students. However, although exemptions vary from state to state, all school immunization laws allow medical exemptions for some children (National Conference of State Legislation, 2021). Examples of such medical exemptions include children who are allergic to the vaccine's components or those with compromised immune systems. Forty-five states and Washington, D.C., grant religious exemptions for people who have religious objections to immunizations. As of this writing, 15 states allow philosophical exemptions for those who object to immunizations because of personal, moral, or other beliefs (National Conference of State Legislation, 2021). Examples of such medical exemptions include children who are allergic to the vaccine's components or those with compromised immune systems. Forty-five states and Washington, D.C., grant religious exemptions for people who have religious objections to immunizations. As of this writing, 15 states allow philosophical exemptions for those who object to immunizations because of personal, moral, or other beliefs (National Conference of State Legislation, 2021).

Nursing consideration: Data and legislation regarding immunization can change without much warning. Nurses should consult resources in their respective states to stay up to date on laws that dictate vaccination requirements.

In 2019 the following legislation was enacted (National Conference of State Legislation, 2021):

- Washington state House Bill 1638 removes the personal belief exemption for the measles, mumps, and rubella vaccine requirement for public schools, private schools, and day care centers.
- Maine House Bill 586 removes personal and religious belief exemptions for public school immunization requirements.
- New York Senate Bill 2994 removes the religious exemption for public school immunization requirements.

The reasons for refusal to vaccinate typically fall into the following four broad categories:

- Religious reasons.
- Philosophical reasons.
- safety concerns.
- The need for more education.

(McKee & Bohannon, 2016; World Innovation Summit for Health, 2019).

RELIGIOUS REASONS

Religious beliefs are among the most common reasons given for choosing not to vaccinate. Currently, 45 states and Washington D. C. grant religious exemptions for people who have religious objections to immunization. Religious beliefs are usually linked to core beliefs and personal morals, making it difficult to convince parents and caregivers of the value of immunization. Additionally, people who refuse vaccinations because of religious beliefs are most often among those who refuse all vaccines rather than a specific one (McKee & Bohannon, 2016; World Innovation Summit for Health, 2019). Some individuals believe that contracting the disease is God's will and should not be interfered with by immunization.

According to 2019 available data regarding existing statutes, the existing statutes in Minnesota and Louisiana do not explicitly recognize religion as a reason for exemption. However, the nonmedical exemption may encompass religious beliefs. In Virginia parents can receive a personal exemption only for the HPV vaccine. Missouri's personal belief exemption does not apply to public schools; it applies only to childcare facilities (National Conference of State Legislation, 2021).

PERSONAL BELIEFS OR PHILOSOPHICAL REASONS

Currently, 16 states allow exemptions for religious and personal beliefs (Bean, 2020b):

- Arizona.
- Arkansas.
- Colorado.
- Idaho.
- Louisiana.
- Michigan.
- Minnesota.
- North Dakota.
- Ohio.
- Oklahoma.
- Oregon.
- Pennsylvania.
- Texas.
- Utah.
- Washington state.
- Wisconsin.

SAFETY CONCERNS

Arguably, the most commonly cited reason for refusing vaccinations is the concern for children's safety. Safety fears can be triggered by the following factors (McKee & Bohannon, 2016; World Innovation Summit for Health, 2019).

Nursing consideration: Healthcare consumers are constantly assailed with information about vaccines from friends, family, social media, and the Internet, as well as from healthcare professionals. Unfortunately, not all of the information provided is accurate. Nurses are obligated to provide information about vaccines that is accurate and comprehensible to the healthcare consumer. Nurses should also provide information about which Internet sites can provide reliable and accurate information, such as CDC (https://www.cdc.gov) and the Mayo Clinic (https://www.mayoclinic.org).

Information received from family members, acquaintances, and/or the media cant cause parents and caregivers to doubt the safety of vaccines. Information from the media is often sensationalized to obtain higher ratings. Such information is often inaccurate without objective scientific review. The Internet is often the source of much inaccurate information about vaccines (Word Innovation Summit for Health, 2019).

Some fear that giving multiple vaccines at the same time, or in close proximity, increases the risk of adverse reactions. Thus, some parents and caregivers may choose to delay vaccinations in opposition to the recommended schedule (World Innovation Summit for Health, 2019).

Many Internet reports that contribute to vaccine hesitancy are based on a report published in The Lancet 6 years ago. The report, published by a physician, claimed that there is a link between autism and vaccines (specifically the measles, mumps, and rubella [MMR] vaccine). The conclusions from this study were vague and not based on statistically valid data. The study was subsequently retracted by The Lancet. Nevertheless, the study is used by some vaccine hesitancy groups as "proof" that vaccines are harmful (World Innovation Summit for Health, 2019).

Fears that the vaccine will actually cause the disease they are administered to prevent have also been cited as a safety concern. Some people are convinced that immunizations ultimately cause serious illness (World Innovation Summit for Health, 2019).

NEED FOR EDUCATION

The fourth reason for vaccine refusal involves parents and individuals expressing a need for more information about the immunization process. They need to receive accurate information about both the benefits and risks of each recommended vaccine. Healthcare professionals must hold objective conversations about vaccination and encourage open discussion, including being willing to answer any and all questions and address fears and concerns without bias (McKee & Bohannon, 2016; World Innovation Summit for Health, 2019).

Parents and other adults often want more information about vaccine risks as well as benefits. They want detailed information that is based on facts and is nonbiased. It is important that information be provided in ways that are understood by people without a healthcare background (World Innovation Summit for Health, 2019).

The following statements show the importance of vaccination (World Innovation Summit for Health, 2019):

- Immunizations can save the lives of children by protecting them against diseases that once killed thousands of people. Several diseases have been completely eradicated in the US, such as polio. Currently, there are no reports of polio in the US. The history of vaccination shows that vaccinations are safe and effective. Review by physicians, scientists, and healthcare researchers support the safety and efficacy. Serious side effects are rare. The benefits of being vaccinated far exceed the risk for possible side effects.
- Vaccination of children contributes to herd immunity. Herd immunity is defined as the point at which a sufficient number of people are immune to infection so that people who are not immune are not infected. If enough of the population is immune to a disease, transmission can be reduced and vulnerable individuals are protected.
- Immunizations can save time and money. Children with some vaccine-preventable diseases can be denied attendance at some schools, and adults may be prohibited from some job opportunities in healthcare or the military. These types of diseases can lead to long-term disabilities that can result in significant medical bills and caregiver's lost time at work.

Nursing consideration: If children are not vaccinated, there is the risk of harm not only to themselves, but to possibly exposing other children and families to vaccine-preventable diseases. The choice of whether or not to vaccinate affects an entire population (World Innovation Summit for Health, 2019). Transmission of preventable diseases such as pertussis can endanger the lives of elderly persons or those who are immunosuppressed.

Case study 1: Mrs. Maran and her daughter

Mrs. Maran is strongly opposed to the administration of vaccines and has received a personal exemption for immunization based on personal beliefs. She believes that vaccines are linked to the development of disease and that they are also responsible for long-term, chronic conditions such as autism spectrum disorder. Mrs. Maran believes that natural immunity is best. She thinks it is better to acquire immunity naturally without injecting chemicals into the body. Her daughter is 4 years old and has not received any of the recommended childhood immunizations. Mrs. Maran and her family recently moved to Missouri and she is thinking of investigating the public school system associated with her new home. She is confident that she will be able to receive a personal belief exemption from vaccination as she prepares her daughter for entrance into the public school system.

Question 1: Will Mrs. Maran be able to use personal belief objections to avoid having her daughter immunized?

> ***Discussion 1:*** *In Missouri, personal belief exemption does not apply to public schools. It applies only to childcare facilities. Mrs. Maran will not be able to claim personal beliefs to obtain an exemption.*

Question 2: What other states have limitations on exemptions because of 2019 legislation?

Discussion 2: *According to 2019 available data, the existing statutes in Minnesota and Louisiana do not explicitly recognize religion as a reason for exemption. However, the nonmedical exemption may encompass religious beliefs. In Virginia, parents can receive a personal exemption only for the HPV vaccine. Missouri's personal belief exemption does not apply to public schools. It applies only to childcare facilities (National Conference of State Legislation, 2021).*

Question 3: Mrs. Maran cites personal beliefs as her reason for objecting to vaccination. What do personal beliefs encompass when talking about distrust of vaccines?

Discussion 3: *Personal beliefs or philosophical reasons encompass a wide variety of issues. For example, some people believe that it is beneficial for children to contract certain vaccine-preventable diseases. They believe that natural immunity, acquired by actually having the disease, is better than immunity gained from vaccination. Some people believe that vaccines do more harm than good and cause disease and long-term adverse effects. Additional reasons that are part of personal beliefs or philosophical reasons include believing that the diseases for which vaccinations are available are no longer a threat, assuming that the possible negative side effects outweigh the benefits of vaccination, and believing that if vaccine-preventable diseases are contracted, they are easily treatable and are not serious.*

POTENTIAL CONSEQUENCES OF NOT OBTAINING RECOMMENDED IMMUNIZATIONS

The most obvious potential consequence of failure to obtain recommended immunizations is development of the disease and the risk of its complications. Acquiring vaccine-preventable diseases may have serious, even fatal, consequences. For example, the CDC reported the estimated range of annual burden of flu in the US from 2010 to 2020 resulted in an estimated 9 million to 45 million illnesses; between 140,000 and 810,000 hospitalizations; and between 12,000 and 61,000 deaths annually since 2010 (CDC, 2019n; CDC, 2020e).

Nursing consideration: Some parents may believe that most vaccine-preventable diseases no longer occur in the United States; therefore, they believe that vaccine administration is not necessary. It is important to teach parents and other caregivers that diseases – such as whooping cough, measles, chickenpox, meningitis, and influenza – still circulate in the United States. Effects of such diseases can range from mild to severe and life threatening.

Consequences for children

If parents choose not to vaccinate or to delay vaccination of their children, they must understand a number of important issues and take appropriate actions. Such actions include maintaining a written record of the child's vaccination status (CDC, 2019n; ImmunizeBC, 2020). This record should be easily accessible. If a child becomes ill or injured, healthcare providers must know what immunizations the child has or has not received or if immunizations were not administered according to recommended schedules. Under stress, parents may not remember the details of the child's immunization status. Healthcare providers must be able to quickly access this information. Make sure that all of the child's physicians and healthcare providers are aware of the child's immunization status. This is especially important if an outbreak of vaccine-preventable diseases occurs.

Physicians, other healthcare professionals, and parents/caregivers can take steps to help protect the child against such diseases (CDC, 2019n; ImmunizeBC, 2020):

- Contact the child's physician immediately if the child has been exposed to a vaccine-preventable disease but has not been vaccinated against that disease. In some cases, vaccination may still be possible.
- Know that if an outbreak of vaccine-preventable diseases occurs in the children's school or day care center, they may be asked to take their unvaccinated child out of school or day care until it is deemed safe for them to return. This can take from several days up to several weeks.
- Learn early signs and symptoms of vaccine-preventable disease. If a child develops symptoms of such a disease, parents should notify the child's physician immediately.
- Make sure that all members of the healthcare team who come into contact with the child know that the child has not been vaccinated. This helps to prevent spread of the disease. Learn about possible exposure to diseases common in certain geographic areas before traveling with an unvaccinated child. Vaccine-preventable diseases are common throughout the world, including Europe. Consult CDC travelers' information website before traveling at www.cdc.gov/travel
- If, while traveling, an unvaccinated person develops a vaccine-preventable disease, they should not travel by plane, train, or bus, and should follow medical recommendations regarding isolation until the person is no longer contagious.
- Seek immediate medical help if a child or any members of their family develop early signs and symptoms of vaccine-preventable disease. When visiting healthcare providers or emergency departments, inform staff members that the child has not been vaccinated before there is contact with the child or family members.
- Consult with the child's physician for the latest information about vaccines. Visit CDC website www.cdc.gov/vaccines
- Older adults should be cautious when taking care of unvaccinated children.

Nursing consideration: Nurses have an obligation to explain the consequences of failing to immunize children to parents and caregivers. Parents and caregivers must have the most accurate, current information so that they can make informed decisions about immunization.

Consequences for adults

According to a 2016 National Health Interview Survey, many adults are not aware that they need vaccines at regular intervals (CDC, 2018b; CDC, 2018e; CDC, 2020z).

- Compared with the 2015 survey data, there was a modest increase in vaccination coverage for some vaccines and age groups. However, coverage decreased for one vaccine overall and in two age groups in one racial/ethnic category. Apart from these findings, vaccination coverage among adults in 2016 was similar to estimates from 2015.
- Overall, influenza vaccination decreased 3.1 percentage points to 70.4% among adults > 65 years of age and decreased among whites in all age groups except among adults aged 19 to 49 years. Pneumococcal vaccination increased 3.3 percentage points to 66.9% among adults > 65 years of age.
- Vaccination of adults 19 years and older with tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) increased by
- 3.4 percentage points to 26.6% overall.
- Hepatitis A vaccination increased by 14.8 percentage points to 23.7% among adults 19 to 49 years of age with chronic hepatic conditions. Herpes zoster (shingles) vaccination increased 2.8 percentage points to 33.4% among adults 60 and older, and increased 3.1 percentage points to 37.4% among adults 65 and older. HPV vaccination (at least one dose) among females and males 19 to 26 who had not

received HPV vaccination before age 19 was 8.6% and 2.7%, respectively.
- Racial and ethnic vaccination differences persisted for all vaccinations. Coverage was generally lower for most vaccinations among non- Hispanic and non-Hispanic Asian adults compared to White adults. Vaccination differences widened for Tdap (African Americans, all age groups) and Herpes Zoster (Asians > 65 years). This was primarily because of increases in Whites receiving vaccinations.

RECOMMENDED ADULT IMMUNIZATIONS (CDC, 2020V; CDC, 2020W)

- Influenza (flu) inactivated (IIV) or influenza recombinant (RIV) vaccine: One dose annually, or influenza live attenuated (LAIV) one dose annually.
- Tetanus, diphtheria, pertussis (Tdap or Td): One dose Tdap and then Td or Tdap booster every 10 years.
- Measles, mumps, rubella (MMR): One or two doses depending on indication (if born in 1957 or later).
- Varicella (VAR): two doses for persons 19 to 40 (if born in 1980 or later): Adults over the age of 45 should receive two doses.
- Zoster recombinant (RZV): Preferred two doses for persons aged 50 years of age or older.
- HPV vaccine is recommended for routine vaccination (for both males and females) at age 11 or 12, but vaccination can be started at age 9. For adults it is recommended that everyone through age 26 years should be vaccinated if not adequately vaccinated previously. Vaccination is not recommended for everyone older than age 26. However, some adults ages 27 through 45 may decide to get the HPV vaccine based on discussion with their clinicians if they were not adequately vaccinated when they were younger.
- Pneumococcal vaccination with pneumococcal conjugate (PCV13): Persons 19 to 64 years of age with certain medical conditions should receive one dose. Persons 65 years of age and older should receive one dose.
- Pneumococcal vaccination with (PPSV23): Recommendations for persons 19 to 64 years of age is one or two doses depending on indication. For persons 65 years of age and older, one dose should be administered.
- Hepatitis A (HEPA): Vaccine is administered in two or three doses depending on vaccine for persons 19 years of age and older.
- Hepatitis B (HEPB): Vaccine is administered in two or three doses depending on vaccine for persons 19 years of age and older.
- Meningococcal A, C, W, Y (MenACWY): Administered as one or two doses depending on indication.
- Meningococcal B (MenB): Administered as two or three doses depending on vaccine and indication for persons 19 years of age and older.
- Haemophilus influenzae type b (Hib): Administered as one or three doses depending on indication for persons 19 years of age and older.
- Current recommendations for COVID vaccines vary by state and whether the immunization is by Moderna, Pfizer, or Johnson & Johnson.

Nursing consideration: Certain vaccines may have been administered in childhood, which may alter timing or the need for adult immunizations. For example, adults receive the varicella vaccine only if they did not receive it as children or did not have varicella (chickenpox). Some vaccines are recommended for adults with certain risks related to their health, job, or lifestyle. Before receiving any type of vaccination, adults should review their immunization status with their healthcare providers. Additionally, CDC website offers current information about recommended immunization schedules at www.cdc.gov/vaccines

TEN REASONS FOR ADULTS TO RECEIVE RECOMMENDED IMMUNIZATIONS

There are numerous reasons adults should receive recommended immunizations, including the following 10 important issues (MD Monthly Staff, 2019).

1. Vaccines reduce the spread of disease. Herd immunity, one of the goals of vaccination, is described as "even if vaccines are not 100% effective, having a large enough percentage of the population vaccinated against disease will protect everyone, even those in whom the vaccine is not effective." The vaccine rate necessary for herd immunity differs among various diseases but is typically about 60% to 80% of the population.
2. Vaccines reduce the incidence of serious health complications. Even though vaccines do not always completely eliminate the possibility of contracting a specific disease, the risk is greatly decreased. If someone who has been vaccinated does develop a disease for which vaccination has been obtained, the chances of having serious complications are significantly less.
3. Vaccines reduce the risk of death. For example, before the development of the measles vaccine, more than 500,000 children contracted the disease each year and about 500 died from the disease. Children younger than 5 years of age and adults older than 20 years of age are more likely to suffer from serious complications such as pneumonia and encephalitis.
4. Some individuals are not able to receive vaccines. Allergies to vaccine components or people with compromised immune systems are examples of reasons that vaccines may be contraindicated. Those who can be vaccinated help to raise herd immunity and protect people who cannot receive vaccines.
5. Lack of immunization can cause people to miss out on important activities such as work and social events. In addition to financial compromise as a result of lost work time, quarantine may be necessary, and a significant disruption of interpersonal relationships may occur.
6. The cost of disease is significantly more than the cost of vaccination. For example, measles may lead to hospitalization and meningitis could be fatal. The cost of contracting a vaccine-preventable disease can lead to severe financial compromise.
7. Travel may be limited without vaccination. Many countries mandate vaccinations for those who want to visit. International travel nearly always requires vaccinations.
8. Vaccines do not cause disease. A concern often cited by those who oppose vaccination is that vaccines cause the disease they are supposed to prevent. This is inaccurate. There are no living pathogens in vaccines that are able to cause disease.
9. Thimerosal is no longer a component of most vaccines. Except for certain versions of the flu vaccine, vaccines do not contain thimerosal. Although no disease has been linked to thimerosal in scientific research, vaccine manufacturers have switched to other types of preservatives.
10. Vaccination is not linked to autism. Extensive research over many years has shown that autism is not linked to, or caused by, vaccines. There is also no evidence to suggest that vaccines negatively impact development or cause disability. There is evidence, however, to support vaccination as a means of preventing disease, disability, and death.

PEOPLE WHO SHOULD NOT RECEIVE VACCINATIONS

Age, health status, and other factors influence whether or not people should receive certain immunizations. The following summary provides information about contraindications for certain vaccines. For detailed information about vaccine contraindications, patients should consult with their healthcare providers. CDC website (www.cdc.gov/vaccines) also offers significant information about vaccine contraindications (CDC, 2020x).

Guidelines for vaccine contraindications include, but are not limited to, the following.

Diphtheria, tetanus, and acellular pertussis (DTaP vaccine)

Some children should not get the DTaP vaccine or should wait. These include the following (CDC, 2020cc):

- Those who have had an allergic reaction after a previous dose of any vaccine that protects against tetanus, diphtheria, or pertussis, or have any severe or life-threatening allergies.
- Those who have had a coma, decreased level of consciousness, or prolonged seizures within 7 days after a previous dose of any pertussis vaccine (DTP or DTaP).
- Those who have had seizures or another nervous system problem. Those who have ever had Guillain-Barré syndrome (GBS).
- Those who have had severe pain or swelling after a previous dose of any vaccine that protects against tetanus or diphtheria.

In some cases, a child's healthcare provider may decide to postpone DTaP vaccination to a future visit. Children with minor illnesses such as a cold may be vaccinated. Children who are moderately or severely ill should usually wait until they recover before getting DTaP (CDC, 2020cc).

Hepatitis A vaccine

Some people should not receive the hepatitis A vaccine or should wait to receive it if they have had an allergic reaction after a previous dose of hepatitis A vaccine or have any severe or life-threatening allergies. In some cases, healthcare providers may decide to postpone vaccination (CDC, 2020cc).

People with minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting hepatitis A vaccine (CDC, 2020cc).

Hepatitis B vaccine

Some people should not receive the hepatitis B vaccine or should wait to receive it if they have had an allergic reaction after a previous dose of hepatitis B vaccine or have any severe or life-threatening allergies. In some cases, healthcare providers may decide to postpone vaccination (CDC, 2020cc).

People with minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting hepatitis B vaccine (CDC, 2020cc).

HPV (human papillomavirus) (HPV) vaccine

People should not get this vaccine if they have had an allergic reaction after a previous dose of HVP vaccine, have any severe or life-threatening allergies, or they are pregnant (CDC, 2020cc).

In some cases, healthcare providers may decide to postpone HPV vaccination to a future visit. People with minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting HPV vaccine (CDC, 2020cc).

Influenza (live) vaccine

Before receiving the vaccine, the person or a caregiver must inform healthcare providers if the patient (CDC, 2020cc):

- Is younger than 2 years or older than 49 years of age.
- Is pregnant.
- Has had an allergic reaction after a previous dose of influenza vaccine or has any severe or life-threatening allergies.
- Is a child or adolescent 2 through 17 years of age who is receiving aspirin or aspirin-containing products.
- Has a weakened immune system.
- Is a child 2 through 4 years old who has asthma or a history of wheezing in the past 12 months.
- Has taken influenza antiviral medication in the previous 48 hours.
- Cares for severely immunocompromised persons who require a protected environment.
- Is 5 years or older and has asthma or respiratory compromise.
- Has other underlying medical conditions that can put people at higher risk of serious flu complications such as lung disease, heart disease, kidney disease, kidney or liver disorders, neurologic or neuromuscular, or metabolic disorders.
- Has had Guillain-Barré Syndrome (GBS) within 6 weeks after a previous dose of influenza vaccine.

In some cases, a healthcare provider may decide to postpone influenza vaccination to a future visit. For some patients a different type of influenza vaccine (inactivated or recombinant influenza vaccine) might be more appropriate than live attenuated influenza vaccine. People with minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting influenza vaccine (CDC, 2020cc).

Influenza (inactivated) vaccine

Before receiving this vaccine, healthcare providers should be informed if the person getting the vaccine has had an allergic reaction after a previous dose of influenza vaccine, has any severe or life-threatening allergies, or has ever had GBS (CDC, 2020cc).

In some cases, the healthcare provider may decide to postpone influenza vaccination to a future visit. People with minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting influenza vaccine (CDC, 2020cc).

Measles, mumps, rubella (MMR) vaccine

Some people should not receive the MMR vaccine or should wait before receiving it if they (CDC, 2020cc):

- Have had an allergic reaction after a previous dose of MMR or MMRV vaccine or have any severe or life-threatening allergies.
- Are pregnant or think they might be pregnant.
- Have a weakened immune system or have a parent, brother, or sister with a history of hereditary or congenital immune system problems.
- Have ever had a condition that makes them bruise or bleed easily.
- Have recently had a blood transfusion or received other blood products.
- Have tuberculosis.
- Have gotten any other vaccines in the past 4 weeks.

People with minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting MMR vaccine (CDC, 2020cc).

Measles, mumps, rubella, and varicella (MMRV) vaccine

Before receiving the vaccine, healthcare providers should be informed if the person getting the vaccine (CDC, 2020cc):

- Has had an allergic reaction after a previous dose of MMRV, MMR, or varicella vaccine, or has any severe or life-threatening allergies.
- Is pregnant or thinks pregnancy is a possibility
- Has a weakened immune system or has a parent, brother, or sister with a history of hereditary or congenital immune system problems.
- Has ever had a condition that makes them bruise or bleed easily.
- Has a history of seizures or has a parent, brother, or sister with a history of seizures.
- Is taking, or plans to take, salicylates such as aspirin.
- Has recently had a blood transfusion or has received other blood products.
- Has tuberculosis.
- Has gotten any other vaccines in the past 4 weeks.

In some cases, a healthcare provider may decide to postpone MMRV vaccination to a future visit or may recommend that the child receive separate MMR and varicella vaccines instead of MMRV. People with minor illnesses such as a cold may be vaccinated. Children who are moderately or severely ill should usually wait until they recover before getting MMRV vaccine (CDC, 2020cc).

Shingles (herpes zoster) vaccine

Before receiving this vaccine, healthcare providers must be informed if the person getting the vaccine has had an allergic reaction after a previous dose of shingles vaccine, has any severe or life-threatening allergies, is pregnant or breastfeeding, or is currently experiencing an episode of shingles (CDC, 2020cc).

In some cases, the healthcare provider may decide to postpone shingles vaccination to a future visit. People with minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting shingles vaccine (CDC, 2020cc).

Meningococcal vaccines

For both the Serogroup B Meningococcal (MenB) and Meningococcal ACWY (MenACWY) vaccine, healthcare providers must be informed before giving the vaccine if the person has had an allergic reaction after a previous dose of meningococcal vaccines or has any severe or life- threatening allergies (CDC, 2020cc).

Not much is known about the risks of this vaccine for a pregnant woman or breastfeeding mother. However, pregnancy or breastfeeding are not reasons to avoid Meningococcal ACWY vaccination. A pregnant or breastfeeding woman should be vaccinated unless it is specifically contraindicated. People with minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting Meningococcal ACWY vaccine (CDC, 2020cc).

PCV13 (pneumococcal conjugate) vaccine

The person getting the vaccine should inform the healthcare provider if they have had an allergic reaction after a previous dose of PCV13, to an earlier pneumococcal conjugate vaccine known as PCV7, or to any vaccine containing diphtheria toxoid (for example, DTaP), or has any severe or life-threatening allergies (CDC, 2020cc).

In some cases, the healthcare provider may decide to postpone PCV13 vaccination to a future visit. People with minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting PCV13 (CDC, 2020cc).

PPSV23 (pneumococcal polysaccharide) vaccine

Before getting the vaccine, healthcare providers should be told if the person receiving the vaccine has had an allergic reaction after a previous dose of PPSV23 or has any severe or life-threatening allergies (CDC, 2020cc).

In some cases, the healthcare provider may decide to postpone PPSV23 vaccination to a future visit. People with minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting PPSV23 (CDC, 2020cc).

Polio vaccine

Before administering the vaccine, healthcare providers should be informed if the patient has had an allergic reaction after a previous dose of polio vaccine or has any severe or life-threatening allergies (CDC, 2020cc).

In some cases, the healthcare provider may decide to postpone polio vaccination to a future visit. People with minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting polio vaccine (CDC, 2020cc).

Rotavirus vaccine

Before administering the vaccine, healthcare providers should be informed if the patient (CDC, 2020cc):

- Has had an allergic reaction after a previous dose of rotavirus vaccine or has any severe or life-threatening allergies.
- Has a weakened immune system.
- Has severe combined immunodeficiency (SCID).
- Has had a type of bowel blockage called intussusception.

In some cases, the child's healthcare provider may decide to postpone rotavirus vaccination to a future visit. Infants with minor illnesses such as a cold may be vaccinated. Infants who are moderately or severely ill should usually wait until they recover before getting rotavirus vaccine (CDC, 2020cc).

Adult tetanus and diphtheria vaccine (TD)

Before administering the vaccine, healthcare providers should be informed if the patient has had an allergic reaction after a previous dose of any vaccine that protects against tetanus or diphtheria, has any severe or life-threatening allergies, has ever had GBS, or has had severe pain or swelling after a previous dose of any vaccine that protects against tetanus or diphtheria (CDC, 2020cc).

In some cases, the healthcare provider may decide to postpone Td vaccination to a future visit. People with minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting Td vaccine (CDC, 2020cc).

Before administering the vaccine, healthcare providers should be told if the patient (CDC, 2020cc):

- Has had an allergic reaction after a previous dose of any vaccine that protects against tetanus, diphtheria, or pertussis, or has any severe or life-threatening allergies.
- Has had a coma, decreased level of consciousness, or prolonged seizures within 7 days after a previous dose of any pertussis vaccine (DTP, DTaP, or Tdap).
- Has seizures or another nervous system problem.
- Has ever had GBS.
- Has had severe pain or swelling after a previous dose of any vaccine that protects against tetanus or diphtheria.

In some cases, the healthcare provider may decide to postpone Tdap vaccination to a future visit. People with minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting Tdap vaccine (CDC, 2020cc).

Varicella (chickenpox) vaccine

Before receiving the vaccine, healthcare providers should be told if the patient (CDC, 2020cc):

- Has had an allergic reaction after a previous dose of varicella vaccine or has any severe or life-threatening allergies.
- Is pregnant or thinks they might be pregnant.
- Has a weakened immune system or has a parent, brother, or sister with a history of hereditary or congenital immune system problems.
- Is taking salicylates such as aspirin.
- Has recently had a blood transfusion or has received other blood products.
- Has tuberculosis.
- Has gotten any other vaccines in the past 4 weeks.

In some cases, the healthcare provider may decide to postpone varicella vaccination to a future visit. People with minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should usually wait until they recover before getting varicella vaccine (CDC, 2020cc).

Self-Assessment Quiz Question #1

A 19-year-old patient is going to receive the MMR vaccine. As a child her immunization schedule was sporadic. She was raised by a single parent and the family frequently moved from one state to another. After consulting with her physician, it is decided that she should receive the vaccine. All of the following are reasons she should not get the vaccine today EXCEPT:

a. She is pregnant.
b. She received a COVID-19 vaccine 2 weeks ago.
c. She has a cold.
d. Her brother has a congenital immune system disorder.

VACCINE-PREVENTABLE DISEASES: SMALLPOX

Because immunization programs have significantly decreased the incidence of vaccine-preventable diseases, some healthcare professionals may not be as familiar as they should be with certain diseases. Even smallpox, a disease that has been declared eradicated, can pose a threat. Consider the following information.

> *President Bush today announced he has ordered smallpox vaccinations to begin for military personnel. He has also recommended medical personnel and first responders receive the vaccine, but on a voluntary basis. Administration officials stopped short of recommending widespread vaccinations of the American public. 'Men and women who could be on the frontlines of a biological attack must be protected,' the president said during an afternoon press briefing in the Eisenhower Executive Office Building. The president stressed his decision was not based on a specific threat, but on the renewed focus on security brought about by the Sept. 11, 2001, terrorist attacks and the subsequent anthrax attacks through the mail. (U.S. Department of Defense, 2002)*

After the terrorist attacks on September 11, 2001, authorities strongly considered the health status of the American public and the very real possibility of terrorists using biologic weapons in future warfare. Although the risk is considered low, there are concerns that the smallpox virus could be used for bioterrorism. In 2002, a joint working group consisting of members of the Advisory Committee on Immunization Practices and the National Vaccine Advisory Committee met in Atlanta as part of their review of smallpox vaccine recommendations. As a result of their recommendations and the occurrence of terrorist events on American soil, there is now a stockpile of enough smallpox vaccine to vaccinate every person in the United States. This stockpile also has medications that might help to treat smallpox if individuals contract the disease (CDC, 2016b).

Storage of the smallpox virus

The last confirmed case of smallpox occurred in the US in 1949. Routine smallpox vaccination ended in this country in 1972. Smallpox was declared eradicated from the planet in 1980, becoming the first time in history that medical scientists and public health workers had completely purged the world of a devastating infectious disease (CDC, 2016a).

However, even though the disease was declared eradicated, samples of the live virus were preserved for research purposes. The only verified repositories of the virus are in secure laboratories at CDC in Atlanta and the State Center for Research on Virology and Biotechnology in Koltsovo, Russia (CDC, 2016a)

There is no known immediate threat of a bioterrorist attack using the smallpox virus. However, there is concern among health authorities that some countries may have made the virus into weapons. Such weapons may have fallen (or might fall) into the hands of terrorists or other people with criminal intent (CDC, 2016a).

Concerns about using smallpox and other potentially deadly methods of bioterrorism increased when, on Tuesday, July 8, 2014, CDC announced that workers discovered stray vials of the smallpox virus from the 1950s at a federal laboratory near Washington, D.C. This was the second lapse identified in a month that involved a deadly pathogen at a government facility. Six glass vials sealed with melted glass that contained freeze-dried smallpox virus were found in a cardboard box on July 1, 2014, at a former lab that was being cleared out on the National Institutes of Health campus in Bethesda, Maryland. The vials appeared to be intact and there was no evidence that lab workers or the general public were placed at risk (Kaiser, 2014).

Although low, the risk of smallpox virus being used as a bioterrorism weapon is real. This warrants nurses and other healthcare personnel to be aware of the pathophysiology of the disease, its clinical presentation, and treatment initiatives.

Nursing consideration: Nurses and other healthcare professionals must be aware of the continued existence of smallpox virus stored in secured laboratories and of the possibility of some virus samples being stolen for use as bioterrorism weapons. They must be alert to the possibility of bioterrorism and how they may be called upon to intervene in the event of such a disaster.

Description

Smallpox, or variola, is an ancient acute, disfiguring, highly contagious infectious disease caused by the variola virus. It is often deadly. Naturally occurring smallpox was eradicated by 1980 (, 2020i). Vaccination is recommended only for certain laboratory workers and is offered to members of the military, health department officials, first responders, and key healthcare providers. If smallpox is used as a bioterrorism agent, vaccination programs are ready to be initiated (CDC, 2016a; CDC, 2016b).

After the last known naturally occurring case of smallpox in late 1975 in Bangladesh, the only known cases were caused by a laboratory accident in 1978 in Birmingham, England, which killed one person and led to a limited outbreak (CDC, 2016b).

Types of smallpox

There are two clinical forms of smallpox. First is variola major, the severe form, which had a case-fatality rate of about 30%. Second is variola minor, which occurred less often, is less severe than variola major, and had a death rate of 1% or less (FDA, 2018).

There are four types of variola major smallpox (FDA, 2018):

1. Ordinary: Historically, ordinary smallpox occurred most frequently.
2. Modified: This type was mild and occurred in previously vaccinated persons.
3. Flat: Flat type occurred less often than ordinary and modified but was usually fatal.
4. Hemorrhagic: Hemorrhagic type also occurred less often than ordinary or modified and was usually fatal. This type had a much shorter incubation period than other types and was not initially recognized as smallpox by healthcare providers. Smallpox vaccination does not provide much, if any, protection against hemorrhagic smallpox.

Etiology and incidence

Historically, smallpox affected people of all ages throughout the world. It existed for at least 3,000 years and was fatal, on average, in up to 30% of cases. In temperate zones incidence was highest during the winter, and in the tropics incidence was highest during the hot, dry months. Caused by the variola virus, smallpox was transmitted directly by person-to-person contact from respiratory droplets or from dried scales of virus- containing lesions. The virus was transmitted indirectly via contact with contaminated linens or other objects (CDC, 2017; FDA, 2018; WHO, 2016).

Smallpox had an incubation period of between 7 and 17 days after exposure. It was most infectious during the first week of illness but was contagious from onset until after the last scab was shed (CDC, 2017; FDA, 2018; WHO, 2016).

Clinical manifestations

Smallpox was generally transmitted at a slower pace compared to diseases such as measles or chickenpox. This was because by the time the patients were contagious, they were ill and in bed, and the disease was spread primarily to household members and friends. Large outbreaks in schools were uncommon (CDC, 2017; FDA, 2018; WHO, 2016).

Following the 1- to 2-week incubation period, the pre-eruptive stage of the disease developed abruptly causing chills, high fever, headache, backache, severe malaise, and – especially in children – vomiting and possible seizures. Occasionally, violent delirium, stupor, or coma occurred (CDC, 2017; FDA, 2018; WHO, 2016).

The pre-eruptive stage was followed by the appearance of a maculopapular rash (eruptive stage) that progressed to papules 1 to 2 days after the rash appeared. Vesicles appeared on the 4th or 5th day, pustules by the 7th day, and scab lesions on the 14th day (CDC, 2017; FDA, 2018; WHO, 2016).

The rash first appeared on the oral mucosa, face, and forearms. It then spread to the trunk and the legs. Lesions were also found on the palms and soles. Lesions were deeply embedded in the dermis and felt like firm, round objects embedded in the skin. As the lesions healed, scabs separated, and pitted scarring slowly developed (CDC, 2017; FDA, 2018; WHO, 2016).

Nursing consideration: Smallpox patients were most infectious during the first week of the rash when large amounts of the virus were found in saliva. Patients were no longer infectious after all scabs had separated, which was about 3 to 4 weeks after the onset of the rash FDA, 2018).

Figure 1: Smallpox patient

Rice. (n.d.b). Smallpox. *https://www.cdc.gov/smallpox/images/clinician/clinical-disease- patient.jpg*

Diagnosis and treatment

Smallpox was easily recognized before it was eradicated. Today, however, many healthcare professionals are not aware of its characteristic clinical manifestations. It is important that they become familiar with these manifestations in the event of an outbreak caused by terrorist activities. Diagnosis was made on the basis of history, clinical presentation, and isolation of the virus from lesion scrapings and aspirate of vesicles and pustules (CDC, 2017; FDA, 2018; WHO, 2016).

There is no cure for smallpox. Treatment was supportive and included strict isolation treatment of bacterial infections/ complications (CDC, 2017; CDC, 2020v; FDA, 2018; WHO, 2016).

Research indicates that in laboratory tests, tecovirimat has been shown to be effective against the variola virus in animals who had diseases similar to smallpox. Cidofovir and brincidofovir also have been shown to be effective against the variola virus in animals who had diseases similar to smallpox (CDC, 2017; CDC, 2020v; FDA, 2018; WHO, 2016).

These drugs have not been tested in people with smallpox. Thus, it is unknown whether treatment would help human patients who actually have smallpox. Tecovirimat and cidofovir are stockpiled by CDC's Strategic National Stockpile, which has medical supplies to protect the American public if a public health emergency involving smallpox occurs (CDC, 2020v).

The replication-competent smallpox vaccines (ACAM2000 and APSV) can protect people from getting sick or make the disease less severe if they receive the vaccine either before or within a week of coming in contact with smallpox virus (CDC, 2020v). Before contact with the virus, the vaccine can protect a person from getting sick. Within 3 days of being exposed to the virus, the vaccine might protect a person from getting the disease. If a person still gets the disease, the person might get much less sick than an unvaccinated person would. Within 4 to 7 days of being exposed to the virus, the vaccine likely gives a person some protection from the disease. If a person still gets the disease, the person might not get as sick as an unvaccinated person would.

Once a person has developed the smallpox rash, the vaccine will not protect (CDC, 2020v).

Points about vaccination

Anyone who has received the smallpox vaccination has some level of protection. However, it may not still be fully effective but should protect people from the worst effects of the disease. If exposure is likely, a repeat vaccine is recommended (WHO, 2016).

Currently, routine vaccination against smallpox is not recommended for the general public. Vaccine is still administered to protect researchers who work with the virus and to certain military personnel (WHO, 2016).

POLIO

To a polio victim who can no longer breathe for himself, nothing is more disheartening than the thought of spending every hour of his life flat on his back in an iron lung. In the past few years, the iron lung has been radically altered to make life within it more bearable. By enclosing the patient's head in a plastic bubble, air can be pumped in and out of his lungs while the rest of the machine is removed. Thus, long periods of therapy and nursing care are possible. Doctors are also experimenting with a new lung in which patients can actually sit up. But most encouraging of all new developments is a breathing technique which enables patients to leave their iron prisons for hours at a time. (Life Magazine, 1953, pp. 127-128)

In just over 67 years, amazing strides have been made to prevent this devastating disease. Patients once feared spending their lives confined in a cylinder-like breathing apparatus; others remained physically disabled for the rest of their lives. The development and administration of the polio vaccine has drastically reduced the occurrence of this disease to primarily small outbreaks among unvaccinated populations.

> *The biggest experiment in U.S. medical history will take place during the next few months when at least 500,000 children will be injected with a vaccine against poliomyelitis. Inoculations probably will get under way next month, in towns throughout the country and will continue into June. Then local medical teams under the National Foundation for Infantile Paralysis will wait and watch as the annual curve of polio begins to climb, slowly in June, higher in July, highest in August and September, then falls steeply again with cool weather. Comparing the amount of polio among the inoculated children with that among the uninoculated ones, a committee of leading scientists will be able to judge the vaccine's effectiveness. In theory it should produce immunity against polio in most or all of the inoculated children. The expectation is that it will produce at least some. Conceivably, it may produce none. Suppose it should produce little or none. That would be a disappointment but would not alter the fact that an effective polio vaccine can be and will be made. (Coughlan, 1954, p. 121).*

Reading this 1954 excerpt from Life Magazine gives the reader a glimpse of what it was like to be on the edge of discovering a vaccine that would theoretically save hundreds of thousands of lives. Medical advances (and communicating such advances) occurred at a much slower pace in the 1950s, a pace that is difficult for 21st century practitioners to comprehend. The excerpt gives some idea of the hopes of researchers who had worked on a polio vaccine development since 1949.

A follow-up article on May 24, 1954, discussed the vaccination process that occurred during the preceding months. It also discussed the use of gamma globulin as an anti-polio agent.

> *During the last few weeks, the famed Salk polio vaccine has been given to several hundred thousand children in a huge 'field trial,' the biggest controlled medical experiment ever attempted. Although the results won't be fully known until this winter, the trial has so far gone more smoothly than anyone had a right to expect. The only ill effects have been a few fainting and lost lunches from the tension and excitement, and a few cases of allergic reaction from the penicillin included in the vaccine. About three weeks from now, the last shots will be given. The reason for stopping the program is the advent of the annual polio "season," when, for reasons unknown, the danger of infection is worst. To prevent this seasonal factor from clouding the results of the test, the substance that holds such promise for ending polio must ironically be put aside just in time when people most need protection. Then what about the children who haven't been vaccinated – is there any way to protect them? … In 1951 and 1952, GG [gamma globulin] was tested in carefully controlled mass experiments, smaller but similar to the current vaccine trial. Results showed that if GG were given before a person was exposed to the virus, his chances of getting the disease would be reduced by 80 percent for about five weeks – not much protection but better than nothing. In 1953, GG was released for general use in different ways – one way entirely different from the method of 1951 and 1952. Behind the change of method lay a wrong but plausible scientific hunch which sprang from the worthy hope of using GG so as to do the greatest good for the greatest number. (Life Magazine, 1954, p 8).*

Traveling back to the early 1950s shows that researchers were as concerned with objective evaluation of vaccine trials as they are today. The use of gamma globulin was also a strategy used in disease prevention, similar to some prevention efforts today. Now, it is known that the polio vaccine strategies initiated in the 1950s were a resounding success. But unlike smallpox, polio has not been eradicated.

Background

Polio, also referred to as infantile paralysis or poliomyelitis, ranges in severity from mild flulike symptoms to severe, sometimes fatal, paralytic illness (Mayo Clinic, 2020f). The disease was first recorded in Egyptian carvings dated to approximately 1400 bc. It circulated at low levels during the 1800s and was considered relatively uncommon. Advances in hygiene and improvements in standards of living in the early 1900s were thought to contribute to the spread of polio. Infants who were once exposed to polio at a very young age through contaminated water had maternal antibodies and could fight off infection and develop immunity. Advances in hygiene delayed exposure until children were older and maternal antibodies wore off, leaving them with little immunity and significant opportunity for disease development. The disease reached pandemic (an epidemic that occurs over a widespread geographic area and affects a large proportion of the population) status in Europe, North America, Australia, and New Zealand during the early 1940s and 1950s (History of Vaccines, 2018).

Etiology and incidence

Polio is a highly contagious viral illness caused by the poliovirus. Between the late 1940s and early 1950s, polio disabled about 35,000 annually in the United States alone (National Institute of Neurological Disorders and Stroke, 2020). There is no cure for polio; it can only be prevented.

Despite vigorous worldwide efforts to eradicate the disease, polio continues to affect children and adults in Afghanistan and Pakistan (WHO, 2020a).

Polio has been eliminated in the United States, meaning that there is no year-round transmission of the virus in this country (CDC, 2019a). No cases of polio have originated in the United States since 1970. Yet the virus has still been brought into the country by travelers with polio; the last time this occurred was in 1993 (CDC, 2018c). Although cases of polio have decreased by over 99% since 1988, the disease still exists. Currently, only three countries in the world have never stopped transmission of polio: Pakistan, Afghanistan, and Nigeria. The polio virus can easily be imported into a polio-free country and can swiftly spread among unimmunized populations. Failure to eradicate polio throughout the world could result in as many as 200,000 new cases every year within 10 years all over the world (WHO, 2020a).

Nursing consideration: Some members of the general public, and even some healthcare professionals, may believe that polio is no longer a threat. Nurses must educate healthcare consumers about the very real dangers of polio that still exist, and of the importance of making sure that immunization is current if traveling to areas where there is a risk of contracting the disease.

Vaccination recommendations

There are two types of polio vaccines: inactivated polio vaccine (IPV) and oral polio vaccine (OPV). Oral polio vaccine is no longer administered. The last two countries to add inactivated polio vaccine to their routine immunization programs and discontinue use of OPV are Mongolia and Zimbabwe (Whyte, 2019).

Children should be vaccinated with a total of four doses of IPV, one dose each at 2 months, 4 months, 6 through 18 months old, and 4 through 6 years old (CDC, 2018f).

Children traveling to areas where polio still occurs should complete the series of vaccinations before international travel. Healthcare providers should be consulted regarding accelerating the polio vaccine regimen if the child cannot complete the routine series before leaving on the trip (CDC, 2018f).

Adults traveling to areas of the world at high risk for polio, working in a laboratory and handling specimens that may contain the polio virus, or who are healthcare workers treating patients who have or have had close contact with someone who could have polio and have never been vaccinated should receive three doses of IPV: first dose at any time, second dose 1 to 2 months later, third dose 6 to 12 months after the second (CDC, 2018f).

Adults in the preceding three groups who have had one or two doses of polio vaccine sometime in the past should receive the remaining one or two doses. Adults at increased risk of exposure to poliovirus who have previously completed a routine series of polio vaccine can receive one lifetime booster dose of IPV (CDC, 2018f).

Pathophysiology and transmission

The polio virus enters the human intestinal tract primarily via the fecal-oral route. The virus multiplies in oropharyngeal and lower gastrointestinal tract mucosa during the first 1 to 3 weeks of the incubation period. The virus may be secreted in saliva and feces during this time, leading to easy transmission from person to person. Next, the virus moves into the cervical and mesenteric lymph nodes and then into the blood stream. Only about 5% of infected patients have nervous system involvement, which causes the most adverse effects of the disease (Kishner, 2019).

Clinical manifestations

Fortunately, most people with polio have only mild symptoms or none at all. They are unaware that they have been affected by the virus (Mayo Clinic, 2020f).

Nonparalytic polio (abortive polio) is the most common form of infection and causes flulike symptoms that last for about 10 days. Following are other signs and symptoms (Mayo Clinic, 2020f):

- Fever.
- Headache.
- Sore throat.
- Vomiting.
- Fatigue.
- Back pain or stiffness.
- Neck pain or stiffness.
- Pain or stiffness in the arms or legs.
- Muscle weakness or tenderness.

The incubation period from virus exposure to the paralytic (neurologic) phase can last from 4 to 10 days but may be as long as 4 to 5 weeks (Kishner, 2019). Paralytic polio symptoms mimic the less severe form of the disease for about 7 days, at which time more severe signs and symptoms develop (Davis, 2019; Kishner, 2019). Following are the signs and symptoms (Davis, 2019; Mayo Clinic, 2020f):

- Increasing severity of muscle aches and spasms.
- Initially brisk reflexes progressing to absent reflexes.
- Muscle weakness that tends to maximize within 48 hours. No progression of weakness should be noted after temperature drops to normal for 48 hours. Weakness affects lower limbs more often that upper limbs.
- Flaccid paralysis.
- Sense of paresthesias in affected limbs without real sensation loss
- Sensitivity to touch.
- Severe muscular pain.
- Paralysis that remains for days or weeks before slow recovery begins, which can take months or years. Some paralysis may be permanent.
- Urinary retention.
- Meningeal irritation.
- Muscle atrophy.

When the disease affects the brain stem, the respiratory muscle nerves are affected, causing respiratory paralysis and producing

symptoms of encephalitis. Other signs and symptoms of this form of polio include the following (Kishner, 2019; Mayo Clinic, 2020f):

- Facial weakness.
- Diplopia.
- Dysphagia.
- Trouble chewing.
- Difficulty or inability to swallow or expel salvia.
- Food regurgitation through the nose.
- Dyspnea.
- Abnormal respiratory rate, depth, and rhythm.

Diagnosis, treatment, and nursing considerations

Diagnosis is confirmed when polio virus is isolated from throat washings obtained early in the course of the disease, feces throughout the course of the disease, and cerebrospinal fluid (CSF) cultures in patients with CNS infection (Kishner, 2019; Mayo Clinic, 2020f).

There is no cure for polio, so treatment is supportive. Analgesics are administered to reduce pain and leg spasms. Physical therapy may help to alleviate spasms and increase strength. Mechanical ventilation may be necessary if respiratory muscles are severely affected (Mayo Clinic, 2020f). Morphine is contraindicated for pain relief because it suppresses respiratory muscle function (Comerford & Durkin, 2021).

Patients remain on bed rest only until extreme discomfort resolves, which may take quite some time. Patients who have paralytic polio require extensive rehabilitation. Convalescence is prolonged and patients need significant emotional support (Kishner, 2019; Mayo Clinic, 2020f).

Critical nursing considerations include the following issues (Davis, 2019; Kishner, 2019; Mayo Clinic, 2020f):

- Meticulously monitoring for signs of paralysis and other types of neurological compromise. These complications can occur quickly, including respiratory compromise. Emergency respiratory equipment should be maintained at the patient's bedside. Nurses must be prepared to assist in a tracheotomy at the first signs of respiratory distress. Patients are placed on mechanical ventilation to maintain adequate ventilation.
- Performing vital signs and neurologic assessments at regular intervals: These patients can deteriorate rapidly, so routine vital signs need to be more frequent.
- Monitoring patients for signs of fecal impaction, which can occur with dehydration and lack of intestinal activity.
- Facilitating adequate fluid and nutritional intake.
- Providing good skin care is essential, especially for patients who suffer from paralysis.
- Using high top sneakers or a footboard to prevent foot drop.
- Placing patients on strict contact precautions: Only nurses and other healthcare professionals who have been vaccinated against polio should provide patient care.
- Reporting all cases of polio to the public health department.

POST-POLIO SYNDROME

The majority of nurses in the US are not likely to provide care for patients afflicted with polio. However, it is possible that they will encounter people dealing with post-polio syndrome. Post-polio syndrome (PPS) is a neurological disorder that affects acute paralytic polio survivors' decades (an average of 30 to 40 years) after recovery from an initial acute attack of polio (Mayo Clinic, 2020g). PPS progresses quite slowly with periods of relative stability alternating with periods of decline. PPS is characterized by new and progressive muscular weakness, pain, and fatigue. Although rarely life-threatening, PPS can significantly interfere with a person's ability to function independently. Some people experience only minor symptoms; others develop serious muscle weakness and atrophy. The most common symptoms include slowly progressive muscle weakness and fatigue. This is concerning because weakness of respiratory muscles can compromise breathing. Also worrisome is that weakness in swallowing muscles puts patients at risk for aspirating food and liquids. Joint pain and generalized muscle weakness can significantly impair mobility. Even though polio is contagious, PPS is not. Only a polio survivor can develop PPS (National Institute of Neurological Disorders and Stroke, 2020).

Incidence and etiology

The precise incidence and prevalence of PPS is unknown. It is estimated that the incidence of PPS ranges from about 22% to 68%. Prevalence of PPS is estimated at 28.5% of all paralytic polio cases. Currently, about 1.6 million cases of PPS have been documented (Kedlaya, 2019).

Some experts believe that if polio survivors are monitored long enough, 100% of them will develop some symptoms of PPS. Risk of developing PPS is significantly higher in females and in people who have sustained significant permanent impairment after having polio. Research has shown that PPS incidence peaks at 30 to 34 years after acute polio (Kedlaya, 2019).

The exact cause of PPS is unknown. However, several theories attempt to explain the syndrome. One theory involves the degeneration of individual nerve terminals in neural motor units. In an attempt to compensate for the loss of polio-affected neurons, surviving cells sprout new nerve-end terminals that connect with other muscle fibers. These new fibers may initially help in recovery but, over time, the increased workload and stress placed upon them causes a slow degeneration of neurons. Some experts hypothesize that PPS is caused by the usual stressors of age and weight gain (National Institute of Neurological Disorders and Stroke, 2020).

Nursing consideration: Research has shown that PPS can have devastating consequences for people who have survived initial infection by the polio virus (Kedlaya, 2019). But not all healthcare professionals may be aware of the syndrome. Nurses are obliged to educate patients, families, and colleagues about PPS, its effects, and how to help patients cope with the effects of the syndrome.

Diagnosis

Diagnosis is based on history and clinical manifestations. There are no laboratory tests that are specific to PPS and symptoms vary among patients (National Institute of Neurological Disorders and Stroke, 2020).

Diagnostic criteria for PPS are published by the March of Dimes and have been validated by a team of international experts. These criteria include the following (National Institute of Neurological Disorders and Stroke, 2020):

- Prior paralytic poliomyelitis with evidence of motor neuron loss: Motor neuron loss is confirmed by a history of acute paralytic polio, signs of residual weakness and atrophy of muscles on neuromuscular exam, and signs of motor neuron loss on electromyography (EMG). On rare occasions some people present with PPS symptoms who have had only subtle paralytic polio symptoms with no obvious deficit. These patients should have their original polio diagnosis confirmed with an EMG study rather than simply a reported history.
- A period of partial or complete functional recovery after acute paralytic poliomyelitis followed by an interval (of usually 15 or more years) of stable neurologic function.
- Gradual progressive and persistent new muscle weakness or decreased endurance, with or without generalized fatigue, muscle atrophy, or muscle and joint pain: Sudden onset of PPS may follow a period of inactivity, trauma, or surgery. Less often, symptoms associated with PPS may lead to new problems with breathing or swallowing.

- Signs and symptoms must persist for at least 1 year. Other neurologic, medica,l or orthopedic problems must be ruled out as causes of symptoms.

Treatment and nursing considerations

At this time there are no effective pharmaceutical treatments to stop or prevent deterioration or reverse the syndrome's adverse effects. Focus is on identifying interventions that reduce symptoms and improve quality of life. Several controlled research studies have shown that non-fatiguing exercises may improve muscle strength and reduce fatigue (National Institute of Neurological Disorders and Stroke, 2020).

National Institutes of Health (NIH) researchers have tried treating PPS patients with high doses of prednisone. Although patients demonstrated mild improvement, results were not statistically significant and the side effects of steroid treatment outweighed the benefits. Therefore, it was determined that steroid therapy should not be used to treat PPS (National Institute of Neurological Disorders and Stroke, 2020).

Additional treatment options under investigation include preliminary studies that suggest that intravenous immunoglobulin may reduce pain and improve quality of life. A small trial that used the anticonvulsant lamotrigine to treat fatigue showed modest effects. But larger, more controlled studies are needed in order to validate these findings (National Institute of Neurological Disorders and Stroke, 2020).

Recommended PPS management strategies include the following (Mayo Clinic, 2020g; National Institute of Neurological Disorders and Stroke, 2020):

- Exercise under the supervision of healthcare professionals who have experience in PPS syndrome: Exercise must be carefully prescribed and meticulously monitored, and it is most likely to benefit muscle groups that were least affected by polio. Exercise prescriptions should address the specific muscle groups to include or exclude the type of exercise, its frequency, and its duration.
- Cardiopulmonary endurance training is usually more beneficial than strengthening exercises. Frequent breaks should be implemented with energy conservation techniques. Intense resistive exercises and weightlifting may cause damage and can further weaken, rather than strengthen, affected muscles.
- Physical therapy may help strengthen muscles.
- Speech therapy may help to compensate for swallowing problems.
- Pain relievers (Tylenol, Advil) may help to ease muscle and joint pain.

Patients with PPS may benefit from joining support groups that encourage self-help strategies and positive recommendations.

Nursing consideration: Patients and caregivers should be taught that exercise should be reduced or discontinued if it leads to additional weakness, fatigue, or excessive recovery time from the effects of exercising. Muscles should not be exercised to the point of causing pain, fatigue, or weakness. All exercise programs must be monitored by experienced healthcare professionals (National Institute of Neurological Disorders and Stroke, 2020).

There is no known way to prevent PPS. Polio survivors should take steps to live a healthy lifestyle, including eating a well-balanced, nutritional diet, getting plenty of rest, avoiding smoking, using prescribed assistive devices, and following a medically prescribed exercise program. Taking anti-inflammatory medications under a physician's supervision may help reduce PPS symptoms (National Institute of Neurological Disorders and Stroke, 2020).

Self-Assessment Quiz Question #2

When counseling patients and their families about polio, it is important to explain which of the following?

a. The polio vaccine is not recommended for anyone born after 1975.
b. Oral polio vaccine (OPV) is recommended for children.
c. It is recommended that adults do not receive polio vaccine.
d. Children should be vaccinated with a total of four doses of IPV.

Critical thinking scenario

Amanda, a 65- year-old retired investment banker, is looking forward to the birth of her first grandchild. Her son and daughter-in-law have asked that all close family members check with their healthcare providers to be sure that their pertussis (whooping cough) immunization (and all other immunizations) is current. They are rightfully concerned about their baby's well-being. Amanda is insulted. "I never had whooping cough, and it's not a problem anymore anyway. I'm not going to get any more vaccines at my age." Her son explains that whooping cough is still common in the United States. Amanda still refuses to comply with his request. Her refusal has led to estrangement from her son and daughter-in-law. Amanda, however, remains adamant and is not going to worry about "diseases that don't cause problems anymore."

PERTUSSIS VACCINATION

Pertussis, commonly known as whooping cough, is an extremely contagious respiratory tract infection. Its effects can become serious, even deadly, especially in infants. For this reason, it is imperative that pregnant women and others who will have close contact with an infant be vaccinated against pertussis (CDC, 2021d; Mayo Clinic, 2019e). Grandparents and other older adults that have contact with infants can pose a particular risk and should be immunized.

Since pertussis vaccines were introduced in the 1940s, reported cases of the disease have declined significantly from more than 100,000 annually to fewer than 10,000 by 1965. But during the 1980s, pertussis reports began to gradually increase. By 2015 (the most current year of available data), more than 20,000 cases were reported throughout the United States (CDC, 2019d; CDC, 2019e; Mayo Clinic, 2020b).

The incidence of whooping cough is believed to be increasing for two main reasons: The pertussis vaccine immunity received when vaccinated as a child has decreased, leaving most teenagers and adults susceptible to the disease during an outbreak. Children are not fully immune until they have received at least three injections. This means that infants 6 months of age and younger are at highest risk for contracting the disease (Harvard School of Public Health, 2017).

Several forms of the vaccine are used to prevent diphtheria, tetanus, and pertussis. Some forms are combined with vaccines to prevent other diseases and thus reduce the number of injections received at one time. In the US, children younger than 7 years of age receive DTaP. Older children, teens, and adults get Tdap (CDC, 2021b).

In the US, DTaP is given to infants and children to prevent diphtheria, tetanus, and pertussis. They should receive five doses of this vaccine, usually administered at 2, 4, 6 months, 15 through 18 months, and 4 through 6 years of age. DT can be used for infants and children who should not receive acellular pertussis-containing vaccines (CDC, 2021d).

Following are additional vaccine recommendations (CDC, 2021b; CDC, 2021d):

- Adolescents should receive a single dose of Tdap, preferably at 11 to 12 years of age.
- Pregnant women should receive a single dose of Tdap during every pregnancy, preferably at 27 through 36 weeks' gestation. The rationale for receiving Tdap with every pregnancy is that antibodies to the disease decrease over time; therefore, antibody levels will not remain high enough to provide adequate protection for future pregnancies.
- Tdap is recommended only in the immediate postpartum period before discharge from the hospital or birthing center for new mothers who have never received Tdap before or whose vaccination status is unknown.
- A dose of Tdap can be given at any time for adults who have never received it.

Nursing consideration: Some vaccines are contraindicated during pregnancy; others, such as the pertussis vaccine, are recommended during each pregnancy. Nurses must know the guidelines for vaccine administration, including guidelines during pregnancy. This CDC resource provides information on current recommendations: https://www.cdc.gov/vaccines/schedules/index.html

Incidence and etiology

Pertussis is caused by the nonmotile gram-negative coccobacillus called Bordetella pertussis (B. pertussis). Pertussis is characterized by a violent cough that becomes paroxysmal and usually ends in a high-pitched inspiratory "whooping" sound. The disease is most severe in older adults and in infants. Death in children younger than 1 year of age is most often caused by pneumonia and other complications of the disease (CDC, 2019d).

Pertussis is transmitted directly through inhalation of contaminated respiratory droplets and indirectly from contact with soiled linen and other items contaminated by respiratory secretions (Mayo Clinic, 2019e; Meadows-Oliver, 2019).

Pertussis complications can be life-threatening. A number of complications are associated with pertussis Mayo Clinic, 2019e; Meadows-Oliver, 2019):

- Aspiration pneumonia.
- Atelectasis.
- Coma.
- Conjunctival hemorrhage.
- Convulsions.
- Detached retina.
- Emphysema.
- Encephalopathy.
- Epistaxis.
- Periorbital edema.
- Pneumonia.
- Pneumothorax.

Clinical manifestations

The incubation period is about 5 to 10 days, after which the bacteria enter the trachea-bronchial mucosa. Pertussis follows a characteristic 6- week course that includes three stages: catarrhal, paroxysmal, and convalescent. Each of these stages lasts about 2 weeks. The disease is most communicable just before the catarrhal stage to 3 weeks after onset of the paroxysms or until coughing has stopped (CDC, 2019d; Mayo Clinic, 2019e).

Stage 1: Catarrhal stage: During the first stage of pertussis, symptoms are generally mild and resemble a common cold that lasts from 1 to 2 weeks (CDC, 2019d; CDC, 2019e; Mayo Clinic, 2019e). Signs and symptoms of the catarrhal stage, during which the disease is highly communicable, include the following (CDC, 2019d; CDC, 2019e; Mayo Clinic, 2019e):

- Anorexia.
- Dry, hacking cough that is often worse at night.
- Infected conjunctiva.
- Low-grade fever.
- Nasal congestion.
- Red, watery eyes.
- Sneezing.

Stage II: Paroxysmal stage. After about 7 to 14 days, the paroxysmal stage begins. This stage is characterized by the accumulation of thick mucus that accumulates in the airways, leading to uncontrollable coughing, and lasts for2o to 4 weeks or longer. The paroxysmal cough is characteristic of the disease and ends in a loud, inspiratory whoop sound. This stage can last from 1 week to as long as 10 weeks (CDC, 2019d; CDC, 2019e; Mayo Clinic, 2019e).

Sometimes coughing is so severe and prolonged that the following clinical manifestations occur (CDC, 2019d; CDC, 2019e; Mayo Clinic, 2019e):

- Atelectasis.
- Bruised or cracked ribs.
- Conjunctival hemorrhage.
- Detached retina that may lead to blindness.
- Epistaxis (nosebleed).
- Hemorrhage of the eye's anterior chamber.
- Increased venous pressure.
- Inguinal, abdominal, or umbilical hernia.
- Choking on the thick mucus, which can lead to nausea and vomiting. Periorbital edema.
- Pneumonia.
- Rectal prolapse.
- Respiratory distress.
- Seizures.
- Vomiting.

Stage III: Convalescent stage: The convalescent stage can last from 2 weeks to several months. Paroxysmal coughing gradually subsides. However, such coughing may reoccur with respiratory infections. For months afterward even slight respiratory infections may cause the patient to develop paroxysmal coughing. In some patients the convalescent stage may last for weeks, months, or even years (CDC, 2019d; CDC, 2019e; Mayo Clinic, 2019e).

Diagnosis

Classic clinical manifestations and history suggest a diagnosis of pertussis. The following tests can confirm the diagnosis (CDC, 2019d; CDC, 2019e; Mayo Clinic, 2019e):

- Nose or throat culture: A nose, throat, or suction sample is obtained and cultured.
- White blood cell count: Although not specific for pertussis, an elevated white blood cell count suggests infection or inflammation.
- Chest X-ray: A chest X-ray may be performed to assess for pneumonia or fluid in the lungs.

Treatment

Treatment consists of vigorous supportive therapy, including fluid and electrolyte replacement, especially for infants, who are generally hospitalized. Older children and adults usually receive treatment at home. Following are additional treatment measures (CDC, 2019d; CDC, 2019e; Mayo Clinic, 2019e; Meadows-Oliver, 2019):

- Administrating antipyretics.
- Administrating antibiotics to prevent disease progression and treat secondary infections.
- Administrating mild sedation and codeine to reduce coughing.
- Facilitating bed rest.
- Implementing a quiet, restful environment.
- Providing adequate nutrition and facilitating fluid intake.
- Implementing gentle suctioning of infants as necessary.
- Providing oxygen therapy as needed.

Nursing concerns: A number of nursing concerns are associated with pertussis. Although most older children and adults are treated at home, they (and their families) must know how to facilitate recovery. Infants are usually hospitalized (Mayo Clinic, 2019e; Meadows-Oliver, 2019).

- Droplet precautions (surgical masks only) should be in place for 5 to 7 days after initiating antibiotic therapy. The wearing of masks for family/household members depends on the likelihood of transmission, the immune status of household members, and the health of people in close contact with the patient.
- The environment should be as quiet and calm as possible. Stressors should be reduced as much as possible. These interventions should help to reduce coughing.
- Because codeine can cause nausea and constipation, patients should be observed for both. Patients should eat small frequent meals to facilitate nutritional intake in the presence of anorexia, nausea, and paroxysmal coughing. Fluids and an adequate diet can help reduce constipation. If constipation becomes significant, laxatives may be administered.
- Infants may need suctioning, which should be gently performed. During suctioning, patients must be carefully monitored for respiratory distress because suctioning removes oxygen while removing secretions.
- Change soiled linens as often as needed and as soon as possible after contamination.
- Waste containers for the disposal of tissues and other items contaminated by respiratory droplets should be within easy reach and emptied often.
- Empty suction bottles at least once a shift or more often if necessary to decrease exposure to contaminated contents.
- Report all pertussis cases to public officials as soon as possible.

Family members, work colleagues, friends, day care personnel, and others who have had close contact with the patient should have their immune status evaluated (CDC, 2019d; CDC, 2019e; Mayo Clinic, 2019e).

The parents of infants with whooping cough need emotional support because infants generally become quite ill. Nurses should ensure that parents receive accurate information about the pertussis vaccine and other available vaccines to stop the spread of vaccine-preventable diseases (Meadows-Oliver, 2019).

DIPHTHERIA

Diphtheria is an acute toxin-mediated upper respiratory infection caused by Corynebacterium diphtheria. Nontoxic strains also cause disease, which is usually mild (Demirci, 2019). Once a major cause of illness and death in children, diphtheria was responsible for 15,520 deaths (out of 206,000 reported cases) in 1921. Fortunately, thanks to successful vaccination initiatives that began in the 1920s, the incidence of diphtheria decreased rapidly in the US and other countries that implemented vaccination programs. However, diphtheria continues to cause disease globally (CDC, 2020c).

Before the development of effective treatment, diphtheria was fatal in up to 50% of reported cases. Currently, the overall case-fatality rate for diphtheria is 5% to 10%. Higher fatality rates of up to 20% are reported in children younger than 5 years of age and in adults over the age of 40 (CDC, 2020c).

Vaccination

Four vaccines provide protection against diphtheria:

1. The DTaP vaccine protects children from diphtheria, tetanus, and whooping cough.
2. The DT vaccine protects young children from diphtheria and tetanus.
3. The Tdap vaccine protects preteens, teens, and adults from tetanus, diphtheria, and whooping cough.
4. The Td vaccine protects preteens, teens, and adults from tetanus and diphtheria.

The vaccine options used to prevent diphtheria include protection against tetanus and may include pertussis as well. Children should receive five doses of the diphtheria, tetanus toxoids, and acellular pertussis (DTaP) vaccine, one dose at each of the following ages (HHS.gov., 2020a):

- 2 months.
- 4 months.
- 6 months.
- 15 through 18 months.
- 4 through 6 years.

Preteens and teens (ages 7 through 18) should receive one booster shot of the Tdap at age 11 or 12 as part of their routine vaccination schedule. Adults age 19 and older need one booster shot of the Td vaccine every 10 years as part of routine vaccine schedule. Pregnant women need one booster shot of the Tdap vaccine during the third trimester of each pregnancy (HHS.gov., 2020a).

Transmission and pathophysiology

Diphtheria is transmitted through intimate contact, contact with airborne respiratory droplets, and by direct contact with contaminated articles and the environment. Asymptomatic carriers, currently sick people, and convalescing patients may transmit the disease. Infected people who have not been treated may spread the disease for up to 6 weeks even if they are asymptomatic. Diphtheria is very rare in the US and other developed countries thanks to widespread vaccination efforts, but the disease is still common in countries where vaccination rates are low (Mayo Clinic, 2020a).

Diphtheria can be treated with medication. In its advanced stages, diphtheria can damage the heart, kidneys, and nervous system. Even with treatment in these stages, diphtheria can be fatal, particularly in children (Mayo Clinic, 2020a). In more than 90% of patients, the tonsils or the pharynx are the primary areas affected by diphtheria infection. The nose and larynx are the next most common sites (Demirci, 2019).

The organisms that cause the disease generally stay in the superficial layers of skin lesions or respiratory mucosa causing local inflammatory reactions. The major virulence of the diphtheria pathogens is their ability to produce a potent exotoxin that interferes with protein synthesis, causing necrosis of local tissues and forming false membranes on mucosal surfaces (Demirci, 2019).

Clinical manifestations

The incubation period for diphtheria is from 2 to 5 days. There are several forms of the disease, the most common being tonsillar and pharyngeal diphtheria. Attempts to remove the membrane that develops with the disease usually cause bleeding, which is characteristic of the disease (Demirci, 2019).

This form of diphtheria usually begins with a sore throat. Fever, if it occurs, is usually less than 102 °F. Patients may experience general malaise, anorexia, and headache, but these are not prominent characteristics of the disease (CDC, 2020c; Demirci, 2019; Mayo Clinic, 2020a).

More characteristic symptoms include the following clinical manifestations (CDC, 2020c; Demirci, 2019; Mayo Clinic, 2020a):

- Formation of a patchy, thick, grayish-green membrane over the mucus membranes of the pharyngeal walls, tonsils, uvula, and soft palate: The membrane may extend to the larynx and trachea. This can cause airway obstruction and even suffocation.
- Edema of the tissues of the throat and neck: Edema of the neck may become so severe that a characteristic "bull neck" appearance develops. Patients may throw back their heads to relieve pressure on the throat and larynx.
- Development of edema associated with pharyngeal diphtheria obliterates the angle of the jaw, the borders of the sternocleidomastoid muscle, and the medical border of the clavicles.
- Paralysis of the palate muscles making it difficult to swallow.
- Development of lymphadenopathy: Fever and rapid pulse may also develop.

Neurological complications correspond to the extent of the primary infection and include the following (CDC, 2020c; Demirci, 2019; Mayo Clinic, 2020a):

- Paralysis of the soft palate.
- Weakness of facial, laryngeal, and pharyngeal nerves, which makes it difficult to swallow, thereby increasing the risk of aspiration. Such weakness also makes the voice sound harsh, with an accompanying nasal quality.
- Development of cranial neuropathies during the fifth week of infection: This can cause blurred vision, strabismus, and compromised visual accommodation.
- Development of motor function deficit and diminished deep tendon reflexes.

Paralysis of the diaphragm can occur, seriously compromising respiratory status and leading to respiratory arrest (CDC, 2020c; Demirci, 2019; Mayo Clinic, 2020a).

Evidence-based practice! Research has shown that the extent of the disease correlates with significant prostration, presence of bull neck, and airway compromise (CDC, 2020c; Demirci, 2019; Mayo Clinic, 2020a.)

Laryngeal and nasal diphtheria

Following are signs and symptoms of laryngeal and nasal diphtheria, which occur most often in infants (CDC, 2020c; Demirci, 2019; Mayo Clinic, 2020a):

- Low-grade fever.
- Stridor.
- Barking cough.
- Hoarseness that can progress to loss of voice.
- Whitish-gray membrane over nasal septum.
- Respiratory tract obstruction.
- Acute inflammation of the mucus membranes of the nasal cavities.
- Foul oral odor.

Cutaneous diphtheria

Cutaneous (affecting the skin) diphtheria may occur at one or multiple sites. It is generally localized to areas of the skin that have sustained mild trauma (CDC, 2020c; Demirci, 2019; Mayo Clinic, 2020a).

Clinical manifestations include pain, erythema, and exudate at the infection site. Ulceration develops. Lesions have clearly defined borders with a brownish-gray membrane. The extremities are the most likely sites of infection. Cutaneous diphtheria may linger for weeks to months (CDC, 2020c; Demirci, 2019; Mayo Clinic, 2020a).

Complications

A number of complications are associated with diphtheria, including the following (CDC, 2020c; Demirci, 2019; Mayo Clinic, 2020a):

- Cardiac compromise.
- Gastritis.
- Hepatic compromise such as hepatitis.
- Myocarditis.
- Neurologic compromise.
- Paralysis.
- Renal involvement such as nephritis.
- Thrombocytopenia.

Diagnosis

Diagnosis is made based on the characteristic membrane and a throat culture or other suspected lesions for Corynebacterium diphtheria (CDC, 2020c; Demirci, 2019; Mayo Clinic, 2020a):

Treatment and nursing considerations

People who have probable or confirmed diphtheria are eligible to receive diphtheria antitoxin (DAT), which is the mainstay of treatment, either intramuscularly or intravenously. Although not licensed by FDA, DAT is authorized for distribution to physicians as an investigational new drug (CDC, 2020d).

DAT neutralizes free toxins only. It is not recommended for asymptomatic carriers. Asymptomatic carriers receive the following interventions (CDC, 2020d; Demirci, 2019):

- A 7-to 10-day course of prophylactic antimicrobial therapy.
- An age-appropriate form of diphtheria vaccine if the person has not received a booster within 1 year.
- Placement in respiratory or contact isolation (for cutaneous findings) until at least two subsequent cultures, taken 24 hours apart after therapy has stopped, are negative.
- Repeat cultures are taken at a minimum of 2 weeks after therapy is complete. If results are positive, a 10-day course of oral erythromycin is initiated.

In addition to DAT, symptomatic patients with diagnosed diphtheria receive the following treatment interventions (Demirci, 2019):

- Antibiotic therapy (penicillin, erythromycin) to eliminate the organisms from the upper respiratory sites and other affected areas.
- Cardiac monitoring.
- Respiratory support measures as needed.
- Bed rest may be initiated for 2 to 3 weeks.
- Keeping the patient hydrated.
- Isolation with contact and droplet precautions until obtaining two to three consecutive negative nasopharyngeal cultures at least 2 weeks after completing drug therapy.
- Maintaining the environment at high humidity, especially for laryngeal diphtheria patients.
- Reporting all diphtheria cases to the public health department.

Patients must be monitored for signs of shock, which can develop abruptly. They must be constantly monitored for respiratory distress, and equipment for immediate life support such as intubation and tracheotomy must be kept near the bedside (Demirci, 2019).

The best practice is prevention through proper immunization. Nurses should teach patients of all ages about the need, not only for age- appropriate childhood immunization, but also for adolescent and adult immunization. Protective immunity does not last more than 10 years after the last vaccination. Therefore, people should receive a booster dose every 10 years (HHS.gov., 2020a).

INFLUENZA

> *Breakthrough by Du Pont: A Drug that Blocks Viruses. Only last year, when a model of the flu virus appeared on Life's cover, there existed no pill or capsule a doctor could prescribe to combat it, or, for that matter, any other virus. But a fascinating new drug called Symmetrel is just going on the market and will forever change the situation. Because of it, the flu virus – at least the dreaded A2 variety popularly known as Asian flu – has lost its supreme chemical invulnerability, offering hope that other virus enemies will soon lose theirs. (Rosenfeld, 1967, pp. 60A-61A)*

The preceding excerpt from the February 10, 1967, issue of Life Magazine shows how the quest for agents to combat influenza has progressed. In 1967, Symmetrel was considered a breakthrough drug in the fight against the disease. Today, the generic form of Symmetrel, amantadine, is used as an anti-Parkinson agent. For the past several years, CDC has advised physicians not to use amantadine to treat or prevent influenza because it has not shown to effectively prevent most types of influenza virus (Comerford & Durkin, 2021; Ratini, 2020). In 1967, the drug was one of the starting points for antiviral drug investigation and is still prescribed by some physicians as an antiviral agent to treat influenza today.

Vaccination

The most effective way to treat influenza, or the "flu" as it is commonly known, is to prevent it through an annual vaccination for the specific strains predicted to cause the disease in a given year. Each year the influenza vaccine is unique to the anticipated strains and should be administered starting in October.

As of October 2020, an estimated 33% of states require hospitals to offer flu shots or track their vaccination statuses to help boost flu vaccination rates in healthcare settings. The following 17 states mandate that hospitals offer flu vaccines or report employees' vaccination status (Bean, 2020a):

- California.
- Colorado.
- Georgia.
- Illinois.
- Maine.
- Maryland.
- Massachusetts.
- Nebraska.
- Nevada.
- New Hampshire.
- New Jersey.
- New York.
- Oklahoma.
- Oregon.
- Rhode Island.
- South Carolina.
- Tennessee.

CDC recommends that workers in healthcare settings get annual flu vaccine. The issue of mandating the flu vaccine for healthcare workers by their employers is controversial. Appropriate exemptions are typically respected, but refusing to vaccinate may have other consequences. CDC also recommends that employees be provided with the opportunity to receive an exemption under certain medical and religious circumstances (CDC, 2020j; Williamson, 2019).

There are pros and cons to mandatory vaccination. Some pros include the following (Williamson, 2019):

- Lower rates of influenza among healthcare professionals.
- Fewer employee absences related to flu.
- Lower patient mortality rates.
- Financial benefits to the healthcare facility because of fewer absences and lower mortality rates.

Cons of requiring flu shots include the following (Williamson, 2019):

- Time needed to identify those who have exemptions and make arrangements for such exemptions.
- Concern of employees who may have had a bad experience after receiving a prior flu shot or other vaccines.
- Time needed to review legal and ethical mandates regarding vaccination and what exemptions are currently in place.

Some healthcare facilities have established a mandatory flu vaccination program. First responders, military personnel, nursing home personnel, and teachers and staff of day cares and schools are at higher risk and should be immunized early in the flu season. Mandatory programs such as the Johns Hopkins Health System's 2020-2021 Mandatory Flu Vaccination program include the following information: the mandatory flu vaccination campaign began in September 2020; every staff and faculty member, resident, postdoctoral fellow, medical student, and volunteer who works with patients or works in a patient care area or building must receive a flu vaccination; deadline to request a medical or religious exception is Tuesday, November 10, 2020 (Johns Hopkins Health System, 2020).

Nursing consideration: Note that there is a mechanism for requesting exception to vaccination. Healthcare consumers should consult their respective state laws to find out how to apply for exemptions. Healthcare workers who decline the immunization may be transferred to areas where there is limited contact with patients.

The influenza vaccine contains three or four virus strains and changes annually, based on predictions of predominant strains that are expected to dominate the upcoming flu season. It is recommended that people age 6 months and older receive age-appropriate forms of the influenza vaccine annually unless medically contraindicated (Blair, 2018; Mayo Clinic, 2020c).

Etiology and incidence

Influenza, or the grippe, is an extremely contagious acute viral infection of the respiratory tract. Influenza is caused by three different types of virus families and occurs sporadically throughout the year or in epidemics, usually during the colder months. The disease is usually self-limiting (Blair, 2018; Mayo Clinic, 2020c).

People of all ages contract influenza, but the incidence is highest in school-age children. Influenza is most severe and most often leads to complications in young children, older adults, and those who suffer from chronic diseases (Blair, 2018; Mayo Clinic, 2020c).

Influenza is transmitted directly through inhalation of infected respiratory droplets and indirectly via contact with an object contaminated by respiratory secretions, such as a drinking glass or article of clothing (Blair, 2018; Mayo Clinic, 2020c).

Between 5% and 20% of the US population contracts influenza annually. Up to 49,000 deaths in a single year have been reported (Blair, 2018).

Risk factors

Certain factors increase a person's risk for contracting influenza or developing complications, including the following (American Lung Association, 2020; Blair, 2018; Mayo Clinic, 2020c):

- Age: The people most often affected by seasonal influenza are young children under the age of 5 and people over the age of 65. Occasionally, strains of the virus may target other groups. For example, the H1N1 virus responsible for the 2009 pandemic targeted teenagers and young adults.
- Chronic illnesses: Chronic health problems – such as cardiovascular disease, diabetes, or COPD– increase the risk of influenza complications.
- Compromised immune system: People whose immune systems are compromised because of cancer treatment, having HIV/AIDS, or taking antirejection drugs or corticosteroids are at higher risk for developing influenza and for suffering from its complications.
- Environment/living conditions: People who live in close contact with others, such as residents in long-term care facilities or soldiers in barracks, are at higher risk for contracting influenza.
- Occupations: Healthcare workers and people who work with children (day care personnel, teachers) are at a higher risk of contracting influenza.
- Pregnancy: Pregnant women are more likely to develop influenza complications, especially in their second and third trimesters and up to 2 weeks postpartum.

Complications

Influenza can cause a number of complications, including the following (American Lung Association, 2020; Blair, 2018; Mayo Clinic, 2020c):

- Bronchitis.
- Ear infections.
- Encephalitis.
- Exacerbation of chronic obstructive pulmonary disease (COPD). Myocarditis (rare).
- Pericarditis (rare).
- Pneumonia (the most common complication). Reye's syndrome.
- Sinus infections.

Pathophysiology

The influenza virus causes disease by invading the epithelium of the respiratory tract where it causes inflammation and desquamation. The virus is classified into one of three categories (CDC, 2019k; CDC, 2020f; CDC, 2020g):

1. Type A: most common type of influenza virus: It occurs every year with various new serotypes that cause epidemics every 3 years.
2. Type B: occurs annually and causes epidemics only every 4 to 6 years.
3. Type C: is endemic and causes only sporadic outbreaks.

The influenza virus multiplies within the respiratory system along the following track (CDC, 2019k):

- The influenza virus contains RNA that is covered and protected by a layer of protein. The RNA carries the code for viral replication. The virus's genetic material has an astonishing ability to mutate, leading to various new viral strains.
- The virus (like all viruses) needs a host cell to replicate its genetic material and protein. After attaching itself to the host cell, the virus replicates into new virus components that invade additional healthy cells.
- The virus invades the host cells, destroying them. This destruction interferes with normal respiratory defense mechanisms, leaving the patient susceptible to secondary bacterial infections.

Clinical manifestations

After a 1 to 4 day incubation period, there is an abrupt onset of the following symptoms (CDC, 2019k; CDC, 2020f; Mayo Clinic, 2020c):

- Chills.
- Conjunctivitis.
- Fatigue.
- Fever above 104 °F.
- Headache.
- Hoarseness.
- Laryngitis.
- Malaise.
- Myalgia (especially predominant in the limbs and in the back).
- Nasal congestion.
- Rhinorrhea.
- Rhinitis.
- Sore throat.

Acute symptoms generally diminish within 3 to 5 days, but cough, fatigue, and weakness may persist for weeks, especially in older adults. Fever is generally higher in children than in adults, and croup and cervical adenopathy (lymphadenopathy of the cervical lymph nodes) are commonly found in children with influenza (Mayo Clinic, 2020c).

Diagnosis

Generally, diagnosis requires only a patient history, physical assessment, and the presence of signs and symptoms. The diagnosis may be confirmed by isolating the virus from pharyngeal or nasal secretions or by identifying viral antigens in nasopharyngeal cells using a fluorescent antibody test, known as the enzyme-linked immunosorbent assay, or ELISA. The standard for diagnosing influenza A and B is a viral culture of nasopharyngeal samples or throat samples. The rapid influenza antigen test can be performed in the office and can show results in 15 to 30 minutes. Chest X-ray in older adults and other high-risk patients is recommended to rule out pneumonia. Additionally, rapid diagnostic tests that have a high degree of specificity but moderate sensitivity are being used more often as part of the diagnostic process (Mayo Clinic, 2020c; Pagana & Pagana, 2018).

Treatment and nursing considerations

Because influenza is a virus, it cannot be treated with antibiotics that are often requested by patients. Treating uncomplicated influenza consists largely of supportive measures such as the following (CDC, 2020h; Mayo Clinic, 2020c).

- Over-the-counter age-appropriate medicines to reduce fever and relieve aches and pains, such as acetaminophen (Tylenol), aspirin, or ibuprofen (Advil, Motrin IB).
- Cough medicines (antitussives) to relieve nonproductive coughing.
- Rest and sleep to help the immune system combat the infection.
- Increasing fluid intake to help prevent dehydration and reduce fever. Patients should avoid fluids with caffeine, which may make it difficult to sleep.

Nursing consideration: Nurses must remind parents and other caregivers that children and teenagers should not be given aspirin. Research has shown that aspirin increases the risk for Reye's syndrome in these populations (Comerford & Durkin, 2021).

Persons with a severe infection or who are at higher risk for complications may be prescribed an antiviral drug. Such drugs can include oseltamivir (Tamiflu), zanamivir (Relenza), peramivir (Rapivab), and baloxavir (Xofluza; Mayo Clinic, 2020c).

These kinds of drugs may reduce the length of illness by a day or so and help to prevent serious complications. Oseltamivir is an oral medication. Zanamivir is inhaled via inhaler, but zanamivir should not be used by anyone with chronic respiratory problems such as asthma or lung diseases (Mayo Clinic, 2020c).

Side effects include nausea and vomiting, which may be decreased if the medications are taken with food. It is important to note that most circulating strains of influenza have become resistant to amantadine and rimantadine (Flumadine). These older antiviral drugs are no longer recommended (Mayo Clinic, 2020c).

Because most uncomplicated cases of influenza do not require hospitalization, nurses should teach patients and family members about the supportive measures described above. They should also advise that friends and family who do not live in the home with the patient should avoid visits to prevent spreading the disease and to protect the patient from acquiring additional infections from such visitors (CDC, 2020g; Mayo Clinic, 2020c).

In addition, healthcare professionals should encourage patients and family members to wash their hands frequently, especially after touching potentially contaminated articles such as telephones, bedclothes, and tissues (Blair, 2018). Healthcare professionals should teach patients and their family members to recognize the signs and symptoms of complications and what action to take if they occur.

Following are recommendations for influenza vaccination (Blair, 2018; CDC, 2020g; Mayo Clinic, 2020c):

- People 6 months of age and older should receive an annual flu vaccine.
- People at high risk for serious complications of influenza – such as young children, people older than 65, individuals with chronic health conditions, and pregnant women – should receive an annual flu vaccine.
- Those who care for children younger than 6 months of age should be vaccinated because these infants are at high risk for serious forms of the disease. Transmission of the disease from unvaccinated people to children is a significant risk.

Prevention

The best preventive strategy against influenza is appropriate vaccination. But not everyone vaccinated people come into contact with has received the influenza immunization; therefore, good hygiene measures should be implemented to help reduce the spread of influenza and other communicable diseases. Frequent, thorough handwashing has proven to be the best way to prevent the transmission of many communicable diseases. Individuals should wash their hands vigorously for at least 15 seconds. If soap and water are not available, they should use an alcohol- based hand sanitizer. Sick people should cover their mouths and noses with a tissue, dispose of contaminated tissues in a covered trash container, and wash their hands afterward with soap and water or alcohol-based hand sanitizers. During peak flu season, individuals should avoid crowds as much as possible to reduce their chances of infection (Mayo Clinic, 2020c).

Self-Assessment Quiz Question #3

What should be done if a patient is an asymptomatic carrier of diphtheria?

a. Administer diphtheria antitoxin (DAT).
b. Place in respiratory or contact isolation.
c. Initiate a 5-day course of antimicrobial therapy.
d. Encourage aerobic exercise three times per day.

MEASLES (RUBEOLA)

Outbreaks of measles continue to be a worldwide concern. WHO provides the following relevant statistics pertaining to measles
(WHO, 2019):

- In 2019 in Europe, there was a record number of both people sickened by measles and those who chose to be immunized. In 2018, there were more than 140,000 measles deaths globally, primarily among children under the age of 5. Measles vaccination resulted in a 73% drop in measles deaths between 2000 and 2018 globally. In 2018, an estimated 86% of the world's children received one dose of measles vaccine by their first birthday, compared to 72% in 2000. Between 2000 and 2018, measles vaccination prevented an estimated 23.2 million deaths, making measles vaccination one of the most effective health initiatives in public health.
- Before the initiation of measles vaccine in 1963 and widespread vaccination, major epidemics occurred approximately every 2 to 3 years, and measles caused an estimated 2.6 million deaths every year.

Unvaccinated young children are at highest risk of measles, its complications, and death. Unvaccinated pregnant women are also at significant risk. Measles is still common in many developing countries, especially in parts of Africa and Asia. More than 95% of deaths caused by measles occur in countries with low per capita incomes and weak health infrastructures (WHO, 2019).

Outbreaks of measles can be especially deadly in countries experiencing or recovering from a natural disaster or conflict. Damage to health services and health infrastructure interferes with routine immunization. Overcrowding in residential camps significantly increases infection risk (WHO, 2019).

Figure 2: Measles rash

Goodson, J. (2014). *https://phil.cdc.gov/details.aspx?pid=19434*

Vaccination

Vaccination is recommended for the prevention and of measles. The vaccine typically is administered as MMR (measles, mumps, and rubella). Guidelines (as of this writing) include the following important factors (CDC, 2019i; CDC, 2020j; CDC, 2020k; Meadows-Oliver, 2019):

- Measles vaccine is usually administered to children between 12 and 15 months, with a second dose of measles vaccine recommended between ages 4 and 6. In high-risk areas, the vaccine should be given at 12 months.
- During an epidemic, infants as young as 6 months may receive the vaccine, although doses given before 12 months of age should not be counted toward the recommended two doses. These children should be reimmunized at the age of 15 months, with the second dose given between 4 and 6 years of age.
- It should be determined, whenever possible, if patients have any allergies, especially allergies to neomycin; each dose contains a small amount of the drug. Patients who are allergic to eggs may receive the vaccine because it has not been proven to aggravate an egg allergy.
- Pregnant females should not receive the measles vaccine because it contains live attenuated strains of the measles virus. Females should not become pregnant for at least 4 weeks after receiving the vaccine.
- Healthcare professionals should monitor patients for signs of anaphylaxis for 30 minutes after vaccination. Patients who are immunocompromised – such as those with untreated tuberculosis, immune deficiencies, leukemia, or lymphoma, or who are receiving immunosuppressants – should not receive the vaccine.
- Vaccination should be delayed after administration of blood products or immune globulin. Such products may contain measles antibodies that can neutralize the vaccine. The length of time to wait before administering a measles vaccine to these patients can vary significantly based on the type of blood product or immune globulin administered.
- Side effects of the vaccine include transient skin rashes, malaise, arthralgia, and fever up to 2 weeks after receiving the vaccine. If discomfort and swelling at the injection site occur, healthcare professionals should apply cold compresses.

Evidence-based practice! Research has shown that measles is becoming more prevalent in adolescents and adults. Therefore, it is important that nurses encourage adolescents and adults to have their immunity status evaluated (CDC, 2020k).

Etiology and transmission

Measles (rubeola) is an acute, extremely contagious disease caused by the paramyxovirus. It is one of the most common, as well as one of the most serious, communicable childhood diseases. Humans are the only natural hosts of the measles virus. Measles is also one of the world's most contagious diseases. In 2000, measles was declared eliminated from the US. Nevertheless, measles cases and outbreaks still occur every year in the US because measles is still commonly transmitted in many parts of the world, including countries in Europe, the Middle East, Asia, the Americas, and Africa. The annual number of cases has ranged from a low of 37 in 2004 to a high of 1,282 in 2019 (CDC, 2020j). Europe saw a fourfold increase in measles cases in 2017 compared to 2016 (WHO, 2018a).

It is possible that, on average, 3 million to 4 million people have been infected annually, but most cases were not reported. Of the reported cases, about 48,000 people were hospitalized and 1,000 people developed chronic disability from acute encephalitis (CDC, 2020j).

Measles is transmitted by direct contact with infected respiratory droplets or by contact with items contaminated by infected respiratory droplets. It is spread by coughing and sneezing, close personal contact, or direct contact with infected nasal or throat secretions. The virus's portal of entry is the upper respiratory tract. In temperate climate zones, incidence is highest in late winter and early spring (CDC, 2020j; WHO, 2019).

The measles virus remains active and contagious in the air or on infected surfaces for up to 2 hours. It can be transmitted by an infected person from 4 days before the onset of the rash to 4 days after the rash erupts. It is very likely that susceptible persons with close contact to a measles patient will develop the disease. (CDC, 2020j; WHO, 2019).

Complications

Measles can cause serious complications, such as the following (CDC, 2020j; Meadows-Oliver, 2019; WHO, 2019):

- Appendicitis.
- Cervical adenitis.
- Encephalitis.
- Laryngitis.
- Mastoiditis.
- Otis media.
- Pneumonia.
- Diarrhea.
- Secondary bacterial infections.
- Autoimmune reactions.
- Seizures.

Clinical manifestations

After an incubation period of between 8 and 14 days, symptoms begin. The greatest communicability takes place during the prodromal phase, about 11 days after patients are exposed to the virus. The prodromal phase lasts from 2 to 5 days, and signs and symptoms, including the following, may be mistaken for a severe cold or flu (Meadows-Oliver, 2019):

- Fever.
- Lethargy.
- Photophobia.
- Malaise.
- Anorexia.
- Conjunctivitis.
- Coryza.
- Hoarseness.
- Hacking cough.

At the conclusion of the prodromal period, Koplik spots, which are the primary characteristic of rubeola, appear. These are grayish-white or bluish-white tiny spots surrounded by a red halo. Koplik spots appear on the oral mucosa and sometimes bleed (CDC, 2020j; Meadows-Oliver, 2019).

One to 2 days after the onset of Koplik spots, a maculopapular rash appears at the hairline, behind the ears, and over the neck and cheeks. The rash then spreads rapidly over the entire face, neck, eyelids, arms, chest, back, abdomen, and thighs. Within 2 to 3 days, the rash reaches the feet. It then begins to fade in the same time sequence in which it appeared, leaving a brownish discoloration, which disappears within 7 to 10 days. Approximately 5 days after the rash appears, other symptoms disappear and the disease is no longer communicable (CDC, 2020j; Meadows-Oliver, 2019).

Diagnosis

Diagnosis of measles is generally made by evaluating presenting clinical manifestations, particularly the appearance of the characteristic Koplik spots. Laboratory confirmation is now deemed essential for all sporadic cases of measles and all measles outbreaks. Detection of measles- specific IgM antibody and measles RNA by real-time polymerase chain reaction (RT-PCR) are the most common methods for confirming measles infection. Both a serum sample and a throat swab (or nasopharyngeal swab) from patients suspected to have measles should be obtained at first contact. Urine samples may also contain virus, and collecting both respiratory and urine samples can increase the likelihood of detecting measles virus (CDC, 2020j; Pagana & Pagana, 2018).

Treatment and nursing consideration

Treatment focuses on relieving symptoms and monitoring for possible complications. The following are common supportive interventions (CDC, 2020j; Meadows-Oliver, 2019; WHO, 2019):

- Encourage bed rest.
- Maintain a calm, quiet environment.
- Keep the room dark to reduce the discomfort of photophobia.
- Keep the room comfortably warm and use a vaporizer to increase humidity and decrease respiratory irritation.
- Administer over-the-counter, age-appropriate medicines such as acetaminophen (Tylenol) or ibuprofen (Advil, Motrin IB) to reduce fever and relieve aches and pains. Do not give aspirin to children or teenagers because of the risk for developing Reye's syndrome.
- Offer fluids frequently.
- Keep unvaccinated family members away from the patient. Prevent visitors from entering the patient's environment to avoid transmitting the disease.
- Report all cases of measles to the public health department.
- Sedation may be medically prescribed if necessary. Teach patients and caregivers to recognize signs and symptoms of impending complications and to seek immediate medical help if they occur.

Self-Assessment Quiz Question #4

When counseling parents whose children have measles, the nurse should tell them all of the following EXCEPT:

a. Outbreaks of measles still occur in the US.
b. Unvaccinated young children and unvaccinated pregnant women are at highest risk for complications.
c. An infected person can transmit the disease from 1 day before onset of rash to 14 days after the rash erupts.
d. Treatment focuses on relieving symptoms and monitoring for complications.

MUMPS

Mumps (also referred to as infectious or epidemic par otitis) is an acute viral disease that causes a painful enlargement of the parotid glands. The parotid glands are one of three pairs of salivary glands located below and in front of the ears. Mumps was quite common in the US until the mumps vaccination became part of routine childhood immunization programs in the late 1960s. However, mumps outbreaks still occur and the number of cases has increased in recent years. Outbreaks typically affect people who are not vaccinated and occur in settings where close contact is common, such as schools and college campuses (Mayo Clinic, 2020d).

Vaccination

The mumps vaccine was licensed in 1967. Two vaccines can prevent mumps: the MMR vaccine, which provides protection from measles, mumps, and rubella; and the MMRV vaccine, which protects from mumps, measles, rubella, and varicella. Two doses of the vaccine are recommended. The first dose is administered at 12 to 15 months of age, and the second dose at 4 to 6 years of age (as long as it is 28 days after the first dose). Children ages 1 through 12 can get the MMRV vaccine, which is a combination vaccine that also protects against measles, rubella, and varicella (HHS.gov., 2020d).

Adults who should get the mumps vaccine include those who did not receive the vaccine in childhood and those age 18 and older born after 1956 who have not had mumps. These adults need at least one dose of mumps vaccine. Healthcare professionals who have not had mumps need two doses of the mumps vaccine (HHs.gov., 2020d).

People should not receive the mumps vaccine if they have had a life-threatening reaction to a dose of the mumps vaccine or to any ingredient in the vaccine, or if they are pregnant (HHS.gov., 2020d).

The patients' healthcare providers should be informed, before vaccination, if they (HHS.gov., 2020d):

- Have HIV/AIDS.
- Have cancer.
- Are taking medications that impact the immune system.
- Have ever had a blood disorder.
- Have had another vaccine in the past month.
- Have recently had a blood transfusion or were given blood products.

The MMR vaccine is quite effective. However, immunity against mumps is not complete. Two doses of MMR are 88% effective at protecting against the disease. One dose of the vaccine is 78% effective. Outbreaks can still occur even in countries such as the US, where extensive vaccine efforts are in place. For example, mumps outbreaks have been reported on university campuses in the US (CDC, 2020n).

Incidence

Fortunately, mumps is no longer common in the US. Before the initiation of the mumps vaccine program in 1967, approximately 186,000 cases were reported every year. Since the initiation of the MMR vaccine, the number of reported mumps cases in the US has decreased by more than 99% (CDC, 2021a).

From January 1 to January 25, 2020, CDC reported that 16 states in the US reported mumps infections (CDC, 2021a). Healthcare professionals should remain alert to the possibility of outbreaks of mumps.

Etiology and pathophysiology

Mumps is caused by a paramyxovirus, which is found in the salivary glands of infected people. The virus is spread by direct contact or through airborne infected droplets, saliva, and, possibly, urine (Mayo Clinic, 2020d; Meadows-Oliver, 2019).

The virus is present in the patient's saliva for 6 days before and up to 9 days after the onset of parotid gland swelling. The period of greatest communicability is most likely the 48-hour period immediately before swelling begins. The incubation period generally ranges from 16 to 18 days, but cases can occur 12 to 25 days after exposure. The concentration of virus in saliva is greatest just before and after swelling begins (CDC, 2020n; Mayo Clinic, 2020d; Meadows-Oliver, 2019).

Complications

The following complications are associated with mumps (Mayo Clinic, 2020d; Meadows-Oliver, 2019):

- Arthritis.
- Encephalitis.
- Hearing loss.
- Inflamed ovaries.
- Inflamed testicles.
- Involvement of the auditory nerve that can cause unilateral deafness.
- Mastitis.
- Mumps meningitis.
- Myocarditis.
- Miscarriage.
- Nephritis.
- Oophoritis.
- Pancreatitis.

Figure 3: Face swollen from Mumps

CDC. (n.d.a). Mumps. *https://www.immunize.org/photos/mumps-photos.asp*

Clinical manifestations

The severity of presenting signs and symptoms varies significantly among patients. About 30% of people susceptible to the disease have a subclinical form of the illness or extremely mild symptoms (Mayo Clinic, 2020d; Meadows-Oliver, 2019).

After an incubation period of about 18 days, prodromal symptoms that last for about to5 days become evident, including anorexia, malaise, headache, and low-grade fever (CDC, 2020n; Mayo Clinic, 2020d; Meadows-Oliver, 2019).

The most common symptom is parotitis, which is seen in up to 40% of all patients and in 95% of those who are symptomatic. The prodromal signs and symptoms are followed by an earache that is exacerbated by swallowing or chewing, especially when drinking acidic or sour fluids. In addition, pain and swelling of the parotid glands and a fever of 101°F to 104°F may accompany these symptoms. Other salivary glands, in addition to the parotid glands, may become swollen (CDC, 2020n; Mayo Clinic, 2020d; Meadows-Oliver, 2019).

Mumps, meningitis is a complication of mumps. Signs and symptoms of mumps meningitis include fever, evidence of meningeal irritation such as nuchal rigidity, headache, irritability, and cerebrospinal fluid lymphocyte count of 500 to 2,000µL. Fortunately, most patients recover completely from mumps meningitis (National Health Service, 2018).

Diagnosis

Diagnosis is usually made based on history of exposure to the disease and characteristic presenting signs and symptoms, especially parotid gland enlargement. Diagnosis may be confirmed by isolating the virus from a throat swab culture (Mayo Clinic, 2020d; Meadows-Oliver, 2019).

Treatment

Prognosis is good, although some patients do experience the previously mentioned complications. Because of the nature of the disease, those complications may involve the reproductive organs, so the risks to adolescents and adults may be greater. Treatment consists of the following supportive measures (Mayo Clinic, 2020d; Meadows-Oliver, 2019):

- Isolation (droplet precautions) for 5 days from symptom onset or until the swelling of the parotid glands has subsided.
- Bed rest to promote adequate rest, sleep, and recovery.
- Adequate fluid intake to prevent dehydration: Note that in cases where patients are unable to swallow because of swelling and pain when chewing and swallowing, intravenous fluid replacement may be necessary.
- Warm saltwater gargles to relieve pain.
- Soft, bland diet to avoid unnecessary discomfort when chewing and swallowing. Spicy, irritating foods such as citrus juices should be avoided.
- Administering over-the-counter analgesics to reduce fever and aches and pains. However, children or teenagers should not take aspirin because of the risk for developing Reye's syndrome.
- Report all cases of mumps to the public health authorities.

Healthcare professionals should teach parents and adult patients the importance of immunization. Stress that immunization is the best way to prevent contraction and transmission of the disease.

Critical thinking scenario

Karen is 26 years old and in the first trimester of her first pregnancy. She and her husband are thrilled at the prospect of becoming parents. Today, she is looking forward to picking up her 3-year-old niece Allison from day care. Karen loves spending time with her niece and eagerly anticipates the day when she will be spending time with her own child.

A few days later Karen receives a call from her sister, who is obviously distressed. "Oh, Karen, I have some bad news. One of the children at the day care center has come down with German measles. They tell me the child was never vaccinated! Her parents received an exemption because of philosophical reasons. She was there the day you picked up Allison. You need to call your obstetrician right away! You've been exposed to German measles!"

RUBELLA (GERMAN 3-DAY MEASLES)

Rubella, commonly referred to as German measles or 3-day measles, is an acute, mildly contagious viral disease. It is usually self-limiting, considered to be a relatively mild illness, and seldom causes complications. The most serious form of the disease, congenital rubella syndrome, occurs when the disease is transmitted from a mother to the unborn child. Congenital rubella syndrome can lead to spontaneous abortion, stillbirth, and multiple birth defects (CDC, 2020s; Meadows-Oliver, 2019). Therefore, appropriate vaccinations must be administered to prevent the transmission of the disease.

Vaccination

Children should receive two doses of MMR vaccine. The first dose should be given at 12 to 15 months of age and the second dose administered at 4 to 6 years of age. These are the recommended ages, but children can receive the second dose at any age, as long as it is at least 28 days after the first dose. The vaccine is safe and extremely effective. Research has shown that the one dose of the MMR vaccine is about 97% effective at preventing rubella (CDC, 2020t).

Adults may need to be immunized under certain circumstances. Adults do not need to receive the MMR vaccine if they (CDC, 2020t; Meadows- Oliver, 2019):

- Have had severe allergic reactions to the vaccine or its components.
- Are pregnant or think they might be pregnant.
- Have a weakened immune system.
- Have a parent or sibling with a history of immune system problems.
- Have recently had a blood transfusion or have received other blood products.
- Have tuberculosis.
- Have received a vaccination within the previous 4 weeks.
- Are severely or moderately ill.

In addition to the contraindications above, people should not receive the MMRV vaccine if they have a history of seizures, have a parent or sibling with a history of seizures, or are taking salicylates. People should not use salicylates for 6 weeks after receiving the vaccine (CDC, 2020t).

Adults should receive the MMR vaccine if they are not in the categories listed above and they (CDC, 2020t)):

- Were born after 1956, including those who may be at increased risk for exposure.
- Are college or trade students beyond high school.
- Work in healthcare facilities.
- Travel internationally.
- Are passengers on cruise ships.
- Are women of childbearing age.
- Are unvaccinated healthcare personnel born before 1957 who lack evidence of immunity to rubella.

Incidence and etiology

Rubella was eliminated from the US in 2004. Elimination is defined as the absence of continuous disease transmission for 12 months or longer in a specific geographic region. Unfortunately, rubella is still found in other parts of the world and can be brought into this country by persons who became infected in other countries. Contact with international travelers at colleges or during vacations, where close contact with others is likely, will present an additional risk of transmission. Today, fewer than 10 cases of rubella are reported annually in the US. Since 2012, evidence has shown that people infected by the virus were infected when living or traveling outside the United States (CDC, 2020r).

The rubella virus is transmitted via contact with nasopharyngeal secretions, blood, urine, or stools of infected people. It may also be transmitted by contact with items such as clothing and bedclothes that have been contaminated by the secretions of infected people. The virus is also passed via the placenta from mother to unborn child (CDC, 2020r; Meadows-Oliver, 2019).

The incubation period ranges from 12 to 23 days following exposure. People are most infectious when the rash is erupting but can shed the virus from 7 days before to 7 days after the rash appears (CDC, 2020r).

Complications

Complications are rather rare in children. When they do occur, they often manifest as hemorrhagic problems such as thrombocytopenia. Young women may experience joint pain or arthritis that occurs just as the rash is fading. Fortunately, these complications are usually self-limiting and resolve within 5 to 30 days (CDC, 2020r; Meadows-Oliver, 2019).

Other complications associated with rubella that are more serious include encephalitis, myocarditis, and hepatitis (CDC, 2020r; Meadows-Oliver, 2019).

Clinical manifestations

Following an incubation period of 12 to 23 days, a maculopapular rash, appearing as distinct rose spots, abruptly erupts. Following are characteristics of this rash (CDC, 2020r; Meadows-Oliver, 2019):

- The rash usually begins on the face.
- The rash spreads rapidly, often covering the trunk and extremities within hours.
- By the end of the second day, the facial rash begins to fade.
- The rash continues to fade in the order in which it appeared.
- The rash usually disappears by the third day but may last for 4 or 5 days.
- Low-grade fever may accompany the rash but usually does not last after the first day of the rash. On rare occasions temperature may reach 104°F.

Other signs and symptoms, particularly in adolescents and adults, include the following (CDC, 2020r; Meadows-Oliver, 2019):

- Headache.
- Anorexia.
- Malaise.
- Coryza.
- Lymphadenopathy.
- Conjunctivitis.

Diagnosis

A history of exposure helps to make a diagnosis because the rubella rash can mimic scarlet fever, measles, infectious mononucleosis, roseola, and other viral rashes. Therefore, cultures of throat, blood, urine, and cerebrospinal fluid can isolate the virus. Convalescent serum that shows a fourfold rise in antibody titers corroborates the diagnosis (CDC, 2020r; Pagana & Pagana, 2018).

Treatment and nursing considerations

Prognosis is generally excellent and treatment is supportive. Over-the-counter medications such as Tylenol may relieve fever and joint pain. Aspirin should not be given to children or adolescents because of the danger of Reye's syndrome. Droplet precautions should be instituted during the period of communicability. All rubella cases should be reported to public health officials (CDC, 2020r; Meadows-Oliver, 2019).

Congenital rubella syndrome

Although rubella is generally a mild, self-limiting illness, it can have devastating consequences on an unborn child. Congenital rubella syndrome (CRS) is defined as an illness that results from rubella virus infection during pregnancy. In general, the earlier the infection occurs during a woman's pregnancy, the greater the damage to the fetus (CDC, 2020b).

Before vaccination, during the 1962-1965 worldwide epidemic, about 12.5 million rubella cases were reported in the US,

resulting in 20,000 cases of CRS (Ezike, 2017). As previously noted, after vaccination programs were initiated, the incidence of rubella and CRS drastically decreased.

Intrauterine rubella infection can cause spontaneous abortions, stillbirths, or a multitude of congenital anomalies, some of which do not appear until later in life. Research has shown that the risk of congenital infection and anomalies is greatest during the first 12 weeks of gestation and decreases after the first 12 weeks of gestation. Congenital anomalies are rare after the 20th week of gestation. Common congenital anomalies associated with CRS are cataracts, congenital heart disease, hearing impairment, and developmental delay. Hearing deficit is the most common single anomaly (CDC, 2020b; Ezike, 2017).

CRS is characterized by the presence of cataracts, deafness, or cardiac disease (CDC, 2020b; Ezike, 2017). Other common manifestations include low birth weight, intellectual disability, and microcephaly (the head is significantly smaller than normal for age and sex). Experts now believe that congenital disorders can also cause problems that do not appear until later in the affected child's life. These problems may manifest themselves as thrombocytopenic purpura, dental abnormalities, hemolytic and hypoplastic anemia, encephalitis, diabetes mellitus, seborrheic dermatitis, and giant-cell hepatitis (CDC, 2020b; Ezike, 2017; Meadows-Oliver, 2019).

Infants born with CRS should be placed on contact precautions. Research has determined that these children excrete the virus for periods ranging from several months to a year after birth. Parents of infants with CRS need a significant amount of emotional support as they attempt to deal with the physical problems of the disease as well as emotions that range from anger and despair to feelings of guilt. Referrals to appropriate support groups, including mental health consultations, should promptly be started. Sources of financial assistance may also help. Treating a multitude of birth defects may be expensive and beyond what health insurance covers. Women of childbearing age should be aware of their immunization status for rubella and have their antibody levels checked as deemed appropriate. Women who are pregnant and who believe that they may have been exposed to rubella should immediately contact their healthcare providers (CDC, 2020b; Ezike, 2017).

VARICELLA (CHICKENPOX)

Varicella, more commonly known as chickenpox, is an acute, common disease caused by the herpes varicella-zoster virus. It is quite contagious but is generally found to be a mild, self-limiting disease (Bechtel, 2018). This same virus, in its latent stage, can cause herpes zoster (shingles) infection in adults, which can be a more serious disease.

Vaccination

The varicella virus vaccine contains a live attenuated virus. It is approved for use in children 12 months of age and older and for adults. The vaccine is administered subcutaneously at 12 to 15 months of age. A second dose is given at 4 to 6 years, or at least 3 months after the first dose. The varicella virus vaccine may be given to older children and to adults who do not have immunity to the disease. In people older than 13, the second dose may be delayed only 4 weeks after the first dose is given (CDC, 2019l).

Incidence

Before the vaccine was available, varicella was widespread in the US and affected about 4 million children annually. The disease caused as many as 100 deaths in children every year and was responsible for an estimated $400 million in medical costs and lost work time. The initiation of vaccination against varicella in 1995 significantly reduced the incidence of varicella as well as morbidity and mortality rates. Currently, fewer than 10 deaths related to varicella are reported annually, most of them occurring in unvaccinated people. Outbreaks of the disease still occur in schools and day care centers, usually beginning with children who are not vaccinated (Bechtel, 2017; CDC, 2018a).

Varicella occurs worldwide in children who do not have immunity. About 80 million to 90 million cases are reported annually. Most developing countries have low immunization rates, and the disease poses a risk for travelers to these countries (Bechtel, 2017).

There are some geographical differences among the rates and incidences of varicella infections. In countries with temperate climates, more than 90% of people are infected by the time they reach adolescence. In countries with tropical climates, a higher number of people are infected at older ages, which increases vulnerability in young adults (Bechtel, 2017).

Varicella is still endemic in large cities throughout the world. Outbreaks are usually found in regions with large groups of unimmunized children. The disease affects all races and both sexes in equal numbers. In temperate climates incidence is higher during late autumn, winter, and spring (Bechtel, 2017; Meadows-Oliver, 2019).

Risk factors for development of severe varicella

Congenital varicella may affect infants if their mothers had acute varicella infections during their first trimester or early in the second trimester. Neonatal infection is rare, most likely because of immunity passed to infants from their mothers. However, neonates who are born to mothers who develop varicella 5 days before or up to 14 days after delivery are at risk for developing severe varicella (Bechtel, 2017; Meadows-Oliver, 2019).

Neonates are especially susceptible to severe varicella in the first month of life. This is especially true if the mother is not immune to the disease. Early delivery is also a risk factor for severe forms of the disease. Birth before 28 weeks of gestation increases susceptibility because transmission of immunoglobulin antibodies from the mother to the baby occurs after this time (Bechtel, 2017; Mayo Clinic, 2021b)).

The following factors increase the risk for severe varicella in adolescents and adults (Bechtel, 2017; Mayo Clinic, 2021b):

- People who take high doses of steroid therapy for 2 or more weeks are at definite risk for severe varicella. Even short-term therapy with high doses of steroids immediately before or during the incubation period of varicella can cause severe, or even fatal, disease.
- Children with cancer are at increased risk for severe varicella. The risk is greatest for children with leukemia. Nearly 30% of these children whose immune systems are compromised and who have leukemia have severe varicella; 7% of these affected children may die.
- People with compromised immune systems caused by such conditions as cancer, taking anticancer drugs, or HIV/AIDS infection are at risk for severe varicella.
- Pregnant women are at high risk of severe varicella.

Complications

Although rare in healthy children, several complications are associated with varicella (Bechtel, 2017; Mayo Clinic, 2021be; Meadows-Oliver, 2019):

- Arthritis.
- Pneumonia.
- Encephalitis.
- Hemorrhagic varicella.
- Hepatitis.
- Myocarditis.
- Nephritis.
- Reye's syndrome.
- Secondary bacterial infections of varicella lesions.
- Thrombocytopenia.

The varicella-zoster virus also places both mother and fetus at risk for complications if infection occurs during pregnancy. Primary varicella infection during pregnancy is considered to be a medical emergency. Pneumonitis as a result varicella-zoster infection poses a risk for life- threatening respiratory compromise and has a mortality rate of 14%. Before the development of antiretrovirals, the mortality rate was 45% (Marino, 2017).

Infection during pregnancy can lead to congenital varicella syndrome (CVS) that may result in the following (Marino, 2017):

- Spontaneous abortion.
- Cataracts.
- Limb atrophy.
- Cerebral cortical atrophy.
- Neurological disability.

If the mother is infected in the perinatal period, particularly 5 days before delivery or 2 days after, there is a risk of severe neonatal varicella, which has a mortality rate of 30%. Infection during this time inhibits maternal antibody development. This means that the fetus does not receive passive immunity from the mother (Marino, 2017).

Etiology and pathophysiology

Varicella is caused by the herpes varicella-zoster virus and is highly communicable. The virus is transmitted by direct contact, especially with respiratory secretions, by contact with skin lesions, droplet spread, and airborne transmission. The incubation period ranges from 14 to 16 days but can be as short as 10 days or as long as 21 days. The disease is most likely communicable from the onset of fever, which is about 1 to 2 days before the first lesion appears, until the last vesicle dries, which takes about 5 to 7 days (CDC, 2018a; Meadows-Oliver, 2019; Mayo Clinic, 2021b).

The varicella virus enters the body through the respiratory system and colonizes in the upper respiratory tract. The virus replicates in regional lymph nodes. After about a week, it moves to the viscera and skin, causing lesion eruptions characteristic of varicella. CNS or liver infection may also occur at this time, as may the complications of encephalitis, hepatitis, or pneumonia (Bechtel, 2017; CDC, 2018a; Meadows-Oliver, 2019).

Clinical manifestations

The incubation period for varicella is 10 to 21 days. The disease is communicable beginning up to 5 days before the body rash appears and continues until all of the lesions on the skin are crusted over (Meadows-Oliver, 2019).

Varicella causes characteristic signs and symptoms, the most predominant of which is a pruritic (extremely itchy) rash. During the prodromal phase of the disease, the patient develops a low-grade fever, malaise, and anorexia. Within 24 hours the patient develops the characteristic varicella rash (Bechtel, 2017; CDC, 2018a; Mayo Clinic, 2021b).

The rash associated with varicella usually starts as crops of small red flat spots (macules) on the trunk or scalp. The macules become papules (elevated lesions) and then progress to clear vesicles on an erythematous (red) base, sometimes referred to as "dewdrop on a rose petal." These lesions become cloudy and break easily, causing scabs (Bechtel, 2017; CDC, 2018a; Meadows-Oliver, 2019).

The rash first appears on the head and mucous membranes, then spreads over the trunk of the body to the limbs, axillae, upper respiratory tract, conjunctivae, and, occasionally, the genitalia. New vesicles continue to form for about 3 or 4 days. This means that the rash consists of papules, vesicles, and scabs all at the same time. The rash causes severe pruritus. Patients, especially young children, may be unable to control the urge to scratch the rash, which can lead to infection, scarring, impetigo, and even cellulitis (Bechtel, 2017; CDC, 2018a; Meadows-Oliver, 2019).

Diagnosis

Diagnosis seldom requires laboratory testing because the clinical manifestations are generally quite characteristic and are usually accompanied by a history of exposure. The virus can be isolated from vesicular fluid within the first 3 or 4 days of the rash's appearance if necessary. If needed, diagnostic tests include Tzanck smear, which shows multinucleated giant cells, or Giemsa stain, which differentiates varicella-zoster from vaccine and variola viruses (CDC, 2020b; Ezike, 2017).

Treatment and nursing considerations

The prognosis for healthy children is excellent. In children ages 1 to 14 years who are otherwise healthy, the estimated mortality rate is two deaths per 100,000 cases. Children with deficient immune systems are at higher risk for severe disease and death (Bechtel, 2017; CDC, 2018a; Meadows-Oliver, 2019).

Treatment is primarily symptomatic and consists of the following interventions (Bechtel, 2017; CDC, 2018a; Meadows-Oliver, 2019):

- Droplet and contact isolation until all vesicles and the majority of the scabs dry and no new lesions appear: This is usually about 1 week after onset of the rash.
- Lukewarm oatmeal or baking soda baths and calamine lotion to reduce pruritus. Age-appropriate oral antihistamines to reduce pruritus.
- Over-the-counter medications such as Tylenol may be given for fever, but aspirin and other salicylates should be avoided in children and adolescents because of the risk of Reye's syndrome.
- Shorten fingernails to prevent scratching. Have children wear mittens to help avoid scratching, especially while sleeping.

Patients (including newborns) who are at risk for severe disease may be given varicella-zoster immunoglobulin within 10 days (ideally within 4 days) of exposure (Bechtel, 2017). This may offer some passive immunity. Antiviral agents such as acyclovir (Zovirax) may be administered to patients over 12 years of age within the first 24 hours to help slow formation of vesicles, facilitate skin healing, and control the spread of infection systemically (Bechtel, 2017; CDC, 2018a; Meadows-Oliver, 2019). Pregnant patients with varicella need appropriate monitoring and follow-up care from their healthcare providers. Young adult females should consider an immunization review to avoid the risks associated with pregnancy and newborns.

Parents and other caregivers should take their children (or patients of other ages) to an emergency department if the following signs and symptoms occur (Bechtel, 2017 Meadows-Oliver, 2019):

- Refusal to drink fluids.
- Signs of dehydration such as oliguria, increasing drowsiness, and excessive thirst.
- Unusual redness, pain, or swelling over the rash.

- Confusion.
- Unusual weakness.
- Inability or difficulty walking.
- Complaints of severe headache or stiff neck and back pain.
- Frequent vomiting.
- Difficulty breathing.
- Chest pain.
- Severe cough.
- Fever that lasts more than 4 days or a fever that returns after the original fever subsides.

Self-Assessment Quiz Question #5

Parents ask the nurse practitioner when their child, who has been diagnosed with varicella, may return to school. The nurse practitioner tells the parents:

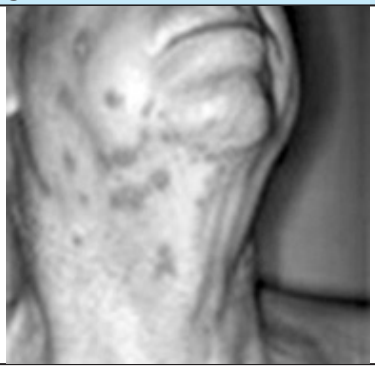
a. When all of the lesions are crusted over.
b. When fever has subsided for 24 hours.
c. Five days after the appearance of the rash.
d. Two days after the lesions are completely gone.

Critical thinking scenario

Janice is 54 years old and a professor of nursing at a large metropolitan university. She suffers from severe arthritis and has just finished a course of steroid therapy in the hopes of decreasing the inflammatory effects of the disease. For the past few days, Janice has not been feeling very well. She has a slight fever, is unusually fatigued, and complains of having no energy. Janice wonders if she has a virus or if the steroid therapy is affecting her in an unusual way. Within 2 days she begins to experience severe deep pain and pruritus over the cervical area of her back. Within another day or two, Janice develops a rash consisting of small red nodular lesions over the painful areas. These lesions are quickly turning to vesicles. Janice's husband drives her to their family doctor where, as Janice fears, she receives a diagnosis of shingles.

SHINGLES (HERPES ZOSTER)

Figure 3: Shingles rash on the neck



CDC. (n.d.b). *https://www.cdc.gov/shingles/about/photos.html*

Shingles, or herpes zoster, is an inflammatory condition that occurs when the varicella-zoster virus reactivates and causes vesicular eruption along the pathway of the nerves from one or more dorsal root ganglia (dermatome). Shingles generally affects adults who are over the age of 40. Severe neuralgic pain occurs in peripheral areas that are fed by the nerves coming from the inflamed ganglia (Lippincott Williams & Wilkins, 2017).

Although most people recover completely, there may be scarring, residual neuropathic pain, and visual impairment if the cornea is affected. Anyone over the age of 50 who has had varicella should receive the shingles vaccine (Shingrix) to prevent the disease (Lippincott Williams & Wilkins, 2017).

Vaccination

Because most older adults have had varicella as children, millions of people are vulnerable to developing shingles. The shingles vaccine has been approved for people age 50 and older. People who have had shingles in the past may get Shingrix to help prevent future occurrences of shingles (CDC, 2020u; Mayo Clinic, 2020h).

The latest recommendations from CDC regarding shingles vaccination are that healthy adults 50 years of age and older should receive two doses of the shingles vaccine (whether they have received Zostavax, which is no longer in use in the US) called Shingrix to acquire protection from shingles and post-therapeutic neuralgia (PHN), which is the most common complication of shingles. There is no maximum age for receiving the shingles vaccine. Doses should be separated by2 to 6 months. The Shingrix injection is administered in the upper arm (CDC, 2020u).

Two doses of Shingrix are more than 90% effective at preventing shingles and PHN. Protection stays above 85% for at least the first 4 years following vaccination (CDC, 2018a; CDC, 2018e; CDC, 2020u).

Research has shown the effectiveness of Shingrix in the following populations (CDC, 2020f):

- In adults 50 to 69 years of age who got two doses, Shingrix was 97% effective in preventing shingles.
- In adults 70 years and older who received two vaccine doses, Shingrix was 91% effective.
- In adults 50 to 69 years old who received two doses, Shingrix was 91% effective in preventing PHN.
- Among adults 70 years and older, Shingrix was 89% effective.

Side effects of the vaccine include pain, redness, swelling, or itching at the injection site; headaches; muscle pain; fever; stomach pain and nausea; and fatigue. About one in six people have side effects that affect their ability to perform normal daily activities for 2 to 3 days. Severe allergic reactions are very rare. Note that Shingrix will not cure herpes zoster once it occurs (CDC, 2020u; Comerford & Durkin, 2021).

It is recommended that patients receive Zostavax even if in the past they had shingles, received Zostavax, or are not sure if they had varicella in the past (CDC, 2018b).

The following groups of people should not receive the shingles vaccine (CDC, 2020u; Comerford & Durkin, 2021):

- People who have had a life-threatening reaction to gelatin, neomycin, or any other component of the shingles vaccine.
- People who have tested negative for immunity to varicella-zoster virus. In this case they should receive the varicella vaccine.
- People who currently have shingles.
- People who have a moderate or severe acute illness. They should wait until they recover before getting the vaccine.
- Women who are pregnant, who might be pregnant, or who are breastfeeding.

Etiology and incidence

Shingles is a reactivation of the varicella virus that primarily affects adults, especially those older than 60. The virus has been dormant in the cerebral ganglia of the cranial nerves or the ganglia of posterior nerve roots after having had varicella (CDC, 2020u).

The reason for this reactivation is unknown. After the primary infection (varicella), the varicella-zoster virus may live in a dormant state in the dorsal nerve root ganglia. Years later the virus may emerge from its dormant state, either spontaneously or as the result of immunosuppression. Some experts believe that the virus multiplies as it reactivates, and antibodies that remain from the initial varicella infection deactivate it. But if an adequate number of effective antibodies does not remain, the virus continues its multiplication process in the ganglia, destroying the neurons that harbor it. The virus then moves down the sensory nerves to the patient's skin (CDC, 2020u; Mayo Clinic, 2020h).

Herpes zoster rates are increasing among adults in the United States, especially among younger adults. The increase has been gradual over a long period. We do not know the reason for this increase. The rates among older adults are plateauing (CDC, 2020u).

Some experts suggest that exposure to varicella boosts a person's immunity to varicella zoster virus (VZV) and reduces the risk for VZV reactivation. Thus, they are concerned that routine childhood varicella vaccination, recommended in the United States since 1996, could lead to an increase in herpes zoster in adults because of reduced opportunities for being exposed to varicella. However, two CDC studies found that herpes zoster rates started increasing before varicella vaccine was introduced in the United States and did not accelerate after the routine varicella vaccination program started (CDC, 2020u). Other countries that do not have routine varicella vaccination programs have also observed similar increases in herpes zoster rates (CDC, 2020u).

Unfortunately, the rate of shingles is increasing among adults in the US. This increase has been gradual and progressive, and the reason has yet to be identified. Some experts are concerned that routine varicella vaccination may actually increase the incidence of shingles in adults because it decreases their exposure to varicella (CDC, 2020u).

Following are disease rates for shingles (CDC, 2020u):

- About 1 million cases of herpes zoster occur annually in the US.
- The incidence of herpes zoster is about four cases per 1,000 US population annually.
- About 1% to 4% of people with herpes zoster are hospitalized for complications.
- Older adults and people with compromised immune systems are more likely to be hospitalized.
- About 1 in 10 adults with herpes zoster develop PHN.
- About 96 deaths occur annually in which herpes zoster was the actual underlying cause. Almost all deaths occur in older adults or those with compromised or suppressed immune systems.

Risk factors

Some factors can increase the risk of contracting shingles. People with compromised immune systems are at particular risk, including those who have cancer, especially leukemia and lymphoma; have HIV/AIDS; have undergone bone marrow or solid organ (heart, liver, lung) transplantation; or are taking drugs that suppress the immune system such as steroids, chemotherapy, or immunosuppressive medications related to transplantation (CDC, 2020u; Mayo Clinic, 2020h).

Other possible risk factors that are under investigation but not yet conclusively supported by research findings include the fact that women seem to develop shingles more often than men. Most studies support this finding. Some research findings from studies in the US as well as other countries indicate that shingles is less common in African Americans by about 50% than in Whites (CDC, 2020u; Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2020h).

Complications

Complications associated with shingles include chronic pain syndrome. About 20% of patients develop chronic pain syndrome. This syndrome is characterized by pain that can be described as a constant aching and burning sensation, intermittent, sharp and cutting, or hyperesthesia (excessive physical sensitivity) of affected areas of the skin after it has healed. Visual complications may also occur. Examples include corneal ulcers, keratitis (corneal inflammation), uveitis (inflammation of the middle layer of the eye), and even blindness. There also can be damage to the facial or auditory nerves, which can lead to hearing loss, vertigo, and facial weakness. Inflammatory processes that can cause pneumonitis, esophagitis, myocarditis, and pancreatitis may also occur (CDC, 2020u; Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2020h).

Clinical manifestations

Initially, shingles causes fever, headache, and malaise. Within 2 to 4 days, the patient begins to experience severe, deep pain; pruritus; and paresthesia or hyperesthesia on the trunk and sometimes on the arms and legs. Some patients report that even air movement on the lesions can be quite painful and that wearing clothing over the area causes intense pain. The pain can be constant or intermittent and generally lasts from 1 to 4 weeks. Inflammation is usually unilateral and involves the cranial, cervical, thoracic, lumbar, or sacral dermatome (area of skin that is innervated by a single spinal nerve) in a "bandlike" configuration (CDC, 2020u; Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2020h).

Small red nodular-like skin lesions erupt over the painful areas of the skin, often within 3 to 4 days of initial symptoms, but these lesions can take as long as 14 days to appear. These lesions usually spread unilaterally around the thorax or vertically over the arms and legs. They appear as patches of vesicles that erupt in groups and appear on erythematous, edematous skin. The lesions quickly become vesicles that fill with pus or clear fluid. These vesicles later rupture and form crusts about 10 days after they appear. Fortunately, scarring seldom occurs unless the vesicles are located deep within the skin and involve the dermis. If vesicles rupture, they can become infected and can lead to lymphadenopathy of regional lymph nodes. Some infected ruptured vesicles can even become gangrenous.

Vesicles that appear on the tip of the nose indicate involvement of the eye. If the ophthalmic branch of the facial nerve is affected, the eye may become painful, which can ultimately become a medical emergency.

In otherwise healthy patients, lesions resolve within 2 to 3 weeks (CDC, 2020u; Lippincott Williams & Wilkins, 2017).

A vulnerable person can acquire varicella if they come into contact with the infected vesicular fluid of a shingles patient. But a person who has had varicella, or who has been vaccinated against varicella, is immune and not at risk for infection after exposure to patients with shingles (CDC, 2020u; Mayo Clinic, 2020h).

Diagnosis

Diagnosis is usually made based on the patient's clinical presentation of characteristic skin lesions. Before the appearance of the lesions, the intense pain may be mistaken for appendicitis, pleurisy, or other conditions that trigger severe pain (Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2020h).

The varicella-zoster virus can be cultured from vesicular fluid and infected tissue to confirm diagnosis. A Tzanck test of vesicular fluid and infected tissue shows eosinophilic intranuclear inclusions and varicella virus (Lippincott Williams & Wilkins, 2017; Pagana & Pagana, 2018).

Treatment and nursing considerations

The foundation of shingles treatment is antiviral therapy, which is administered to stop the characteristic rash from progressing and to prevent complications. Such drugs include acyclovir (Zovirax), famciclovir (Famvir), and valacyclovir (Valtrex). They interfere with viral replication and can be prescribed for all patients, but are especially helpful when treating patients who have compromised immune systems or who are debilitated. Antiviral treatment is most effective when initiated within 72 hours of disease onset. If ruptured vesicles have been infected by bacteria, appropriate antibiotics are prescribed. If the disease has affected the cornea, ophthalmic antiviral ointments are prescribed (Comerford & Durkin, 2021; Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2020h).

Additional treatment measures for pain management include the following (Mayo Clinic, 2020h):

- Capsaicin topical patch (Qutenza).
- Anticonvulsants such as Neurontin.
- Tricyclic antidepressants.
- Numbing agents such as lidocaine.
- Narcotic analgesics such as codeine.
- Corticosteroid injections and local anesthetics.
- Antiviral drugs such as acyclovir (Zovirax), famciclovir, and valacyclovir (Valtrex).

Patients need emotional support as they deal with severe pain. Encourage patients to take analgesics on a regular schedule to help them cope with severe discomfort. Reassure them that the pain will eventually subside, and teach them relaxation strategies such as meditation or deep breathing exercises (Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2020h).

Also, patients should be educated about proper handwashing techniques and encouraged to wash their hands frequently to avoid spreading the infection. It is also important to explain to patients how important it is to avoid scratching because this can cause vesicular rupture, which can cause bacterial infection and scarring (Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2020h).

Self-Assessment Quiz Question #6

A nurse is counseling a 55-year-old male patient about vaccination for shingles. The patient had shingles 2 years ago. The nurse should explain that:

a. The patient should not receive the shingles vaccine because he has already had shingles.
b. Two doses of Shingrix for persons in his age group are 97% effective in preventing shingles.
c. The patient should receive two doses separated by 2 to 6 weeks.
d. Research shows that Shingrix is not effective in adults 70 years and older.

HEPATITIS A AND B

Hepatitis is a general term that refers to liver inflammation. Causes are both infectious (viral, bacterial) and noninfectious (alcohol, drugs, autoimmune diseases). Viral hepatitis accounts for more than 50% of acute hepatitis cases in the United States (Samji, 2017).

The most common viral forms of hepatitis in the United States are hepatitis A, B, and C (HAV, HBV, HCV). All three of these viruses can cause acute illness. HBV and HCV can also lead to chronic infection, which may ultimately progress to cirrhosis and hepatocellular carcinoma. Persons who have chronic hepatitis may remain infectious and are capable of transmitting the disease for many years (Lippincott Williams & Wilkins, 2017; Samji, 2017).

Other hepatotropic viruses that can cause hepatitis are hepatitis D virus (HDV), hepatitis E virus (HEV), and hepatitis G virus (HGV). Additionally, there are infrequent causes of the disease such as Epstein-Barré virus (EBV), adenovirus, cytomegalovirus (CMV), and, rarely, herpes simplex virus (HSV; Samji, 2017). To date vaccinations are available only for hepatitis type A and type B (Lippincott Williams & Wilkins, 2017).

HEPATITIS A

Hepatitis A, a highly contagious disease, is caused by infection with the hepatitis A virus (HAV). Hepatitis A, also known as infectious or short- incubation hepatitis, has an acute onset and most often affects children and young adults. Hepatitis A is usually a mild disease with a generally good prognosis. It is self-limiting and does not cause chronic infection or chronic liver disease (CDC, 2020aa; Lippincott Williams & Wilkins, 2017).

It is transmitted primarily by the fecal-oral route by either person-to-person contact or by consuming food or water that is contaminated. Infections that occur in the United States are primarily linked to travel to another country where HAV transmission is common, close personal contact with infected persons, sex among men who have sex with men, and behaviors associated with drug use (CDC, 2020aa; CDC, 2020bb; Lippincott Williams & Wilkins, 2017).

Incidence

HAV is one of the most common causes of foodborne infection and occurs sporadically and in epidemics throughout the world. In developed countries with proper sanitary conditions, infection rates are low. In developing countries with regions of inadequate sanitation, 90% of children have been infected with HAV before the age of 10. However, epidemics are uncommon in these countries because older children and adults are generally immune. An estimated 7,134 people died from hepatitis A in 2016 (WHO, 2020c).

Risk factors

People at risk include those who have not been vaccinated or previously infected and those who live in areas where the virus is widespread, such as developing countries. Also at high risk are men who have sex with men and people who have chronic hepatic disease. Other risk factors include the following (CDC, 2020aa; CDC, 2020bb; Nettleman, 2020; WHO, 2020c):

- Living in conditions that have poor sanitation and lack of safe water.
- Using injectable drugs.
- Living in close contact with an infected person.
- Traveling to areas where the disease is endemic without being immunized.
- Having chronic liver disease.
- Needing to frequently receive blood products.

Disease course

The incubation period for HAV ranges from approximately 15 to 45 days. Prognosis is generally good with complete recovery likely. However, it can take weeks or even months for complete recovery for a return to work, school, or normal daily activities. This can have a significant interpersonal and economic impact on patients and families (Lippincott Williams & Wilkins, 2017).

Signs and symptoms

Some people infected with HAV have no symptoms. Adults are more likely to have severe symptoms and a prolonged disease course. Signs and symptoms range from mild to severe and can include the following (Nettleman, 2020; WHO, 2020c):

- Low-grade fever.
- Malaise.
- Anorexia.
- Headache.
- Clay-colored stools.
- Vomiting.
- Diarrhea.
- Pain in the right upper quadrant.
- Dark colored urine.
- Jaundice.

Patients shed large amounts of the virus in their feces beginning about 2 weeks before symptom onset and continuing for 1 to 3 months (Nettleman, 2020).

Diagnosis

Diagnosis is confirmed when antibodies to HAV are detected in the bloodstream. HAV infection does not cause chronic hepatic infection. Once someone has recovered from HAV, they are immune to the disease for life (Nettleman, 2020; WHO, 2020c).

Vaccination for HAV infection

There are two approved HAV vaccines currently available in the US: Havrix and Vaqta. Both are injected into the deltoid muscle. There is also a combination vaccine to protect against HAV and HBV infection called Twinrix, which requires three doses over a period of 6 months (CDC, 2020aa; Nettleman, 2020).

Vaccination is the most effective way to prevent HAV transmission. The Advisory Committee on Immunization Practices (ACIP) recommends that the following persons be vaccinated against HAV (CDC, 2020aa):

- All children at age 1 year: This is to avoid interference by passive maternal anti-HAV that may be present during the infant's first year of life.
- Persons who are at increased risk for infection.
- Persons who are at increased risk for complications from HAV.
- Any person who wants to obtain immunity or protection from infection with HAV.

The risks associated with receiving the hepatitis A vaccine include the following (CDC, 2020aa):

- Soreness at the injection site.
- Headache.
- Loss of appetite.
- Fatigue.
- Fever.

Sexually active adults are not considered at risk for HAV unless they live with or are having sex with an infected person, inject drugs, or have chronic liver disease. It is important that nurses know (and relay to their patients) that interventions generally used to prevent the transmission of sexually transmitted diseases (STDs), such as use of condoms, do not prevent HAV transmission. Vaccination is the most effective means of preventing HAV infection (CDC, 2020bb). Some food service personnel may be required to be vaccinated to prevent transmission of the disease. Frequent handwashing should be encouraged.

HEPATITIS B

Type B hepatitis (HBV) is caused by the hepatitis B virus, which can cause both acute and chronic liver disease. It affects all age groups but poses a significant hazard for healthcare workers because it is transmitted via contact with blood or other body fluids that are infected with the virus (WHO, 2020d).

HBV is a potentially life-threatening infection that not only causes chronic hepatic infection, but also puts patients at high risk of death from liver cancer and cirrhosis of the liver (WHO, 2020d).

Incidence and transmission

HBV is a global health problem with the highest prevalence in WHO Western Pacific region and WHO African region, where 6.2% and 6.1%, respectively, of the adult population are infected (WHO, 2020d). An estimated 257 million people are living with HBV infection throughout the world. In 2015, there were 887,000 HBV-related deaths (WHO, 2020d). The age-adjusted hepatitis B-related mortality rate decreased from 0.46 per 100,000 US population in 2017 to 0.43 in 2018, below the 2018 target rate of 0.45 (CDC, 2021d).

HBV is transmitted primarily through contact with infected blood, but there are also other means of transmission, including the following factors (Lippincott Williams & Wilkins, 2017; WHO, 2020d):

- Sexual contact through blood, semen, saliva, or vaginal secretions: HBV is deemed to be a sexually transmitted disease.
- Orally through breastfeeding or saliva.
- Parenteral route through injection equipment, needles, or syringes that have been contaminated.
- Parenteral route among people who are injectable drug users.
- Contact with contaminated body fluids in the healthcare setting, often because of wearing defective gloves.
- Maternal-neonatal transmission.

HBV is not spread by contaminated food or water. It is generally not spread casually in the workplace (WHO, 2020d).

Complications

A number of serious complications accompany HBV, including the following (Lippincott Williams & Wilkins, 2017; WHO, 2020d):

- Chronic active hepatitis. z
- Liver cancer.
- Cirrhosis of the liver.
- Pancreatitis.
- Lymphoma.

HBV infection can progress to chronic infections. For example (WHO, 2020d):

- 80% to 90% of infants infected during the first year of life develop chronic infections.
- Some 30% to 50% of children infected before age 6 develop chronic infections.
- Fewer than 5% of otherwise healthy adults who are infected develop chronic infection. About 20% to 30% of adults who are chronically infected will develop cirrhosis or liver cancer.

Risk factor

People at risk for HBV infection include the following (Lippincott Williams & Wilkins, 2017; WHO, 2020d):

- People who live in geographic regions where the disease is prevalent.
- People who travel to geographic regions where the disease is prevalent.
- Those who use injectable drugs.
- People who receive blood products frequently.
- Healthcare workers who are exposed or have a risk of exposure to infected patients' body fluids.
- Household and intimate contacts of patients who have HBV infection.
- Dialysis patients.
- Patients with chronic hepatic disease.
- People who have HIV/AIDS.
- People who have multiple sexual partners.
- Men who have sex with men.
- Healthcare personnel who have close regular contact with these patients or have had a needle stick from a known case.

The global prevalence of HBV infection in HIV-infected persons is 7.4%. Since 2015, WHO has recommended treatment for everyone with HIV, regardless of the stage of the disease. Tenofovir, which is included in the treatment combinations recommended for HIV treatment, is also active against HBV (WHO, 2020d).

Disease course

HBV has an incubation period of 30 to 180 days, with an average of 75 days. The HBV virus can survive outside the body for at least 7 days, during which time it can cause infection if it enters the body of an unimmunized person (WHO, 2020d).

People infected in adulthood are less likely than children to progress to chronic infection. Fewer than 5% of otherwise healthy adults progress to chronic infections. But 15% to 25% of adults who become chronically infected as children die from cirrhosis or hepatic cancer related to HBV (WHO, 2020d).

Signs and symptoms

HBV has an insidious onset and some people do not have symptoms during the acute infection phase. Those who do may experience 1 week to 2 months of prodromal symptoms, including the following (Lippincott Williams & Wilkins, 2017; WHO, 2020d):

- Anorexia.
- Fatigue.
- Nausea.
- Vomiting.
- Headache.
- Transient fever.
- Abdominal pain.

As the disease progresses, patients may experience the following (Lippincott Williams & Wilkins, 2017; WHO, 2020d):

- Jaundice.
- Dark urine.
- Arthritis.
- Skin rashes.
- Urticaria.
- Myalgia.
- Pruritus.
- Photophobia.
- Changes in the senses of taste and smell.

Although the disease is usually severe and there is a risk for severe complications, more than 90% of healthy adults infected with HBV recover completely within a year (WHO, 2020d).

Diagnosis

Diagnosis is confirmed when antibodies to HBV are detected. Other laboratory tests of significance that support a diagnosis of hepatitis include elevated serum alkaline phosphatase levels and elevated serum bilirubin levels. White blood cell counts reveal transient neutropenia and lymphopenia followed by lymphocytosis (Lippincott Williams & Wilkins, 2017; Pagana & Pagana, 2018).

Vaccination

HBV vaccine has reduced the number of new cases in the US by more than 75%. WHO recommends that all infants receive the hepatitis B vaccine as soon as possible after birth, preferably within 24 hours (WHO, 2020d). The birth dose should be followed by two or three doses to complete the primary series.

According to latest WHO estimates, the proportion of children under 5 years of age chronically infected with HBV dropped to just under 1% in 2019, down from around 5% in the pre-vaccine era ranging from the 1980s to the early 2000s (WHO, 2020d).

This marks the achievement of one of the critical targets to eliminate viral hepatitis in the sustainable development goals: to reach under 1% prevalence of HBV infections in children under 5 years of age by 2020 (WHO, 2020d).

Management of hepatitis A and HB and nursing considerations

Chronic hepatitis B can be treated with antiretroviral medications such as lamivudine (Epivir), which decreases the viral load of hepatitis B. But the majority of treatment interventions, including the following, are supportive and similar for all forms of hepatitis (Lippincott Williams & Wilkins, 2017; WHO, 2020d):

- Facilitate rest and sleep according to the patient's age and level of fatigue.
- Provide a quiet and calm environment with diversionary activities that combat anxiety and boredom but do not overexcite or stress the patient.
- Hospitalize patients who have excessive vomiting or life-threatening complications.
- Provide small high-calorie, high-protein meals to fight anorexia.
- Encourage at least 4 quarts of fluids per day. Offer ice chips and effervescent soft drinks. They help to hydrate the patient without triggering vomiting.
- Administer antiemetics about 30 minutes before meals to relieve nausea and prevent vomiting. Phenothiazines have a cholestatic effect and should not be administered.
- If signs or symptoms of precoma – such as lethargy, confusion, or mental changes – develop, reduce protein intake. If the patient is not hospitalized, seek immediate emergency medical help if such symptoms develop.
- Gradually increase physical activity after jaundice resolves.
- Implement enteric precautions and teach members of the same household and close contacts how to implement enteric and standard precautions.
- Provide emotional support and encouragement. Explain that it may take months for jaundice to clear completely and for physical energy to return.

Self-Assessment Quiz Question #7

Patients with HBV need to know that:

a. It is considered to be a sexually transmitted disease.
b. HBV is typically a mild disease that does not cause chronic infection or chronic liver disease.
c. Transmission routes include spread by food or water.
d. HBV has a short incubation period of about 2 weeks after being infected.

MENINGOCOCCAL MENINGITIS (BACTERIAL MENINGITIS)

After eight cases of group B meningococcal disease at Princeton University and four cases at University of California, Santa Barbara, health authorities have taken an unusual pathway to using a vaccine that is not licensed in the United States. More than 5,000 Princeton students and staff members with certain medical conditions have received one dose of a meningitis B vaccine (Bexsero) approved for use in the outbreak by FDA under an Expanded Access to Investigational New Drug protocol. Students will receive the second of the two needed doses in February. Regulatory agencies in the European Union, Canada, and Australia approved this meningitis B vaccine in 2013, but the U.S. FDA has not reviewed it for use here. The vaccine uses four antigens from serogroup B strains that provide protection from about 78% of the more than 1,000 identified strains of type B (Youngdahl, 2014).

The virulence of certain strains of meningococcal disease has led to changes in the vaccination of people at risk for the disease under certain circumstances, as shown by the preceding excerpt, which describes a situation that helped to trigger awareness of vaccination needs. Meningococcal meningitis can have severe consequences, including death. Outbreaks occur in populations that live in close quarters such as college dormitories, nursing homes, and military barracks (WHO, 2018b).

Etiology and incidence

Meningitis is defined as an inflammation of the meninges that surround the brain and spinal cord. Inflammation can affect all three meningeal membranes: the dura mater, arachnoid, and pia mater membranes. The most common form of meningitis is viral and often clears on its own within 10 days (Lippincott Williams & Wilkins, 2017; WHO, 2018b).

Meningococcal meningitis, commonly referred to as bacterial meningitis, is a bacterial form of meningitis caused by the gram-negative bacteria Neisseria meningitidis and is a much more serious form of the disease compared to viral meningitis (Lippincott Williams & Wilkins, 2017, WHO, 2018b).

Rates of meningococcal disease have been declining in the United States since the late 1990s. In 2018, about 330 cases of meningococcal disease were reported. Anyone can get meningococcal disease, but rates of disease are highest in children younger than 1 year old, followed by a second peak in adolescence. Among adolescents and young adults, those 16 through 23 years old have the highest rates of meningococcal disease (CDC, 202l).

Untreated bacterial meningitis is associated with up to a 50% mortality rate and the possibility of severe brain damage. Especially virulent forms of the disease may be fatal within a matter of hours (WHO, 2018c).

The highest rates of the disease are found in sub-Saharan Africa. About 30,000 cases are reported in this region every year (WHO, 2020b). Migratory populations from wars and famine in this area have contributed to the spread of the disease.

Although several different types of bacteria can cause meningitis, Neisseria meningitidis is the type with the potential to trigger large epidemics of meningitis (WHO, 2018b).

Transmission and pathophysiology

The disease is transmitted from person to person via respiratory droplets or throat secretions. Close, prolonged contact such as kissing or living with large groups of people in close quarters – such as in military barracks, migratory camps, or college dormitories – facilitate the spread of the disease (CDC 2020l; WHO, 2018b).

The Neisseria bacteria infect only humans. The bacteria can overwhelm the body's immune system and spread rapidly through the bloodstream to the brain. It is believed that about 10% to 20% of the population carries Neisseria in their throats at any given time. Why some people develop the disease and others do not is still not understood (WHO, 2018b).

Here are some common examples of how bacterial meningitis is spread (CDC, 2020l):

- Group B Streptococcus and E. coli: Mothers can pass these bacteria to their babies during birth.
- Hib and S. pneumoniae: People spread these bacteria by coughing or sneezing when in close contact with others who breathe in the bacteria.
- N. meningitidis: People spread these bacteria by sharing respiratory or throat secretions (saliva or spit). This typically occurs during close (coughing or kissing) or lengthy (living together) contact.
- E. coli: People can get these bacteria by eating food prepared by people who did not wash their hands well after using the toilet. People usually get sick from E. coli and L. monocytogenes by eating contaminated food.

Complications

A number of complications are associated with bacterial meningitis. Children who acquire the disease are especially vulnerable to becoming deaf and having learning difficulties, spasticity, paresis, or cranial nerve disorders. Seizures occur in 20% to 30% of all patients. Edema of the brain may cause herniation or compression of the brain stem (WHO, 2018b).

Other complications that may occur include the following (Lippincott Williams & Wilkins, 2017; WHO, 2018b):

- Visual impairment.
- Optic neuritis.
- Cranial nerve palsies.
- Personality changes.
- Headache.
- Paralysis.
- Vasculitis.
- Respiratory failure.
- Septic arthritis.
- Pericarditis.
- Endophthalmitis.
- Neurologic deterioration.
- Death.

Clinical manifestations

The average incubation period for meningococcal meningitis is 4 days, but it can range from 2 to 10 days (WHO, 2018b). Classic symptoms include fever, headache, and nuchal rigidity (stiff neck). Patients may also experience vomiting, diarrhea, cough, and myalgia (muscle pain) (Lippincott Williams & Wilkins, 2017; WHO, 2018b).

Confusion and altered mental status may become evident, especially in older patients. Patients may also complain of photophobia. A petechial rash (resembling a rug or brush burn) or purpuric rash may develop (Lippincott Williams & Wilkins, 2017; WHO, 2018b).

Infants may develop a bulging anterior fontanel. Children may refuse to eat or feed, have behavioral changes, exhibit arching of the back and neck, and develop seizures (Lippincott Williams & Wilkins, 2017).

Patients often exhibit positive Brudzinski's and Kernig's signs.

With Brudzinski's sign, the patient is placed in the dorsal recumbent position and the head is flexed upward. Meningeal irritation is indicated if neck flexion causes flexion of hips, knees, and ankles. If the patient also flexes their hips and knees, there may be meningeal irritation and inflammation, which are indicators of meningitis (Lippincott Williams & Wilkins, 2017).

With Kernig's sign, the patient is placed in the supine position. The thigh of one leg is flexed at the hip and knee to form a 90-degree angle. Then the leg is slowly completely extended at the knee joint. If the leg cannot be completely extended because of pain, the sign is positive and meningeal irritation is indicated (Lippincott Williams & Wilkins, 2017).

Onset of bacterial meningitis may take several hours or several days and depends on the patient's age, immune status, the coexistence of any other medical conditions, and the causative organism. Severe forms of the disease may progress with startling rapidity, even leading to death in a matter of hours (Lippincott Williams & Wilkins, 2017; WHO, 2018c).

Diagnosis

In addition to patient history and physical examination, the following diagnostic tests are used to confirm bacterial meningitis (Lippincott Williams & Wilkins, 2017; Pagana & Pagana, 2018; WHO, 2018c):

- Blood or cerebrospinal fluid (CSF) stain: The presence of gram-negative diplococci is highly suggestive for Neisseria meningitidis.
- Blood culture, CSF culture, or culture of lesion scrapings: A positive result for the bacterium confirms diagnosis. Note that nasopharyngeal infections positive for the bacterium are not conclusive because they are part of the normal flora of the nasopharyngeal area.
- Complete blood count (CBC) with differential: Elevated leukocyte count is present in bacterial meningitis.
- CSF evaluation: CSF is evaluated for elevated pressure, elevated leukocytes, elevated protein, and low glucose, which are suggestive of the disease.
- MRI/CT scan (with and without contrast): performed to rule out other disorders such as abscesses.

Treatment and nursing considerations

Effective evaluation and management of bacterial meningitis should be accomplished by a team effort with physicians, nurses, infectious disease specialists, neurologists, internal medicine specialists, and laboratory personnel working closely together (Lippincott Williams & Wilkins, 2017; WHO, 2018c).

The majority of patients receive high doses of intravenous antibiotics as soon as bacterial meningitis is suspected. Still, cultures should be obtained before starting the antibiotic therapy. Antibiotics used depend on the specific pathogen causing the disease and whether the patient is allergic to any medications. Typically, patients receive intravenous (IV) antibiotics for 2 weeks or longer. This is followed by oral antibiotic therapy (Lippincott Williams & Wilkins, 2017; WHO, 2018c). Other medications used as treatment measures include digoxin (Lanoxin) to control arrhythmias, mannitol (Osmitrol) for the reduction of cerebral edema, and anticonvulsants or sedatives to reduce restlessness (Lippincott Williams & Wilkins, 2017).

Supportive interventions include the following (Lippincott Williams & Wilkins, 2017; WHO, 2018c):

- Fluid and electrolyte replacement.
- Maintenance of a patent airway and administration of oxygen as needed.
- Bed rest.
- Meticulous monitoring of vital signs and intake and output.
- Droplet precautions.

Report all cases of bacterial meningitis to public health authorities. Administer prophylactic antibiotics to anyone who has come into close contact with the patient. Healthcare professionals who work in close contact with the patient may need to receive prophylactic antibiotics as well.

Vaccination

The best way to prevent meningococcal disease is by getting vaccinated. There are two types of meningococcal vaccines: MenACWY vaccine and MenB vaccine.

MenACWY vaccine is for preteens, teens, children, and adults who have certain health conditions. All preteens at 11 to 12 years of age and all teens at 16 years of age may receive MenACWY. The booster dose at 16 years of age provides continued protection during the ages when they are at highest risk CDC, 2020m; HHS.gov., 2020c).

MenB vaccine is for teens and young adults 16 through 23 years of age who may also receive MenACWYvaccine. The preferred ages to receive this vaccine are 16 through 18 years old. Multiple doses are needed for the best protection. It is important that the same brand is administered for all doses (CDC, 2020m; HHS.gov., 2020c).

All preteens and teens should receive the meningococcal vaccine as part of their routine vaccine schedule. Additionally, the vaccine is recommended for people at increased risk for meningococcal disease, including those who live in crowded domiciles such as college dormitories or military barracks, have certain medical conditions such as HIV, or are traveling to areas where the disease is common such as sub-Saharan Africa (HHS.gov., 2020c).

People should not receive the vaccine if they have serious allergies of any kind or are pregnant or breastfeeding. If patients are ill, they may need to wait until they are feeling better before getting the vaccine (HHS.gov., 2020c).

Self-Assessment Quiz Question #8

During physical exam of an 18-year-old college student, the nurse flexes the patient's head upward. The nurse notes that the patient flexes hips and knees. This indicates:

a. A positive Kernig's sign.
b. A normal response to flexing the head.
c. A bulging anterior fontanel.
d. Possible meningeal irritation and inflammation.

HPV AND CERVICAL CANCER

Cervical cancer is the third most common cancer of the female reproductive system. Left untreated, cervical cancer may become invasive (Lippincott Williams & Wilkins, 2017). According to the American Cancer Society (2021), about 14,480 new cases of cervical cancer will be diagnosed in 2021 and about 4,290 women will die from cervical cancer.

Cervical cancer and HPV

Various strains of the human papillomavirus (HPV), which is a sexually transmitted, are linked to the development of most cervical cancers. When the body's immune system is exposed to HPV, it reacts by preventing the virus from doing damage. In a small percentage of people, the virus survives for years, helping to cause some cervical cells to become malignant (Mayo Clinic, 2019a).

Cervical cancer is classified as preinvasive or invasive. Preinvasive cancer can range from minimal cervical dysplasia, meaning the lower third of the epithelium contains abnormal cells, to carcinoma in situ, meaning the full thickness of epithelium contains abnormally proliferating cells. If not treated, and depending on the specific cancer form, the disease may progress to invasive cancer (Lippincott Williams & Wilkins, 2017).

Etiology, incidence, and pathophysiology

Cervical cancer starts with the mutation of healthy cervical cells. These abnormal cells grow and multiply in a rapid, uncontrolled fashion. Malignant cells invade nearby tissues and can break off from a tumor to metastasize elsewhere in the body (Mayo Clinic, 2019a).

The exact cause of cervical cancer is unknown, but it is certain the HPV plays a crucial role in cervical cancer development. HPV infection is common and most people who have the virus will not develop cancer. Factors such as the environment and personal lifestyle choices influence whether cancer develops (Mayo Clinic, 2019a).

The main types of cervical cancer are squamous cell carcinoma and adenocarcinoma. Squamous cell carcinoma begins in the squamous cells of the outer part of the cervix, which projects into the vagina. The majority of cervical cancers are squamous cell cancers. Adenocarcinoma, a type of cervical cancer, starts in the glandular cells that line the cervical canal (Mayo Clinic, 2019a).

Two high-risk HPVs, HPV16 and HPV18, are responsible for most HPV-related cancers (National Cancer Institute, 2021). HPV infection is common. Nearly all sexually active people are infected with HPV within months to a few years of becoming sexually active. About half of these infections are with a high-risk HPV type. Both males and females can become infected with HPV infections and develop HPV-related malignancies. Most HPV infections do not cause cancer. The immune system is usually able to control HPV infections so that cancer does not develop. HPV vaccines can prevent infection with disease-causing HPV types, thus preventing many HPV-related cancers and cases of genital warts (National Cancer Institute, 2021).

The following are HPV-related malignancies (National Cancer Institute, 2021):

- Cervical cancers: Virtually all cases of cervical cancer are caused by HPV, and just two types of HPV, 16 and 18, are responsible for most cases.
- Anal cancer: More than 90% of anal cancers are caused by HPV. Anal cancer is almost twice as common in women as in men.
- Oropharyngeal cancers: The majority of these kinds of cancers, which develop in the throat, are caused by HPV. Approximately 70% of these types of cancers are caused by HPV. In the US, the number of new cases is increasing every year, and oropharyngeal cancers are now the most common HPV-related cancers.
- Penile cancers: More than 60% are caused by HPV. This is a rare type of cancer that spreads swiftly without treatment. Most men are older than 50 years at the time of diagnosis. About 2,000 men in the US are given a diagnosis of penile cancer.
- Vaginal cancers: About 75% are caused by HPV. Vaginal cancer is a rare type of cancer that may be found during a routine pelvic exam and Pap test.
- Vulvar cancers: Most vulvar cancers, about 70%, are caused by HPV. Another rare type of cancer, vulvar cancer, accounted for 0.3% in 2020. An estimated 6,120 new cases were diagnosed in 2020.

Risk factors

Anyone who is sexually active can get HPV infection. However, there are certain risk factors that increase the possibility of infection, including the following (American Cancer Society, 2020b; National Cancer Institute, 2021):

- Having multiple sexual partners.
- Having sex with someone who has had multiple sexual partners.
- Having other sexually transmitted infections.
- Having a weakened immune system.
- Smoking.

Clinical manifestations

Preinvasive cervical cancer usually produces no symptoms. Some patients may report a watery vaginal discharge (Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2019a).

Early invasive cervical cancer causes postcoital bleeding and pain, irregular vaginal bleeding, spotting between periods or after menopause, and foul-smelling vaginal discharge (Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2019a).

As the disease progresses and becomes more advanced, the following signs and symptoms are reported (Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2019a):

- Bleeding becomes more constant.
- Abdominal pain and pelvic pain that radiates to buttocks and legs.
- Leakage of urine and feces from the vagina because of fistula.
- Anorexia.
- Weight loss.
- Anemia.
- Edema of the lower extremities.

Diagnosis

A Pap test can detect cervical cancer before the patient develops signs and symptoms. The HPV DNA test is used for women older than 30 who have had abnormal PAP tests. Biopsy and histologic examination findings confirm diagnosis (Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2019a).

Staging

Treatment depends on accurate disease staging. Following are the stages of cervical cancer (Cancer.net, 2019):

Stage I: Cancer has spread from the cervix lining into the deeper tissue but is still found only in the uterus.
Stage II: The cancer has spread beyond the uterus to nearby areas such as the vagina or tissue near the cervix, but it is still inside the pelvic area. It has not spread to other parts of the body.
Stage III: The tumor involves the lower third of the vagina or has spread to the pelvic wall and causes hydronephrosis (swelling of the kidney), stops a kidney from functioning, or involves regional lymph nodes. There is no distant spread.
Stage IVA: The cancer has spread to the bladder or the rectum, but it has not spread to other parts of the body.
Stage IVB: The cancer has spread to other parts of the body.
Recurrent: Recurrent cancer is cancer that has come back after treatment.

Treatment and nursing considerations

Early cervical cancer is usually treated with surgery. The type of surgery depends on the size of the cancer, its stage, and if future pregnancy is hoped for (Mayo Clinic, 2019a).

Surgical Options

Following are some surgical approaches that can be used in the treatment of cervical cancer.

For very small cervical cancers, there is a possibility that a cone biopsy may remove the cancer entirely. A cone-shaped portion of the affected cervical tissue is removed, leaving the remainder of the cervix intact. This option may make pregnancy possible in the future (Mayo Clinic, 2019a).

Trachelectomy is a possible treatment for early-stage cervical cancer. This procedure involves removing the cervix and some surrounding tissue. The uterus remains, thus allowing for the possibility of pregnancy (Mayo Clinic, 2019a).

Radical hysterectomy involves removal of the cervix, uterus, part of the vagina, and nearby lymph nodes via a large incision. This type of hysterectomy can cure early-stage cervical cancer and prevent recurrence. Because the uterus is removed, there is no possibility of pregnancy (Johns Hopkins Medicine, n.d.; Mayo Clinic, 2019a).

With vaginal hysterectomy the uterus is removed through the vagina. This approach, however, does not allow the surgeon a complete full view of the surrounding organs (Johns Hopkins Medicine, n.d.).

With robotic-assisted radical total laparoscopic hysterectomy, using a robotic platform, the surgeon has a complete view of the surrounding organs and more precise control over incisions (Johns Hopkins Medicine, n.d.).

With laparoscopic-assisted total laparoscopic hysterectomy, the intra-abdominal portion of the operation is performed with the laparoscope. The remainder of the operation is performed through a vaginal incision for the removal of cervical tissue (Johns Hopkins Medicine, n.d.).

Total laparoscopic hysterectomy is done using the laparoscope. The surgical specimen is removed via the vagina (Johns Hopkins Medicine, n.d.).

The nurse needs to be able to reinforce explanations of the procedure and offer emotional support at what must be a very difficult time for patients and families. Instructions about the signs and symptoms of infection and the importance of early ambulation is imperative.

Radiation

Radiation is often combined with chemotherapy for the treatment of locally advanced cervical cancers and in the case of increased risk of recurrence. Radiation can be delivered externally by directing an external beam of radiation to the affected area of the body. Internally, a device containing radioactive material is inserted into the vagina, usually for only a few minutes. This is referred to as brachytherapy (Mayo Clinic, 2019a).

Chemotherapy

Chemotherapy may be administered parenterally or orally. Sometimes both methods are used. Low doses of chemotherapy, often given in conjunction with radiation, may be used for locally advanced cervical cancer. For significantly advanced cancer, high doses of chemotherapy may be administered to help control symptoms (Johns Hopkins Medicine, n.d.).

Palliative care

Palliative care focuses on pain relief, control of other symptoms, and emotional support for patients and families. The entire team works together to improve quality of life as they provide palliative care in conjunction with other treatments patients may receive (Johns Hopkins Medicine n. d.).

Preventive measures

Women can take a number of steps to prevent cervical cancer. Nurses should advise patients not to smoke or to stop smoking. HPV vaccine is critical for female and male teens. Nurses should inform patients that delaying the first sexual intercourse experience may help reduce risk of the disease, and that having fewer sexual partners may also decrease risk (Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2019a). Patients that identify sexual partners can help stop the spread of the disease.

Females should have routine Pap test screenings according to the following guidelines (American Cancer Society, 2020b):

- Cervical cancer testing (screening) should begin at age 25 or earlier depending on the sexual history.
- Those aged 25 to 65 should have a primary HPV test every 5 years. If primary HPV testing is not available, screening may be done with either a co-test that combines an HPV test with a Pap test every 5 years or a Pap test alone every 3 years.
- A primary HPV test is an HPV test that is done by itself for screening. FDA has approved certain tests to be primary HPV tests.
- Those over age 65 who have had regular screening in the past 10 years with normal results and no history of CIN2 or more serious diagnosis within the past 25 years should stop cervical cancer screening. Once stopped it should not be started again.
- Women who have had a total hysterectomy should stop screening such as Pap tests and HPV tests unless the hysterectomy was done as a treatment for cervical cancer or serious precancer. Women who have had a hysterectomy without removal of the cervix (called a supracervical hysterectomy) should continue cervical cancer screening according to the guidelines above.
- People who have been vaccinated against HPV should still follow these guidelines for their age groups.
- Patients who have a history of a serious precancer should continue to have testing for at least 25 years after that condition was found, even if the testing goes past age 65.
- Those who are at high risk of cervical cancer because of a suppressed immune system (for example from HIV infection, organ transplant, or long-term steroid use) or because they were exposed to DES in utero, may need to be screened

more often. Diethylstilbestrol (DES) is a synthetic form of the female hormone estrogen. It was prescribed to pregnant women between 1940 and 1971 to prevent miscarriage, premature labor, and related complications of pregnancy, but it is no longer used during pregnancy. They should follow the recommendations of their healthcare team.

Vaccination

Up to 70% of HPV-related cervical cancer cases can be prevented with vaccination. Various changes have been made within the past few years. Patients younger than 15 need only two rather than three doses. The vaccine itself can be used in adults up to the age of 45. Only 9-valent HPV vaccine (Gardasil R9) has been available in the US since late 2016 (CDC, 2020a; CDC, 2020x; Cleveland Clinic, 2019).

The 9-valent HPV vaccine protects against HPV 16 and 18, HPV types that cause about 66% of cervical cancers and the majority of other HPV- attributable cancers in the US, and five additional cancer-causing types, which account for about 15% of cervical cancers. It also protects against HPV 6 and 11, HPV types that cause most anogenital warts (CDC, 2020a).

HPV vaccine recommendations and important points include the following (CDC, 2020a; Cleveland Clinic, 2019):

- HPV vaccine is recommended for routine vaccination at age 11 or 12 years, but vaccination can be started at age 9.
- Vaccination should be for all persons through the age of 26 years. However, some adults ages 27 through 45 years may receive the vaccine based on discussion with their healthcare providers or if they did not get adequately vaccinated when they were younger. It is important to note that, for people aged 27 to 45 years, vaccination provides less benefit for a variety of reasons, including that more people in the age group have already been exposed to HPV.
- HPV vaccine is not recommended for use during pregnancy.
- Two doses of HPV vaccine are recommended for most persons starting the series before their 15th birthday. The second dose of HPV vaccine should be given up to 12 months after the first dose.
- Adolescents who receive two doses less than 5 months apart will require a third dose of HPV vaccine.
- Three doses of HPV vaccine are recommended for teens and young adults who start the series at ages 15 through 26 years and for immunocompromised persons. The recommended three-dose schedule is younger than 1 year, 1 to 2 months, and 6 months. Three doses are recommended for immunocompromised persons, including those with HIV infection aged 9 through 26 years.

Self-Assessment Quiz Question #9

What advice should be given to 60-year-old women regarding cervical cancer screening?

a. If she has no history of cervical abnormalities, she can stop screening.
b. If she has been vaccinated against HPV, she can discontinue screening.
c. If she has had a serious precancer, she should continue to have testing for at least 25 years.
d. If she has a suppressed immune system, screening should not be performed until the immune system is functioning normally.

VACCINE-PREVENTABLE DISEASES: ROTAVIRUS

Before vaccine development, rotavirus caused the following on a yearly basis in children under 5 years of age in the US (CDC, 2019h):

- More than 400,000 visits to physicians.
- More than 200,000 emergency department visits. 55,000 to 70,000 hospitalizations.
- 20 to 60 deaths.

Rotavirus was the leading cause of severe diarrhea in infants and young children in the US before the rotavirus vaccine was introduced in 2006 (CDC, 2019h). Adults can also be infected and may be at increased risk if other chronic conditions are present.

Risk factors

The most severe cases of rotavirus disease occur primarily among unvaccinated children ages 3 months to 3 years. Children at greatest risk for contracting rotavirus disease are those who are in childcare settings. They are more likely to get rotavirus in the winter and spring (January through June; CDC, 2019g).

Older adults have a greater risk of contracting the disease, as do those who provide care to children who have rotavirus disease, have a compromised immune system, or are traveling to geographic regions where the disease is present (CDC, 2018d; CDC, 2019g).

Complications

Complications associated with rotavirus infection include severe dehydration, shock, and skin breakdown (CDC, 2019g).
Transmission and Pathophysiology

The disease is transmitted primarily through the fecal-oral route, although there have been reported low titers of the virus in respiratory tract secretions and other body fluids. Transmission may occur by ingesting contaminated water or food and contact with surfaces and objects contaminated by the virus (CDC, 2019g).

Infected patients pass billions of rotavirus particles in their stools. It takes only a small number of such particles to cause infection. For example, babies or small children can touch contaminated objects, put their fingers in their mouths, and become infected (CDC, 2019g). Strict handwashing should be carried out by those who care for young children or older persons with diarrhea.

Clinical manifestations

After an incubation period of 1 to 3 days, signs and symptoms develop, including fever; nausea; vomiting; and profuse, watery, nonfoul-smelling diarrhea. Effects of the disease can range from mild to severe, and it usually lasts from about 3 to 9 days (CDC, 2019g).

Diagnosis

Diagnosis is confirmed by rapid antigen detection of rotavirus in feces. Acute diarrhea may also be caused by bacteria, parasites, side effects of antibiotic therapy, and food poisoning (CDC, 2019g).

Signs and symptoms similar to those of rotavirus may also be caused by the following (CDC, 2019g):

- Overfeeding.
- Irritable bowel syndrome.
- Celiac disease.
- Lactose intolerance.
- Cystic fibrosis.
- Inflammatory bowel syndrome.

Treatment and nursing considerations

In otherwise healthy patients, rotavirus is usually a self-limiting illness and lasts only a few days without serious complications. Treatment focuses on supportive interventions such as fluid and electrolyte replacement and rest (CDC, 2019g; Meadows-Oliver, 2019).

Patients, especially infants and young children, should be carefully monitored for signs of dehydration such as extreme fussiness or sleepiness in infants and children; irritability and confusion in adults; very dry mouth, skin, and mucus membranes; greatly reduced urinary output; concentrated urine; sunken eyes; and dizziness (CDC, 2019g; Meadows-Oliver, 2019).

Parents and other caregivers should be instructed to wash hands after touching patients' body fluids, clean objects that have been in contact with body fluids such as toys bed linens, and clean perineum gently and thoroughly to avoid skin breakdown (CDC, 2019g; Meadows-Oliver, 2019.

Vaccination

Incidence of the disease has also decreased among older children and adults who have not been vaccinated. Vaccinated children are less likely to contract the disease and transmit it to others (CDC, 2019g). Day care facilities often require vaccination of children to prevent the spread of rotavirus.

There are two FDA-approved rotavirus vaccines in the US: RotaTeq and Rotarix. They are liquids and administered orally. RotaTeq is given in a three-dose series at ages 2, 4, and 6 months. Rotarix is administered in a two-dose series, with doses given at ages 2 and 4 months (CDC, 2018d; CDC, 2019g; Meadows-Oliver, 2019).

PNEUMONIA

Pneumonia is an acute inflammatory infection of the lungs that involves the terminal airways and alveoli of the lung. Pneumonia is classified according to the pathogens that cause the disease and the specific location of involvement (CDC, 2019f; Lippincott Williams & Wilkins, 2017).

For example, pneumonia can be classified according to the following (CDC, 2019f; Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2020e).):

- Pathogen: Pneumonia can be caused by viral, bacterial, fungal, protozoan, mycobacterial, mycoplasmal, or rickettsial pathogens.
- Location in the lung: Lobular pneumonia affects part or parts of a lobe. Lobar pneumonia affects an entire lobe, and bronchopneumonia affects the distal airways.
- Type: Primary pneumonia is caused by inhalation or aspiration of a pathogen; secondary pneumonia may follow lung damage caused by a noxious chemical or superinfection.

For the purpose of this education program, which focuses on vaccine-preventable diseases, the emphasis is on pneumococcal pneumonia. This type of pneumonia is caused by a group of bacteria called Streptococcus pneumonia. This type can cause not only pneumonia, but also meningitis (Mayo Clinic, 2020e).

Risk factors

Following are the risk factors for developing pneumonia (Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2020e):

- Smoking.
- Alcoholism.
- Bronchial asthma.
- Immunosuppression.
- Cardiac or respiratory disease.
- Advanced age.
- Prolonged immobility or bedrest.
- Chronic illness.
- Cancer, especially lung cancer.
- Malnutrition.
- Sickle cell disease.
- Aspiration.
- Immunosuppressive therapy.
- Exposure to noxious gases.

Complications

Complications associated with pneumonia include the following (Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2020e):

- Atelectasis.
- Bacteremia.
- Delirium.
- Empyema.
- Endocarditis.
- Hypoxemia.
- Lung abscess.
- Pericarditis.
- Persistent hypotension and shock, especially in elderly patients with gram-negative bacterial disease.
- Pleural effusion.
- Respiratory failure.
- Septic shock.
- Superinfections such as meningitis and pericarditis.

Clinical manifestations

Pneumococcal pneumonia is often preceded by an upper respiratory tract infection. Following are the signs and symptoms of pneumococcal pneumonia (Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2020e):

- Abrupt onset of severe shaking chills.
- Sustained temperature of 102°F to 104°F.
- Tachypnea.
- Crackles (rales).
- Cough.
- Production of sputum.
- Pleuritic chest pain exacerbated by coughing.
- Dyspnea.Tachycardia.(Use of accessory muscles of respiration and nasal flaring.)

Diagnosis

Diagnosis is made by a thorough history and physical examination and the following diagnostic tests (Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2020e):

- Chest X-ray: Shows infiltrate and the location and extent of the disease.
- Sputum evaluation: Gram stain and culture and sensitivity of sputum are performed to identify the causative pathogen.
- Blood cultures: Obtained to detect and identify bacteria and other pathogens.
- White blood cell count (WBC): Elevated in the presence of infection.
- Immunologic testing: Such tests detect microbial antigens in serum, sputum, and urine.

Treatment and nursing considerations

Antibiotic treatment depends on the causative agents and local antibiotic resistance. Antibiotic therapy begins as soon as possible after taking the appropriate cultures. It is not necessary to wait for results as long as cultures are obtained before administering the medication (Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2020e). Additional interventions include oxygen therapy, frequent coughing exercises and deep breathing, frequent position changes, and as much mobility as possible (Lippincott Williams & Wilkins, 2017).

Prevention

Nurses should encourage all patients, especially those who have limited mobility, to perform deep breathing and coughing exercises frequently. Incentive spirometers are used to encourage prolonged inspiration to increase lung expansion and expectoration. Early ambulation is encouraged postoperatively. For patients who spend a lot of time in bed, encourage position changes and range of motion exercises (Lippincott Williams & Wilkins, 2017; Mayo Clinic, 2020e).

Vaccination

Vaccines help prevent pneumococcal disease, which is any illness caused by Streptococcus pneumoniae bacteria (Mayo Clinic, 2019b). CDC recommends routine administration of pneumococcal conjugate vaccine (PCV13) for all children younger than 2 years of age. PCV13 is given to infants as a series of four doses, one dose at each at 2 months, 4 months, 6 months, and 12 through 15 months. Children who miss their shots or start the series later should still get the vaccine. The number of doses recommended and the intervals between doses will depend on the child's age when vaccination begins (CDC, 2019n).

For adults 65 years or older who do not have an immunocompromising condition, cerebrospinal fluid leak, or cochlear implant and want to receive PPSV23 only, administer one dose of PPSV23. Anyone who received any doses of PPSV23 before age 65 should receive one final dose of the vaccine at age 65 or older. Administer this last dose at least 5 years after the prior PPSV23 dose (CDC, 2019n).

For adults 65 years or older who do not have an immunocompromising condition, cerebrospinal fluid leak, or cochlear implant and want to receive PCV13 and PPSV23, administer one dose of PCV13 first and then give one dose of PPSV23 at least 1 year later. If the patient has already received PPSV23, give the dose of PCV13 at least 1 year after they have received the most recent dose of PPSV23. Anyone who has received any doses of PPSV23 before age 65 should receive one final dose of the vaccine at age 65 or older. Administer this last dose at least 5 years after the prior PPSV23 dose. Routine administration of pneumococcal polysaccharide vaccine (PPSV23) is recommended for all adults 65 years or older. In addition, CDC recommends PCV13 based on shared clinical decision making for adults 65 years or older who do not have an immunocompromising condition, cerebrospinal fluid leak, or cochlear implant and have never received a dose of PCV13. Clinicians should consider discussing PCV13 vaccination with these patients to decide if vaccination might be appropriate (CDC, 2019n).

INFLUENZAE (HIB)

Haemophilus influenzae type b (Hib) is a type of bacterium that can affect many organ systems. The most common types of disease caused by Hib bacteria are pneumonia, bacteremia, meningitis, epiglottis, septic arthritis, cellulitis, otitis media, and purulent pericarditis. An estimated 3% to 6% of Hib infections in children are fatal. Patients 65 and older infected with invasive H. influenzae have higher case-fatality rates than children have (CDC, 2020f).

Haemophilus influenzae enters the body through the respiratory tract and replicates in the nasopharynx. It can colonize the nasopharynx temporarily or for several months. Many patients do not develop symptoms in response to colonization and can develop immunity. Some patients can develop invasive infections from colonization. Although the exact method of infection is not known, the bacteria can invade the bloodstream and spread to distant sites in the body, such as the meninges of the central nervous system (CDC, 2020f).

In the pre-vaccine era, meningitis was the most common manifestation of invasive Haemophilus influenzae type b. Patients present with decreased mental status, stiff neck, fever, hearing impairment, and other neurologic symptoms. Because Hib can affect many organ systems, other common manifestations include pneumonia, arthritis, cellulitis, and epiglottitis. Hib can also cause osteomyelitis and pericarditis (CDC, 2020f).

Risk factors

According to CDC (2020f), those at increased risk of Hib disease are unimmunized children younger than 5 years old, household contacts of a person with the disease, and day care classmates of a person with the disease.

Additionally, the following groups are at increased risk of H. influenzae disease (CDC, 2020f):

- Children younger than 5 years of age.
- Adults who are 65 and older.
- Native Americans and Alaska Natives.
- People with sickle cell disease, asplenia (absence of a spleen), HIV, and immunoglobulin and complement component deficiencies.
- People with malignant neoplasms requiring hematopoietic stem cell transplant, chemotherapy, or radiation therapy.

Clinical manifestations

Haemophilus influenzae type b generally sparks a characteristic inflammatory response in the affected tissues and causes a high fever and general malaise. When it infects the larynx, trachea, or bronchial tree, it causes an irritable cough; dyspnea; a thick, purulent exudate; and mucosal edema. If it spreads to the lungs, it can cause bronchopneumonia. In the pharynx it can cause epiglottitis, as well as reddened pharyngeal mucosa and, rarely, a soft yellow exudate (CDC, 2020f).

Complications

Complications associated with Hib include the following (CDC, 2020f):

- Meningitis.
- Pleural effusion.
- Pericarditis.
- Cellulitis.
- Respiratory failure.
- Subdural effusions.
- Obstruction of the upper airways.
- Neurologic sequelae that can be permanent.

Treatment and nursing considerations

Invasive disease caused by Haemophilus influenzae type b generally requires hospitalization. The antibiotic used depends on the site of infection and susceptibility testing. In the US, many forms of the bacteria produce beta-lactamase; more than 50% are resistant to ampicillin. For the treatment of invasive illness, cefotaxime or ceftriaxone is recommended. For infections that are not as serious, oral cephalosporins (except for first-generation cephalosporins such as cephalexin) are usually effective (Merck Manual Professional Version, 2020).

Children with serious illness are hospitalized with contact and respiratory isolation for 24 hours after starting antibiotics. Maintain respiratory function through proper positioning, humidification, and suctioning if necessary. Monitor patients for signs of cyanosis and dyspnea, which could indicate the need for intubation. Monitor patients for signs of dehydration, including decreased urine output, increased pulse, decreased skin turgor, and parched lips. Encourage rest (Merck Manual Professional Version, 2020).

Prevention

After initiation of vaccine therapy, serious cases of Hib disease have dropped by more than 99% since 1991. There are two types of Hib vaccines: Hib vaccine, which protects children and adults; and the DtaP-IPV vaccine, which protects babies ages 2 through 18 months from Hib disease, tetanus, diphtheria, whooping cough, and polio (HHS.gov., 2020b).

Infants and children need three or four doses depending on which brand of the vaccine they receive. Children should receive doses of the vaccine according to the following schedule (HHS.gov., 2020b):

- 2 months of age for the first dose.
- 4 months of age for the second dose.
- 6 months of age for the third dose if they are getting four doses.
- 12 through 15 months for the booster (additional dose).

Children ages 2 through 18 months may also receive a combination vaccine that is designed to protect against Hib disease, tetanus, diphtheria, whooping cough, and polio (DtaP-IPV/Hib). The child's healthcare providers can recommend the vaccine that is appropriate (HHS.gov., 2020b).

The majority of people over the age of 5 do not need the Hib vaccine. However, they may need to receive the vaccine if they have a damaged spleen or sickle cell disease or have had a bone marrow transplant (HHS.gov., 2020b).

People who should not receive the Hib vaccine include infants younger than six weeks, those who have had a life-threatening reaction to the vaccine in the past, and people who have a serious allergy to any of the vaccine's ingredients (HHS.gov., 2020b).

Self-Assessment Quiz Question #10

All of the following actions are appropriate for the prevention of Hib disease EXCEPT:

a. Administer the first dose of Hib vaccine with 1 week of birth.
b. Explain to parents that most people over the age of 5 do not need the Hib vaccine.
c. Administer the DtaP-IPV vaccine to babies ages 2 through 18 months.
d. Explain to parents that children should receive three or four doses depending on which brand of the vaccine is being administering.

Critical thinking scenario

Nicholas and his family were enjoying a family vacation at their favorite campground. One afternoon, as they hiked a familiar wooded trail, they came upon a raccoon. The animal was unsteady on its feet, growling, and drooling profusely. Alarmed, Nicholas stepped between the raccoon and his young daughter. The animal charged Nicholas and bit him on the leg, after which the raccoon ran rapidly into the woods. Nicholas and his family drove to the nearest hospital emergency department immediately after informing campground authorities of the incident. The raccoon could not be located and hospital personnel believed that, based on the behavior of the animal, it was advisable to initiate treatment with rabies vaccine.

RABIES

Although not a disease for which vaccine is routinely administered, rabies vaccine is one of the few treatment options for a disease that is serious and virtually 100% fatal (WHO, 2020e).

Etiology and incidence

Rabies is a preventable disease affecting mammals. It is most frequently transmitted via the bite of a rabid animal. Any mammal can transmit the rabies virus. In the US, most rabies cases reported to CDC occur in wild animals like bats, foxes, skunks, and raccoons. In the developing countries of Africa and Southeast Asia, stray dogs are the most likely animals to transmit rabies to people (CDC, 2020p; Mayo Clinic, 2019c; WHO, 2020e).

The rabies virus is usually transmitted by direct contact with virus-laden saliva of a rabid animal through a bite or a scratch. Rarely, the rabies virus is transmitted via routes such as mucous membranes, aerosol transmission, and corneal and organ transplantations (CDC, 2020p).

The virus replicates in the striated muscle cells at the site of entry and spreads up the nerves to the CNS, where it replicates in the brain. The disease is nearly always fatal if patients begin to show signs and symptoms. Thus, anyone who may have a risk of contracting rabies should receive rabies vaccines (Mayo Clinic, 2019c).

Rabies is found on all continents with the exception of Antarctica. More than 95% of human deaths from rabies occur in Asia and Africa. Rabies in poor, vulnerable populations may go undiagnosed or unreported. It occurs most often in remote rural communities where dog vaccination programs have not been implemented (WHO, 2020f). Domestic pets such as dogs and cats are usually required by state laws to be vaccinated.

According to WHO, 40% of people bitten by suspected rabid animals are children under the age of 15. Dog bites are the source of the majority of human rabies deaths. Dog bites contribute up to 99% of all rabies transmissions to humans. Cleansing the wound/bite with soap and water and receiving immunization within a few hours after contact with a suspect rabid animal can prevent the onset of rabies and death. More than 29 million people throughout the world receive a post-bite vaccination. The economic burden of dog-mediated rabies is about $8.6 billion per year (WHO, 2020e).

Clinical manifestations

The incubation period of rabies virus is usually about 2 to 3 months but varies from as little as less than 1 week to more than 1 year, depending on factors such as virus entry and viral load (WHO, 2020e).

Initial symptoms include fever; malaise; fatigue; headache; a sense of apprehension and anxiety; and pain or unusual sensations of tingling, pricking, or burning at the site of the bite. As the virus spreads to the CNS, symptoms of excitation – such as agitation, restlessness, anxiety, and cranial nerve dysfunction – develop (WHO, 2020e).

As the disease advances and the virus spreads through the CNS, progressive fatal inflammation of the CNS develops. At this point, two clinical forms of the disease can occur: furious rabies and paralytic rabies (WHO, 2020e).

With furious rabies, patients exhibit hyperactivity, excited behavior, and hydrophobia. Death occurs within a few days from cardiopulmonary arrest.

Paralytic rabies is responsible for about 20% of the total number of human cases of rabies. This form produces less dramatic signs and symptoms, and the course is usually longer than the furious form. Muscle paralysis occurs gradually, beginning at the site of the wound. Coma develops slowly and eventually leads to death. The paralytic form of rabies is often misdiagnosed. This contributes to under-reporting of the disease and the lack of accurate statistics pertaining to prevalence and incidence.

Diagnosis

Diagnosis is confirmed when the virus is isolated from the patient's saliva or throat and with an examination of the blood by direct fluorescent antibody (DFA). A swift diagnosis is critical for the prompt administration of postexposure prophylaxis. Laboratory tests may spare patients from stress and psychological trauma and being given vaccine if the animal is not rabid (CDC, 2020p).

Treatment and nursing considerations

Because rabies is fatal unless treatment is administered promptly, all people who have sustained unprovoked animal bites should be treated as though rabies were suspected (WHO, 2020e).

Nursing consideration: As part of their public health initiatives, nurses must be sure to teach patients about the ongoing danger of rabies and steps to avoid contracting the disease. They must also teach the necessity of getting immediate medical attention if anyone is exposed to an animal bite, especially a wild animal's.

Postexposure prophylaxis (PEP) is the immediate treatment of a bite victim after rabies exposure. Initial first aid for animal bites is washing and flushing the wound immediately for a minimum of 15 minutes with soap and water, detergent, povidone iodine, or other substances that kill the rabies virus (WHO, 2020e).

Depending on the severity of contact with the suspected rabid animal, a full PEP course is recommended as follows (WHO, 2020e):

Category I: touching or feeding animals, animal licks on intact skin (no exposure).

Category II: nibbling of uncovered skin, minor scratches or abrasions without bleeding (exposure).

Category III: single or multiple transdermal bites or scratches, contamination of mucous membrane or broken skin with saliva from animal licks, exposures to direct contact with bats (severe exposure).

All Category II and III exposures are assessed as carrying a risk of developing rabies and require PEP. This risk is increased if (WHO, 2020e):

- The biting mammal is a known rabies reservoir or vector species.
- The exposure occurs in a geographical area where rabies is still present.
- The animal looks sick or displays abnormal behavior.
- A wound or mucous membrane was contaminated by the animal's saliva.
- The bite was unprovoked.
- The animal has not been vaccinated, or vaccination status cannot be determined.

Nursing consideration: The vaccination status of the suspect animal should not be the deciding factor when considering to initiate PEP when the vaccination status of the animal is questionable. This can be the case if dog vaccination programs are not sufficiently regulated or followed out of lack of resources or low priority (WHO, 2020e).

If someone has never had the rabies vaccine, the first dose should be administered as soon as possible. The next dose is given 3 days after the first dose. The third dose is given 1 week after the first dose. The last dose is given 2 weeks after the first dose (HHS.gov., 2020e).

A dose of rabies immune globulin is administered with the first dose of the vaccine as well. For those with weakened immune systems, another dose is given 4 weeks after the first dose (HHS.gov., 2020e).

For those people who have already had the rabies vaccine, two doses are administered. The first dose is administered as soon as possible and the second dose is given 3 days later. The rabies immune globulin injection is not needed (HHS.gov., 2020e).

Common side effects of the rabies vaccine may go away as the patient's body adjusts to the vaccine. These side effects should be reported to the patient's healthcare professional and their severity discussed. Following are common side effects (HHS.gov., 2020e):

- Chills.
- Fever.
- Dizziness.
- General discomfort or feeling ill.
- Headache.
- Itching, pain, redness or swelling at the injection site.
- Nausea
- Stomach, abdominal pain.
- Muscle and joint aches and pains.

Side effects such as the following are less common but require immediate medical attention (HHS.gov., 2020e):

- Chest tightness.
- Confusion.
- Crawling, burning, itching, numbness, tingling feelings, or "pins and needles" sensations.
- Coughing.
- Difficulty moving.
- Hives.
- Irritability.
- Joint inflammation.
- Loss of strength.
- Lymphadenopathy in the neck, underarm, or groin.
- Muscle pain, stiffness, or weakness.
- Paralysis or severe weakness in the legs.
- Rash.

- Respiratory distress.
- Seizures.
- Stiffness of the extremities or neck.
- Swelling of the eyelids, area around the eyes, face, lips, or tongue.
- Tachycardia.
- Trouble swallowing.
- Unusual fatigue.
- Vomiting.

Self-Assessment Quiz Question #11

A patient has experienced a Category II contact with a suspected rabid animal. Which of the following statements about this type of contact is accurate?

a. There was no exposure, so no vaccine is necessary.
b. There was contamination of mucous membrane.
c. The vaccination status of the suspect animal will determine treatment.
d. A dose of vaccine should be administered as soon as possible.

ANTHRAX

The FBI announced that it has concluded its investigation into the 2001 anthrax mailings, saying Friday that a biodefense researcher carried out the attacks alone. The anthrax letters killed five people and sickened 17 shortly after the September 11, 2001, terrorist attacks. The letters, filled with bacterial spores, were sent to Senate Democratic leaders and news organizations. By 2007 investigators conclusively determined that a single spore-batch created and maintained by Dr. Bruce E. Ivins at the United States Army Medical Research Institute of Infectious Diseases was the parent material for the letter spores, said a report released Friday by the FBI. Evidence developed from that investigation established that Dr. Ivins, alone, mailed the anthrax letters. Ivins, 62, committed suicide in July 2008 as federal agents were closing in on him, police said. (CNN Justice, 2010)

Like rabies, immunization for anthrax prevention is not routinely administered. But the use of anthrax as a terrorist weapon makes it important for healthcare workers to become familiar with its clinical manifestations and available vaccine.

Anthrax is an acute bacterial infection caused by the bacterium Bacillus anthracis, which exists as spores in soil. These spores can live for years. It is most often found in animals that graze such as sheep, goats, cattle, and horses. The disease can also affect humans who come into contact with infected animals or their fur, bones, hair, or wool. Anthrax is also used as a bioterrorism agent, as in the 2001 case when letters containing anthrax spores were mailed to various people, including members of Congress and news organizations in the US (FDA, 2018; WHO, 2020b).

There are three forms of anthrax (FDA, 2018; WHO, 2020b).

1. Cutaneous or skin anthrax: This form is usually transmitted when someone with a break in their skin comes into direct contact with anthrax spores. It is the most common form of anthrax in humans and is responsible for more than 95% of reported cases. The point of contact results in an itchy bump that quickly develops a black sore. Some people develop muscle aches, headaches, fever, and vomiting. It is essential that cutaneous anthrax be treated quickly. The mortality rate for cutaneous anthrax is about 20% without antibiotic therapy.
2. Gastrointestinal (GI) anthrax: GI anthrax is acquired from eating the meat of an infected animal. Patients develop symptoms similar to food poisoning such as nausea, vomiting, and fever. These symptoms progress to abdominal pain, vomiting blood, and severe diarrhea. People should seek medical evaluation and treatment swiftly. Even with treatment, death occurs in 25% to 75% of cases.
3. Inhalation anthrax: Inhalation anthrax is the most serious form of the disease. It is also the rarest form. People contract inhalation anthrax by breathing in a large number of anthrax spores that have been suspended in the air. Initial signs and symptoms resemble those of the common cold: malaise, fever, headache, chills, and myalgia. The disease can progress to cause severe respiratory distress and shock. Sadly, even with treatment, inhalation anthrax is usually fatal, with a fatality rate of 80% or higher.

Diagnosis

Diagnosis is made by culturing the patient's blood, skin lesions, or sputum. The presence of Bacillus anthracis confirms the diagnosis of anthrax. Specific antibodies to the bacterium may also be detected (Cleveland Clinic, 2020).

Treatment and nursing consideration

It is imperative to initiate treatment as soon as anthrax exposure is suspected. Antibiotic therapy with agents such as penicillin, ciprofloxacin, and doxycycline is most often used. Monitor the patient's response to antibiotic therapy and perform supportive measures such as monitoring vital signs, intake and output, and cardiac and respiratory status (FDA, 2018; WHO, 2020d).

Emotional support is also critical because this is a frightening, often fatal, disease.

Standard precautions must be strictly implemented and surfaces in the patient's room disinfected. Initiate contact precautions if patients have draining lesion (Cleveland Clinic, 2020).

Vaccine

Anthrax vaccine consists of an attenuated strain of the bacterium. This vaccine is not available for routine administration to the general public and is, as of this writing, administered only to US military personnel before deployment and, under certain circumstances, to other people who have been or may be exposed to anthrax (FDA, 2018; WHO, 2020b).

The only licensed anthrax vaccine is anthrax vaccine adsorbed (AVA), or BioThraxTM, and is indicated for active immunization for the prevention of anthrax caused by Bacillus anthracis in people ages 18 to 65 who are at high risk of exposure, such as people who work with potentially infected animals, researchers who study the bacterium, or military personnel. The vaccine has been approved for use since 1970. Next- generation vaccines are currently under development by a variety of manufacturers (FDA, 2018).

BioThraxTM has been purchased by the US federal government. It is stored in the Strategic National Stockpile (SNS) for use as part of a postexposure prophylaxis regimen with licensed antibiotics in the event of a terrorist attack with anthrax. The military also has an active vaccination program for military personnel going to specific locations around the world (FDA, 2018).

Questions still exist about the spread of anthrax via the mail because this was the mode of transport in the 2001 domestic terrorist attacks. WHO (2020b) offers the following information about suspicious letters or parcels:

- Examples of characteristics of letters or parcels that should incite suspicion include having a powdery substance on the outside, are unexpected, are from someone who is unfamiliar, have incorrect titles or titles with no name, contain

misspellings of common words, are addressed to someone who is no longer at the home or workplace, have no return address or a return address that does not seem to be legitimate, are of unusual weight given their size, are oddly shaped, have an unusual amount of tape, have strange odors or stains, or are marked with restrictive instructions such as confidential or personal.
- People who receive suspicious letters or parcels should not handle them. They should move the letters or parcels to an isolated area. Everyone who has touched the letters or parcels should wash their hands with soap and water.
- Law enforcement authorities should be notified immediately of any suspected source. A list of all people who have touched the letter or parcel, including their contact information, should be compiled and given to law enforcement authorities.
- All items of clothing worn when in contact with the suspicious letters or parcels should be placed in plastic bags and given to law enforcement authorities. As soon as possible, all people who have had contact with the suspicious letters or parcels should shower with soap and water. Notify public health officials.

Self-Assessment Quiz Question #12

When discussing anthrax with patients, which of the following information is accurate?

a. Inhalation anthrax is the most serious form of the disease.
b. Anthrax spores die quickly.
c. Anthrax cannot be acquired from eating infected meat.
d. Several licensed anthrax vaccines are available.

COVID-19

The coronavirus disease 2019 (COVID-19) pandemic is caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This novel virus is found throughout the world, causing an abrupt increase in hospitalizations for pneumonia with multiorgan disease (Wiersinga et al., 2019).

Many questions about the virus, mutations, transmission, and treatment remain. The following information is current as of this writing (March 2021).

Transmission

COVID-19 was first documented in Wuhan, a city in China, in December 2019. Early hypotheses suggested that the new virus may be linked to a seafood market in this city. But people with no link to the market also became ill. Healthcare officials are still investigating its exact starting point (Johns Hopkins Medicine, 2021).

The most common mode of transmission is air-borne droplets expelled during face-to-face exposure during talking, coughing, or sneezing. People who are within 6 feet of an infected person or who have direct contact with that person are at greatest risk of infection. Risk also increases when people are in cramped quarters with infected persons (CDC, 2021e).

The virus can linger in small droplets and particles that can linger in the air for minutes to hours. This method of transmission (air-borne transmission) can cause infection even if people are farther than 6 feet away from the infected person and even after that person has left the area (CDC, 2021e).

Less commonly, a person may become infected by touching a surface or object that has the virus on it and then touching the mouth, nose, or eyes. At this time, the risk of COVID-19 spreading from animals to people is considered low, but there is some limited evidence that the virus can spread from people to animals (CDC, 2021e).

Clinical manifestations

The usual time frame for symptom development after infection is 5 days. However, this incubation period can vary, ranging from as early as 2 days after infection or as late as 14 days after infection (Wiersinga et al., 2020).

Following are common signs and symptom (Johns Hopkins Medicine, 2021; Wiersinga et al., 2020):
- Fever.
- Chills.
- Cough.
- Fatigue.
- New loss of taste or smell.
- Sore throat.
- Body aches.
- Runny or stuffy nose.
- Shortness of breath or difficulty breathing.
- Vomiting and diarrhea.
- Headache.

Less common symptoms are eye problems such as enlarged red blood vessels, swollen eyelids, excessive watering, and discharge; confusion; and skin changes such as painful, itchy lesions on hands and feet (Johns Hopkins Medicine, 2021; Wiersinga et al., 2020).

The previous symptoms are common to many illnesses. However, a significant symptom related to COVID-19 infection is the loss of taste or smell (Wiersinga et al., 2020).

Symptoms vary in intensity from asymptomatic to severe life-threatening illness. Symptoms can be mild at the start of illness but become most intense over a 5-to-7-day period (Johns Hopkins Medicine, 2021; Wiersinga et al., 2020).

Severe disease may lead to the following complications (Sparks, 2021; Wiersinga et al., 2020):
- Pneumonia.
- Respiratory disease.
- Organ failure.
- Acute respiratory distress syndrome.
- Sepsis.
- Blood clots.
- Acute kidney injury.
- Additional viral and bacterial infections.

Diagnosis

Diagnosis is generally made using polymerase chain reaction testing via nasal swab (Wiersinga et al., 2020).

Treatment

Treatment is generally supportive, focusing on addressing symptoms as they appear. Best practices for management of acute hypoxic respiratory failure and adult respiratory distress syndrome (ARDS) should be followed. More than 75% of patients hospitalized with COVID-19 need supplemental oxygen therapy. Severe respiratory compromise may necessitate the need for invasive mechanical ventilation. It is important to note that a disproportionate percentage of patients hospitalized with COVID-19 and deaths from infection occur in lower income and minority populations. Hospital mortality from COVID-19 is about 15% to 20%, but is up to 40% in those patients who require admission to the intensive care unit (ICU; Wiersinga et al., 2020).

Patients who have not been identified and die at home are not included in these data.

Preventive measures include wearing an appropriately fitted mask when outside the home, staying 6 feet away from persons not in your household, washing hands often with soap and water for at least 20 seconds, or use of an alcohol-based hand sanitizer that contains at least 60% alcohol. Masks should be washed after each use and worn over the nose and mouth. Congested gatherings, especially indoors, should be avoided. Avoid touching the face or shaking hands and touching others. Clean and disinfect frequently touched surfaces on a daily basis (Tosh, 2021).

Vaccines

As of this writing, two vaccines are in use in the US: BNT1162b2 (Pfizer, Inc., and BioNTech) and mRNA-1273 (ModernaTX, Inc.; CDC, 2021c). These vaccines are approved for adults 18 years of age and older. Studies are underway to determine safety and use in children. With BNT1162b2, two injections, 21 days apart, are given in the upper arm muscle. Common side effects are pain, swelling and redness at the injection site, chills, tiredness, and headache. Side effects seem to be more common after the second injection. With mRNA-1273, two injections, 28 days apart, are given in the muscle of the upper arm. Side effects are similar to those of the Pfizer vaccine.

A third vaccine, manufactured by Johnson & Johnson, has recently been approved. On February 26, 2021, vaccine advisers to FDA recommended that the agency grant emergency use authorization for the Johnson & Johnson vaccine, which would require only a single injection (Fox, 2021).

High-risk groups

Groups at high risk for serious disease have been given priority for obtaining COVID-19 vaccine. These groups include the following (Mayo Clinic, 2021):

- Older adults: The risk of developing serious symptoms increases with age. Those who are 85 and older are at the highest risk.
- Those with respiratory conditions: COVID-19 targets the lungs. People with serious respiratory disorders –such as chronic obstructive pulmonary disease (COPD), lung cancer, moderate to severe asthma, cystic fibrosis, or pulmonary fibrosis – are at high risk.
- Those with chronic conditions: Those who have severe, chronic diseases – such as cardiac disease, diabetes, and obesity – are also at high risk.
- Those with cancer and blood disorders: People who currently have cancer and blood disorders such as sickle cell anemia are at increased risk for severe symptoms.
- Other conditions: Persons with weakened immune systems and chronic renal or hepatic diseases are also at high risk.

Treatment

Treatment strategies are continuing to evolve. FDA and CDC websites offer the most current information. In addition to supportive measures, FDA (2021) provides the following information about treatment.

FDA has approved the antiviral drug remdesivir (Veklury) for adults and some pediatric patients with COVID-19 who are sick enough to need hospitalization. Veklury should be administered only in a hospital setting or in a healthcare setting capable of providing acute care comparable to inpatient hospital care.

FDA may also authorize the use of unapproved drugs or unapproved uses of approved drugs under certain conditions. For example, FDA has authorized emergency use of monoclonal antibody treatments for the treatment of mild or moderate COVID-19 in adults and pediatric patients (ages 12 and older weighing at least 88 pounds) with positive results of direct SARS-CoV-2 viral testing and who are at high risk for progressing to severe COVID-19 or hospitalization (FDA, 2021).

Conclusion

The National Center for Complementary and Integrative Health has Thanks to long-term research, immunizations are now available for many diseases that were once significant causes of serious complications and even death. Research continues in the area of immunization so that current vaccines may be made even more safe and effective, and that new vaccines may be developed to limit or prevent the occurrence of diseases for which there are currently no means of prevention.

Some members of the public, including some healthcare professionals, have concerns about the number of vaccines administered, the timetable for administration, and the safety and effectiveness of immunization programs. Nurses should be aware of these concerns and be prepared to address them when interacting with patients and families. Nurses should also be aware of their own concerns regarding vaccines and vaccine-preventable diseases. These concerns should not interfere with objective patient education and counseling.

It is important that healthcare professionals be aware of potential vaccine side effects. Even though the vast majority of vaccines cause minimal, mild side effects, there remains the potential for serious adverse occurrences such as anaphylactic reactions in a small percentage of the public. When assisting with vaccine administration, nurses should meticulously help patients and families identify potential risk factors for such reactions, including allergies to vaccine components.

Nurses and other healthcare professionals should also be aware of the state laws that govern vaccine administration. For example, what laws are in place regarding vaccination status before children being enrolled in school? Are there exemptions to these laws? Laws vary across states in the US, so nurses must be aware of the laws governing immunizations in their particular geographic location. Nurses must be able to help clarify these laws for patients and families and comprehend what type of exemptions may apply-- medical, religious, or philosophical. Nurses must also be aware of the consequences of refusal to receive vaccinations. For example, parents of unvaccinated children may be held legally liable in some states if their children transmit a vaccine-preventable disease to another child.

Patients and families must also be aware of the effects of acquiring vaccine-preventable diseases. Some diseases such as rubella are mild and self-limiting; however, even these diseases can have serious consequences. Recall that a pregnant female exposed to rubella may give birth to a baby with serious birth defects as a consequence of such exposure. Additionally, all diseases have the potential to cause complications, some of which can be life altering.

Adults often forget that they, too, need to receive vaccinations. Vaccines to prevent influenza, pneumonia, and shingles are available. Older adults should be also informed of the risks associated with COVID-19, pneumonia, and influenza. But many adults refuse such vaccines, which generally increases the potential for severe outbreaks and life-threatening complications. Adults are often unaware of the need for periodic booster immunizations to ensure that they remain protected. All adults should consult with their healthcare providers as to the best way to determine their immunization status and what action to take if immunization is needed.

Members of healthcare professions must be aware that more and more healthcare organizations are mandating that their employees receive influenza vaccine yearly. This trend may expand to include vaccination for other diseases as well, and nurses must be prepared for such mandates. Military personnel and those in occupations that require international travel are at greater risk of exposure to vaccine-preventable diseases.

Nurses must also recognize how disease-causing pathogens can be used as bioterrorist weapons. For example, the fact that specimens of the smallpox virus are still maintained for research purposes has triggered concerns that such specimens may be used as weapons of terror in the US and other countries. Diseases that are considered eradicated, such as smallpox, or under control have the potential to experience resurgence and cause dangerous epidemics if causative pathogens fall into the hands of those terrorists who would use them as weapons. Finally, all healthcare professionals must be aware of steps to take to prevent vaccine-preventable diseases in addition to immunization. Basic infection control initiatives, especially frequent handwashing, can go a long way to prevent the spread of disease. They must also be able, in the event that these diseases are contracted, to teach family members and other caregivers and close contacts how to avoid becoming ill themselves.

Another aspect of prevention is to discourage the unnecessary use of antibiotics. Many people believe that taking antibiotics is a good way to prevent disease. They must be taught that prophylactic antibiotic therapy is useful only under specific circumstances outlined by qualified healthcare providers. The overuse of antibiotics has contributed to the ever-growing problem of antibiotic-resistant pathogens. It is a matter of concern to all who work in healthcare. Researchers are constantly looking for ways to develop new antibiotics to combat resistant pathogens. But patient education about the dangers of indiscriminate use of antibiotics is essential as part of the fight against drug-resistant pathogens.

Vaccine-preventable diseases have decreased drastically thanks to effective, vigorous immunization programs. Nevertheless, there has been an increase in the number of cases of such diseases caused, in large part, by people not receiving recommended immunizations. This increase can have drastic consequences, as in the case of recent deadly outbreaks of meningitis on college campuses, or as seen in current outbreaks of measles (the most contagious of childhood diseases) in unvaccinated populations. Healthcare professionals must help patients and families understand the benefits of immunization that outweigh the potential side effects. With appropriate immunization programs, it is hoped that more and more vaccine-preventable diseases can be eradicated and individuals spared the consequences of communicable diseases.

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STAYING HEALTHY: VACCINE PREVENTABLE DISEASES

Self-Assessment Answers and Rationales

1. The correct answer is C.
Rationale: People who have minor illnesses such as a cold may be vaccinated. People who are moderately or severely ill should wait until they recover before getting MMR vaccine.

2. The correct answer is D.
Rationale: Children should be vaccinated with a total of four doss of IPV, one dose at each at ages 2 months, 4 months, 6 through 18 months, and 4 through 6 years.

3. The correct answer is B.
Rationale: Asymptomatic carriers should be placed in respiratory or contact isolation (for cutaneous findings) until at least two subsequent cultures, taken 24 hours apart after therapy has stopped, are negative.

4. The correct answer is C.
Rationale: The measles virus remains active and contagious in the air or on infected surfaces for up to 2 hours. It can be transmitted by an infected person from 4 days before the onset of the rash to 4 days after the rash erupts. It is very likely that susceptible persons with close contact to a measles patient will develop the disease. Measles virus can remain infectious in the air for up to 2 hours after an infected person leaves an area.

5. The correct answer is A.
Rationale: The incubation period for varicella is 10 to 21 days. The disease is communicable beginning up to 5 days before the body rash appears and continues until all of the lesions on the skin are crusted over.

6. The correct answer is B.
Rationale: Shingrix was 97% effective in preventing shingles in adults 50 to 69 years of age.

7. The correct answer is A.
Rationale: HBV can be transmitted via sexual contact through blood, semen, saliva, or vaginal secretions. HBV is considered to be a sexually transmitted disease.

8. The correct answer is D.
Rationale: The nurse is eliciting Brudzinski's sign. The patient is placed in the dorsal recumbent position and the head is flexed upward. Meningeal irritation is indicated if neck flexion causes flexion of hips, knees, and ankles. If the patient also flexes their hips and knees, there may be meningeal irritation and inflammation, which are indicators of meningitis.

9. The correct answer is C.
Rationale: If the patient has a history of a serious precancer, she should continue to have testing for at least 25 years after that condition was found, even if the testing goes past age 65.

10. The correct answer is A.
Rationale: People who should not receive the Hib vaccine include infants younger than 6 weeks, those who have had a life-threatening reaction to the vaccine in the past, and people who have a serious allergy to any of the vaccine's ingredients (HHS.gov., 2020b).

11. The correct answer is D.
Rationale: Category II contact occurs when there is nibbling of the skin, minor scratches, or abrasions without bleeding. PEP is necessary. If someone has never had a rabies vaccine, the first dose is administered as soon as possible.

12. The correct answer is A.
Rationale: Inhalation anthrax is the most serious form of the disease. It is also the rarest form.

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Faculty

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Early in her career, Catherine Turner, BSN, MBA, RN-BC recognized the value that technology could bring to patients, care teams, and healthcare organizations. As an advocate of maximizing technology to provide safer care, she has lent her passion and expertise to the implementation, development, and marketing of MEDITECH's Electronic Health Record (EHR). Working with executives at healthcare organizations throughout the United States, Ms. Turner, ensures that optimum benefits are achieved. She is well-known as a leader in the nursing informatics community and is the Director of MEDITECH's Nurse Informatics Program, spearheading the annual Nurse Conference. She is an active member and current co-chair of the HIMSS CNO-CNIO Vendor Roundtable Summit, was previously on the Corporate Advisory Board for the American Nurses Foundation, is a current member of the Healthcare Information Management System Society (HIMSS), is a member of the American Organization of Nursing Leadership (AONL) , and a member of the American Nursing Informatics Association (ANIA), and represents MEDITECH's Nursing Informatics Program for the Alliance for Nursing Informatics (ANI). Ms. Turner has been a reviewer for several publications, as well as a popular presenter at nationwide conferences and past content expert for AHIMA publications. She is a lecturer at the Northeastern University Bouvé College of Health Sciences Health Informatics Program and was previously at the School of Nursing, having taught both programs in the classroom and online, as well as having taught and developed the course "Introduction to Health Informatics" at the University of Miami, FL for their Master's in Health Informatics Program.

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

Peer reviewer:
Brenda K. Williams, PhD, MBA, RN, is a college professor and curriculum writer at Ohio Christian University, Circleville, Ohio, teaching Healthcare Business. She is also a Research Chair for the DBA (Doctor of Business Administration) program for Indiana Wesleyan University. She serves as an SME (Subject Matter Expert) for the National Patient and Family Engagement Learning and Action Network (NPFE-LAN) in End Stage Renal Disease (ESRD) as well as serving on the Patient Advisory Committee: CMS/ISPRO End Stage Renal Disease Network of the Ohio River Valley. Dr. Williams is an author of multiple articles and a book titled: *Judge Me Not: The Real Story of the Biblical Wife of Job*, and is the Director of the Parish Nursing Ministry at the church she attends. Dr. Williams is also a member of ISFP (International Society of Female Professionals). Dr. Williams graduated from Walden University with a PhD in Applied Management Decision Sciences, Leadership & Organizational Change. Her dissertation was *"An Exploration of Bullied Nurses, Witnesses, and a Hospital's Bottom Line"*. She also earned Master certificates from Johns Hopkins/Normandale in Value-Based Care, Data Analytics, and Population Health.

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

Course overview

The purpose of this course is to recognize the impact of value-based care and identify care delivery models to achieve better outcomes for the individual patient, the healthcare organization, and the population of patients being served.

Learning objectives

After completing this course, the learner should be able to:

- Describe the definition and goals of value-based care in the United States.
- Differentiate the financial impact of healthcare on the US economy in comparison to other countries.
- Identify factors in value-based care that influence nursing clinical practice.
- Identify methods for measuring clinical quality outcomes in value-based care.
- Discuss the effect of healthcare reform on consumers and providers.
- Discuss two models of healthcare delivery and healthcare payments.

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

Deborah Martin, DNP, MBA, RN, NE-BC, FACHE, Director, Healthcare Learning Innovation.

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
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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

Dynamic and evolving changes are occurring in the healthcare industry, affecting all healthcare organizations. These changes, in turn, affect the consumer and the work of healthcare providers in all types of care settings, including the profession of nursing. Changes include the following:

- The cost of healthcare in the United States continues to rise.
- Despite this rise in costs, mortality rates, including infant deaths and life expectancy, are higher than in other developed nations.
- Healthcare legislation and regulations continue to evolve, often burdening care providers.
- Various models of care are emerging, from single organizations to integrated care networks and accountable care organizations (Heeringa et al., 2020).

Rather than solely focusing on a single episode of care, these changing care models emphasize the effectiveness of transitions of care to ensure a person's health, the person's continuum of care, and the health of populations. The quality of care delivered is being measured and tracked through quality metrics that reflect preventative health, condition-specific and disease management, social determinants of health (SDOH), and population health across care settings. Healthcare reimbursement changes are occurring in the move from fee-for-service payments to various reformed payment models. Consumers are becoming more knowledgeable, involved, and active in their healthcare than ever before. Clinicians involved in all aspects of patient care are challenged by ever-increasing knowledge requirements, intensifying healthcare technology expectations, an escalating pace of work, and challenges with burnout and career satisfaction. While nurses may not always see the direct effects of these components and their impact on nursing practice, these dynamic, evolving, and in some cases, unprecedented elements are affecting patient, provider, payer, and health system behavior. Hence, it is necessary to provide information to enhance awareness of the business of healthcare and strive to improve patient outcomes.

Nurses serve as primary care providers to individuals and communities. They may incorporate knowledge of this changing landscape in the healthcare system in their practice. No matter the nurse's care provider role, these dynamic and evolving changes affect nurses and patients, including their health and behaviors. Nurses must take these into account in the care they provide to others and how they influence healthcare through the varied roles in their professional careers (IOM, 2011).

This course provides nurses with the foundational components that comprise the business of healthcare and the movement toward a value-based healthcare system. Nurses practicing in any healthcare setting will gain or enhance knowledge regarding components of the healthcare industry, including an overview of the current state of healthcare organizations and

systems, healthcare reform, healthcare quality, healthcare system redesign, healthcare economics, consumers, and healthcare providers. The nurse will also explore content related to the cost of care and movement toward a value-driven future, healthcare reform on a federal and state level, redesigning models of care, care transitions, healthcare payment models, consumer engagement and activation, and clinician engagement. As these elements are implemented in healthcare to improve the quality and cost of healthcare, nurses must become more knowledgeable of the dynamic and evolving components of the healthcare industry and use this knowledge in the care they provide in any healthcare setting.

MOVEMENT TOWARD VALUE-BASED HEALTHCARE AND AFFORDABILITY

Healthcare continues the transition toward value-based healthcare to provide better care for individuals and populations at a lower cost. Value-based care relies on programs focusing on reimbursing healthcare for delivering quality care, rather than the number of patients treated (ONC, 2019), or as stated by Corder (2018), "there is a greater financial reward in preventing illness than there is in treating disease "(para., 14). Quality care requires that care interventions and outcomes are measured to evaluate whether previously identified desired results have been met. The reliance on data analytics to report and reflect on care is essential. The Patient Protection and Affordable Care Act (PPACA), also known as the Affordable Care Act (ACA) and commonly referred to as "Obamacare," was enacted to achieve this, stating: "quality, affordable health care for all Americans" (Congress, 111th H.R.3590, p.1). In addition to the focus on quality, the ACA included provisions to prohibit rescinding of coverage, required coverage for preventive services including immunizations, child coverage until the age of 26, and reporting requirements to improve health outcomes, prevent hospital readmissions, improve patient safety and reduce medical errors, and promote wellness and health.

The ACA included language requiring hospitals to publicize a list of standard charges for both items and services, evolving into the Hospital Price Transparency requirements. To comply, hospitals must post their prices online in an easy-to-understand format for the procedures and services that they provide (CMS, 2020). Each year, the Federal Register publishes adjustments and additions to the PPACA (Federal Register, PPACA, 2021). The intent is to make it easier for patients/consumers to view cost estimates and make price comparisons (CMS, 2021d).

Value-based care focuses on quality, aiming to create more value for patients, healthcare systems, and providers where care is received. Value is not determined by cost alone but by an accompanying improvement in health outcomes (Teisberg et al., 2020). Similarly, a focus on quality alone is also incomplete. The results of the care received prove whether better health outcomes have been achieved. Better health outcomes require following evidence-based practices and coordination of efforts along with sharing information across care providers (CMS, 2021e).

An ideal high-value healthcare system features six key components: a clear, shared vision with the patient at the center; leadership and professionalism of healthcare workers; a robust IT infrastructure; broad access to care; and payment models that reward quality improvement over volume. (Smith, 2020, para. 8).

In support of high-value care, members of the National Academy of Medicine (NAM) launched the Vital Directions initiative in 2015. NAM was organized around three core goals: better health and well-being, high-value healthcare, and strong science and technology (Dzau et al., 2017). To meet these goals, NAM identified the following four priority actions:

1. Pay for value – deliver better health and better results for all.
2. Empower people – democratize action for health.
3. Activate communities – collaborate to mobilize resources for health progress.
4. Connect care – implement seamless digital interfaces for the best care (Dzau et al., 2017).

Value-based Alternative Payment Models (APM), "incentivize providers to maintain or improve the health of their patients while reducing excess costs by delivering coordinated, cost-effective, and evidence-based care" (Dzau et al., 2017, p. 6). This can be accomplished by communicating with all providers involved in the patient's care, sharing the plan of care and expected and actual outcomes. These priorities support a new "paradigm of healthcare delivery and financing" that moves away from fee-for-service payment models that reflect payment based on numbers of patients seen, regardless of whether the care and tests are necessary, expected to provide benefit, or may even be duplicated by having been performed elsewhere.

Self-Assessment Quiz Question #1

Value-based care focuses on which of the following?

a. Reductions in healthcare costs.
b. Providing better care at a lower cost for individuals and patients.
c. Protection of healthcare benefits.
d. Volume over value.

Self-Assessment Quiz Question #2

Components of value-based healthcare include which of the following?

a. Patient centered vision.
b. IT infrastructure.
c. Access to care.
d. Rewarding volume over quality.
e. All except d.

HEALTHCARE ENVIRONMENT

Several variables influence the healthcare system and, hence, the evolution of value-based care. These include the rising cost of healthcare, the need to improve outcomes and validate with quality metrics, consumerism and the advantages of patient engagement, and the changes in healthcare delivery models (AHA, 2017).

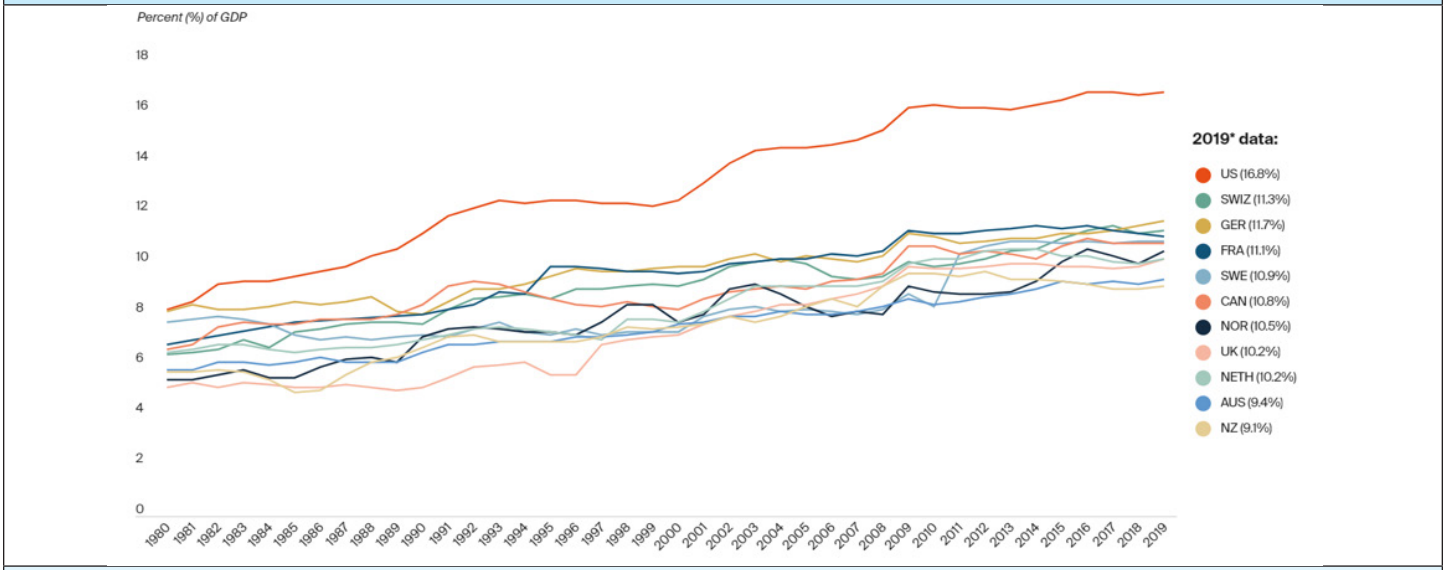
Cost of care

The cost of healthcare remains a primary concern in the United States as healthcare spending has continued to rise over the last five decades (Wager et al., 2021). Compared with comparable (peer) countries, the United States spends more on healthcare yet concedes poorer results. A report by Kamal et al. (2020), reviewing the 2019 OECD Health Statistics database (Organisation for Economic Co-operation and Development) and the CMS National Health Expenditure Accounts data, found that the United States had the highest expenditures for healthcare spending as a percentage of the gross domestic product (GDP) among 11 high-income countries. "In 2019, the U.S. spent 17% of its GDP on health consumption, whereas the next highest peer country (Switzerland) devoted 12% of its GDP to health spending" (Kamal et al., 2020, para. 4). The total health expenditures per capita in US dollars, per-person adjusted, in 2019 were $10,966, compared with the United Kingdom (UK) at $4,653 and comparable country averages of $5,697 (Kamal et al., 2020). This is in comparison to 2016, in which expenditures were $10,248 in the US, $5,169 in comparable country averages, and $4,192 in the UK (Sawyer & Cox, 2018). These numbers were before the coronavirus pandemic, where spending rose for high acuity patients but plummeted for elective procedures. In fact, healthcare spending in 2020 grew by 9.7 percent or $12,530 per person, accounting for 19.7 percent of the GDP (CMS.gov, 2021c).

A study by Papanicolas et al. (2018), analyzing why the United States spends much more on healthcare than other high-income countries (as visualized in figure 1), found that the United

States pays higher prices than other countries for physicians, pharmaceuticals, and healthcare administration services. Only by reducing these costs, can the US achieve healthcare expenses more closely aligned with the spending levels of other countries.

Figure 1: Health Care Spending as a Percentage of GDP, 1980-2019



Notes: Current expenditures on health. Based on System of Health Accounts methodology, with some differences between country methodologies. GDP refers to gross domestic product. *2019 data are provisional or estimated for Australia, Canada, and New Zealand.

Data: OECD Health Data, July 2021

Source: Eric C. Schneider et al., *Mirror 2021 - Reflecting Poorly: Health Care in the U.S. Compared to Other High-Income Countries* (Commonwealth Fund, Aug. 2021). https://doi.org/10.26099/01DV-H208

Despite this high cost of healthcare, the researchers also reported that the United States had lower rates of insurance coverage, mixed levels of health across the population, and except for a higher rate of diagnostic testing, healthcare services used rates like those of other countries. Among the 11 high-income countries that were compared on population health metrics, the United States had the highest percentage of obese or overweight individuals and the highest rates of maternal mortality, infant mortality, and neonatal mortality. The authors noted that the US life expectancy, at 78.8 years, was nearly 3 years less than the average life expectancy in other high-income countries (para. 3). A 2020 Commonwealth report stated that:

- The US spends more on healthcare as a share of the economy — nearly twice as much as the average OECD country — yet has the lowest life expectancy and highest suicide rates among the 11 nations.
- The US has the highest chronic disease burden and an obesity rate two times higher than the OECD average.
- Americans had fewer physician visits than peers in most countries, which may be related to a low supply of physicians in the US.
- Americans use expensive technologies, such as MRIs, and specialized procedures, such as hip replacements, more often than peers.
- The US outperforms its peers in terms of preventive measures — it has one of the highest rates of breast cancer screening among women ages 50 to 69 and the second-highest rate (after the UK) of flu vaccinations among people age 65 and older.
- Compared to peer nations, the US has among the highest number of hospitalizations from preventable causes and the highest rate of avoidable deaths (Tikanen et al., 2019, para 1).

Self-Assessment Quiz Question #3

Despite the high cost of healthcare in the US, mortality rates, suicides, and chronic disease are higher than other nations. Some of the high cost is attributed to which of the following?

a. Higher supply costs and greater utilization of technology.
b. Greater at-risk population.
c. Few physicians per capita.
d. All the above.

Health of the population

In the transition from the fee-for-service (FFS) approach toward value-based models of care, healthcare providers aim to deliver person-centric care, reduce unnecessary services, reduce costs, coordinate services, and improve the alignment of the need for care services with the most appropriate site of care. Value-based models provide high-quality care by grouping patients with similar diseases and disorders together. Patient grouping provides efficiency and cost savings to healthcare organizations and expertise by care providers to deliver safe and effective care with minimal risk (Heeringa et al., 2020). This model includes the expertise in nursing, often seeing patients more frequently and of longer duration than physicians (Butler et al., 2018). With higher costs of care, it is logical to assume that care outcomes would be higher, but as noted previously, several factors weigh into this. One such factor influencing the status of the US healthcare system is the health of the population and its subpopulations.

The population can be segmented into four varied subpopulations: those in good health, those with acute illness or injury, those with chronic disease and multiple comorbidities, and those facing death and dying. In addition, the complex health and social circumstances of the US population and public health issues create fundamental challenges as healthcare delivery and payment reform move forward. Among these complex health, social, and public health issues are health disparities, inequities, and the impact of social determinants of health (SDOH) on outcomes (NAS, 2017).

Nursing Consideration: Nurses require a solid understanding of the impact of social determinants on health outcomes. Obtaining patient information on this requires a trusted relationship with the care provider, which is often found in nurses, the most trusted profession. By screening for social determinants of health, nurses have an opportunity to work with their peers to provide resources that can make a difference in day-to-day and long-term health. These peers may include social workers, care navigators, and care managers, as well as community resources.

Examples of social determinants of health include housing, transportation, food insecurity, the neighborhood in which one lives, insurance coverage, and other conditions related to where people are born, spend their youth, work, and age. These conditions impact money, power, and resources (CDC,2021a). Resources that impact health outcomes, and hence influence the health of a population may include: "safe and affordable housing, access to education, public safety, availability of healthy foods, local emergency/health services, and environments free of life-threatening toxins" (CDC, 2021a, para.8). As evidence continues to reveal the link between social risk and health and healthcare use, health systems recognize the need to collect SDOH data and provide this in the EHR to trigger clinical decision support to identify where needs exist. This effort at the individual patient level and the population of patients that an organization serves should improve health outcomes and reduce costs (HL7, n.d.). Algorithms required to invoke SDOH clinical decision-making require standardized data fields, an effort undertaken by the Gravity Project. The Gravity Project, funded by the Robert Wood Johnson Foundation, gathered a group of stakeholders whose mission was to create a standardized set of core SDOH data to provide interoperability and the sharing of data across different EHRs and healthcare organizations. (HL7, n.d.).

> "The Gravity Project seeks to identify coded data elements and associated value sets to represent social determinants of health data documented in EHRs across four clinical activities: screening, diagnosis, planning, and interventions. The project is focused on three specific social risk domains: food insecurity, housing instability and quality, and transportation access. These domains were selected based both on existing research linking these factors with health and utilization and on active experiments related to these domains, including federal, state, or local demonstration projects" (HL7, n.d., para.4).

Case study 1: Mr. William Jones

William Jones is a 55- year-old, recent "frequent flyer" in the ER. He often appears unkempt with vague symptoms of chest pain and difficulty breathing. Although the results from diagnostic tests can often take hours to receive, they do not reveal any positive findings. Many of the staff in the ER have become impatient with Mr. Jones as other patients of higher acuity require more attention. On Mr. Jones' most recent visit, Nurse Diaz finds that she does not have any urgent patients in her care now and takes the opportunity to engage in a longer discussion with him. As she recalls some of her training in identifying the lack of resources that patients can find themselves, she engages in conversation with Mr. Jones, who slowly reveals some of the challenges in his life. Since losing his job at the factory, Mr. Jones has been living out of his car and has struggled to get back on his feet. As the weather has turned cold, he has taken refuge in the ER's warm environment for respite from the elements and hunger, that has been his existence for the last few months.

Question: What opportunities exist to provide Mr. Jones with a safer environment to provide food and warmth? What financial impact could assisting him have on the healthcare organization where he has sought respite?

Discussion: Mr. Jones is clearly struggling to get back on his feet. While his immediate need is of shelter and food security, which has become obvious after his discussion with Nurse Diaz, his presence in the ER takes up valuable resources and is the most expensive care environment that must be available for patients in more critical condition. Engaging the right social network and community resources can help. Nurse Diaz can engage the care navigator at her organization to contact the local homeless shelters for availability and assist Mr. Jones in finding his way there. One of the shelters that the care navigator suggests also offers clothes for job interviews, hence once settled into a clean, safe, and warm environment, Mr. Jones can begin applying for jobs. Though it will take some time to get him in a forward moving position, transitional shelters and group homes can be a good option before being able to afford a more permanent location. Local foodbanks and other community services can assist Mr. Jones in his day-to-day needs. The care navigator will be able to follow up with the identified resources to ensure that Mr. Jones has been able to take advantage of these. If his employer does not offer health insurance, the care navigator can assist Mr. Jones in applying for healthcare under the Affordable Care Act (ACA). Telehealth visits with the homeless shelter can keep Mr. Jones engaged in care and/or services provided outside of a formal healthcare environment. This saves clinical resources at the healthcare organization and ensures that Mr. Jones avoids greater health issues.

Triple and quadruple aim

The Triple Aim framework was developed in 2008 by Nolan and Whittington; however, the framework is often credited to Don Berwick, the former president of the Institute for Healthcare Improvement (IHI). The framework advocates focusing on three items: care, health, and cost. The IHI's overview of the Triple Aim framework states:

> "There is a growing realization that the successful health and healthcare systems of the future will be those that can simultaneously deliver excellent quality of care, at optimized costs, while improving the health of their population. This is known as the IHI Triple Aim, and we believe it is the ultimate destination for the high-performing hospitals and health systems of the future" (IHI, 2021, para. 1).

The Triple Aim framework's goals are: improve the patient experience, improve the health of populations, and simultaneously reduce healthcare costs. In addition to implementing the Triple Aim and moving toward value-based care, the rapidly changing healthcare system and factors affecting clinical practice put additional pressures on an already dynamic environment. Changes affecting clinical practice include electronic health records (EHRs), new payment and delivery approaches, patient portals, greater patient engagement, and publicly reported quality metrics (Dyrbye et al., 2017). Researchers examined the success of the Triple Aim and suggested additional areas that needed to be added to the framework.

Primarily adapted from the Triple Aim, the Quadruple Aim framework focused on optimizing the performance of healthcare systems. It includes reducing costs, improving population health, and the patients' experience. A fourth domain was added that supported the well-being of the healthcare team. Addressing the well-being of the healthcare team is of most significant importance when addressing the issues of burnout and worker satisfaction. With concern for the healthcare member, the American Nurses Association (ANA) adopted the Healthy Nurse, Healthy Nation initiative, "a social movement designed to transform the health of the nation by supporting nurses to take positive action to improve health" (ANA, n.d., para.2).

Achieving the fourth domain of the Quadruple Aim was challenged by the impact of COVID-19 on care providers and the emotional, physical, and mental fatigue left in its wake. Adequate resources and support for health workers on the front line were slow to materialize. With a shortage of healthcare professionals existing even before COVID, organizations are further pressed to address the quadruple AIM and collaborate with nurses to achieve nurse well-being in a safe environment with adequate staffing and resources. A study by Raso et al. (2021) surveyed more than 5000

nurses to evaluate the pandemic's impact on their practice and intent to leave nursing or their current position. The researchers found that impact was highest for nurses with more than 25 years of experience and those in manager and director-level positions. Of those responding to the survey, 11% indicated they were leaving their position, with 20% of those surveyed undecided. Of those that rated the impact of the pandemic at the highest level, 2% responded that they would leave the nursing profession altogether, with 8% undecided regarding whether they would search for a different opportunity in nursing rather than leave the profession.

As the profession that spends the most time with the patient, nurses have a unique perspective on improvements that can be made to contribute to safe, quality care. In their 2010 report on the Future of Nursing, The Institute of Medicine (IOM) focused on how the demand for nurses could meet the increased demand for care under healthcare reform. Meeting the demand included ensuring that nurses can work to the fullest extent allowed by their licensure. The IOM further encouraged nurses to assume leadership roles at the national level to participate in redesigning healthcare and suggested the removal of obstacles that limited nurses' scope of practice, and hence take full advantage of nurses' training, skills, and knowledge in the delivery of patient care (IOM, 2011). The second report by IOM in 2016, *Assessing Progress on the Institute of Medicine Report: The Future of Nursing*, further stressed the need to increase awareness of the breadth of the nursing profession and expertise in practice, education, collaboration, and leadership (IOM, 2016). This was well-received during COVID when Nurse Practitioners were used for virtual visits to keep patients from coming to the hospital.

The National Academies of Sciences (formerly IOM) published a third report: *The Future of Nursing 2020-2030: Charting a Path to Achieve Health Equity (2021)*. The report looked at the nursing profession into 2030 to "create a culture of health, reduce health disparities, and improve the health and well-being of the U.S. population in the 21st century" (NAS, 2021, p.24). The timing of the report during COVID also provided recommendations for the role of nurses during a pandemic and the expected health demands from a nation's population that is aging and will burden the US healthcare system. This included identifying where science and technology can play a role. The report examined the following (NAS, 2021, p 24-25):

- The role of nurses in improving the health of individuals, families, and communities by addressing social determinants of health and providing effective, efficient, equitable, and accessible care across the care continuum, as well as identifying the system facilitators and barriers to achieving this goal.
- The current and future deployment of all levels of nurses across the care continuum, including in collaborative practice models, to address the challenges of building a culture of health.
- System facilitators and barriers to achieving a diverse workforce, including gender, race, and ethnicity across all levels of nursing education.
- The role of the nursing profession in assuring that the voices of individuals, families, and communities are incorporated into the design and operations of clinical and community health systems.
- The training and competency development needed to prepare nurses, including advanced practice nurses, to work outside of acute care settings and to lead efforts to build a culture of health and health equity to the extent that current curriculums meet these needs.
- The ability of nurses to serve as change agents in creating systems that bridge the delivery of healthcare and social needs in the community.
- The research needed to identify or develop effective nursing practices to eliminate healthcare gaps and disparities.
- The importance of nurse well-being and resilience in ensuring delivery of high-quality care and improving community health.
- The role of nurses in response to emergencies that arise because of natural and man-made disasters and the impact on health equity.

Until value-based care is well entrenched, achieving the Quadruple Aim will be challenged by pressures to increase productivity. Expectations of seeing more patients, increasing regulations, and requiring more documentation often lead to spending more time on administrative tasks rather than patient care. Add to this, the consumer preference for convenience and care has now shifted away from primary care patient-provider relationships to care delivery from walk-in clinics, urgent care, concierge medicine, and online sources.

As care providers strive to strike this balance, ensuring the delivery of quality care is still their priority (Arnetz, 2020). This is where the shift from volume to value hopes to make a difference.

Self-Assessment Quiz Question #4

The Quadruple Aim, adapted from the Triple Aim, adds _____ as the fourth Aim:

a. Control of healthcare costs.
b. Decreased administrative burden.
c. Patient safety initiatives.
d. Well-being of the healthcare team.

Healthcare reform at the federal level

Healthcare reform has occurred at both the federal and state levels in the United States, paving the way to introduce reforms to decrease costs while improving the healthcare system and patient outcomes. It is essential to review the reforms at both levels to understand the current state of healthcare reform in the United States.

In 2010, a significant event signaling comprehensive healthcare reform and driving the movement toward value-based care and value-based reimbursement was signed into law as PPACA, otherwise known as the ACA, and commonly referred to as Obamacare. Major components of the law included expanding health insurance coverage, controlling healthcare costs, and improving the healthcare delivery system. Not since Medicare was enacted has there been as comprehensive an effort to provide healthcare coverage to Americans (Manchikanti, 2017).

As the debate continues whether the ACA has been a success or failure, statistics reveal some of each. Those in favor of the ACA state that millions that have subscribed to a health plan now have health insurance that they did not have before, are covered for preventative services, and have avoided discrimination against pre-existing conditions (Somers, 2020).

People critical of the ACA's requirement to subscribe to a health plan have contested the requirement 50 times (Somers, 2020), but as of the date of this writing, they have not been successful in overturning the requirement. While health insurance premiums have continued to rise at a rate of 3.6% since the APA was instituted, this is at a lower rate than before the ACA, which was at 4.5% (Patton, 2020).

As a result, employees saw a rise in their out-of-pocket costs and more workers obtained benefits outside of their work establishment (Manchikanti, 2017). The ACA did gain a net increase in the number of individuals with insurance, primarily through Medicaid expansion. Enrollment in Medicaid significantly increased during COVID (Medicaid.gov, 2021) and in the ACA, with the highest enrollment numbers recorded in the signup period that ended December, 2021. An increase in enrollment of ACA and Medicaid was seen as the direct impact of COVID, which emphasized an increased need for financial assistance. Other factors that led to an increase in enrollment were a broader window for sign-up and endorsement by the change in the office of the presidency (Managan, 2022).

The ACA's provision to control healthcare costs stimulated the movement toward value-based payment and care by moving away from volume-based FFS reimbursement and in the direction of payment for provider and health system performance. The ACA's provision to improve the healthcare

delivery system accelerated trials in how care delivery is organized, designed, and delivered. The ACA also provided for initiatives to train the workforce of the future to meet the healthcare needs of the American population.

Self-Assessment Quiz Question #5

Success of the Affordable Care Act (ACA) will be measured by which of the following?

a. Decreased options in healthcare plans.
b. Increased costs of care.
c. Increased percentage of individuals with healthcare coverage.
d. Decreased patient outcomes.

Healthcare reform at the state level

In 2007, Massachusetts became the first state to initiate healthcare reform by mandating that all residents obtain health insurance. If a state resident does not have employment or healthcare offered through an employer, the state offers health insurance subsidized by state and federal funds (Mass.gov, 2021). Massachusetts was also the first state to require its residents to submit proof of health insurance with their tax returns; the failure to do so incurs a state tax penalty. Other states that successfully passed health insurance mandates include California, the District of Columbia, New Jersey, Rhode Island, and Vermont, though Vermont does not include a penalty for failure to submit (Pak, 2021). While the ACA requires employers to offer health insurance to employees who work at least 30 hours per week, some employers avoid this and do not pay penalties by hiring staff at less than 30 hours per week. Businesses with fewer than 20 staff are exempt, hence the burden falling to the states that have mandated healthcare coverage.

The Supreme Court ruled that it was unconstitutional to mandate Medicaid expansion in all states (MACPAC, 2021); therefore, the ACA provided individual states the option for expansion of Medicaid to all non-Medicare eligible individuals under the age of 65, with incomes up to 138% of the federal poverty level. When this opportunity presented itself, 24 states and the District of Columbia opted in, and by mid-2016, seven more states had signed onto it, increasing enrollment by an average of 33.9%, ranging from a low of 2.9% in Delaware to a high of 113.5% in Kentucky (MACPAC, 2021). Although adoption slowed in 2017 because of the attempts to appeal the ACA, by 2021, all but twelve states had taken advantage of the Medicaid expansion (Norris, 2022). Several states used citizen-initiated ballot referendums/questions to let voters decide whether to expand Medicaid.

The American Rescue Plan, enacted in response to the economic burden imposed by COVID-19, provided those remaining states yet to adopt the Medicaid expansion, additional federal funding if they then took advantage of the Medicaid expansion. Oklahoma and Missouri have taken advantage of this option (Norris, 2022). Medicaid expansion states have seen a reduction in medical costs and increased Medicaid revenues for some local providers, decreases in the state's uninsured rate, improved patient access to care, and improved affordability of care. Voter polling in both expansion and non-expansion states has shown a positive view of Medicaid expansion (Moulds et al., 2018). With the focus on affordable, accessible healthcare being a priority, it is important to note that is not the only goal. A healthier nation should help stem the tide of the increasing costs of healthcare and the reason to promote quality of care over quantity, an effort impacting all caregivers in the movement toward value-based care.

HEALTHCARE QUALITY

A significant component of value-based healthcare is measuring healthcare quality and patient safety through outcomes. The measurement of evidence-based healthcare quality began in the 1850s through the efforts of Florence Nightingale. Nightingale's use of observation, data collection, record keeping, and statistical analysis pioneered healthcare quality advancements in nursing, hospitals, and public health (ASA, 2020). She advocated for improved infection prevention standards in the care of patients during the Crimean War, improved public health sanitary conditions in Britain and India, shaped hospital design and renovation, and established a training school for nurses and midwives. Nightingale believed in the use of statistics to assist care providers in achieving better, more efficient, and more economical care.

In the early 1900s at Massachusetts General Hospital, the surgeon Ernest Codman published the *End Result of a Hospitalization Standardization Program* (Mueller, 2019). Codman studied the outcomes of his patients and the processes that could lead to improving outcomes. In his work A Study in Hospital Efficiency: As Demonstrated by the Case Report of the First Five Years of a Private Hospital (1916), Codman wrote:

> "…hospitals do not consider it their duty to see that good results are obtained in the treatment of their patients. They see to it that their financial accounts are audited, but they take no inventory of the product for which their money is expended" (Codman, 1916, p. 5).

The information gathered by Nightingale and Codman afforded a means to track the quality of care provided to patients, which could improve outcomes. The American College of Surgeons (ACS) adopted Codman's work in 1917 and heralded it as the beginning of the movement to improve the quality of care (Mueller, 2019). Codman's work described what needed to be done to improve patient outcomes while ignoring the financial ramifications.

During this period in the history of medicine, the mortality rate for postoperative patients was approximately 40%, mainly because of infection, which reinforced the need to improve the quality of care (Mueller, 2019.) Hospitals depended on physicians as the primary source of revenue for the institution, consequently requiring that the physicians begin to use aseptic technique and improve communication to improve patient outcomes (Gosling, 2017).

By 1952, several organizations joined the American College of Surgeons to form the Joint Commission on Accreditation of Hospitals (JCAH). These organizations included the American College of Physicians (ACP), the American Hospital Association (AHA), the American Medical Association (AMA), and the Canadian Medical Association (CMA). The JCAH was an independent, not-for-profit organization with the primary purpose of providing voluntary accreditation via standards set for hospital accreditation. To reflect an expanded scope of responsibilities, the organization's name was changed to the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) in 1987. Its mission statement was revised to explicitly reference patient safety in 1999, and its name was shortened to The Joint Commission (TJC) in 2007 (The Joint Commission, 2020).

In 1966, Avedis Donabedian, a physician and health services researcher at the University of Michigan, created a framework for examining health services and evaluating healthcare quality. His model to measure and evaluate the quality of care is known as the measures of structure, process, and outcome (Berwick,2016). Measures of structure are properties of a healthcare delivery system, such as equipment or the EHR. Process measures are actions or activities of care, such as treatments or a bundle of care interventions. Outcome measures are the effects of care on the patient, such as new knowledge or a change in health status. In 2016, Berwick and Fox wrote that Donabedian's work continues to be significant to the healthcare quality movement; however, they cite three gaps in his work that are evident today. The first gap is the current emphasis on patient-centeredness

or person-centeredness – "a shift of power that is fundamental to both the definition and the pursuit of quality" (Berwick, 2016, para.10). The second gap is the significant impact of the new information age on care and health. The third gap is understanding healthcare as a system.

> "[W]e cannot achieve real excellence without seeing and acting upon health care as a system. That raises, beyond anything Donabedian really anticipated, the value of better scientific understanding of health care as a system, of the importance of the continual design and redesign of processes of care, and of the crucial role of executives, clinical leaders, boards of trustees, and regulators in creating the culture and supports that allow continual improvement and innovation to thrive" (Berwick & Fox, 2016, p. 240).

Building on the early work of Nightingale, Codman, and Donabedian, two subsequent seminal reports focused on the quality of the healthcare delivery system. In 1999, "To Err Is Human: Building a Safer Health System" was published by the Quality of Health Care in America Committee of the Institute of Medicine (IOM, now the Health and Medicine Division of the National Academies). Concluding that many Americans die each year from safety gaps in their care, the committee created an all-embracing road map to reduce preventable medical errors and set a minimum goal of a 50% reduction in medical errors in 5 years. The strategy for improvement recommended the following:

- Establishing a national focus on safety.
- Developing a nationwide public mandatory reporting system.
- Setting and enforcing performance standards for patient safety.
- Implementing safety systems in healthcare organizations (IOM, 1999).

In 2001, the IOM committee published "Crossing the Quality Chasm: A New Health System for the 21st Century" (IOM, 2001). This report recommended a 10-year strategy and action plan to stimulate innovation and improve care delivery. Six aims for improvement were adopted around an essential need for healthcare to be safe, effective, patient-centered, timely, efficient, and equitable. Ten general principles to guide efforts to redesign the healthcare system were outlined and the changes that would be required in the environment. Among the general principles were (1) care is customized according to patient needs and values, (2) decision making is evidence-based, (3) transparency is necessary, and (4) cooperation among clinicians is a priority (IOM, 2001).

The required environmental changes included applying evidence to healthcare delivery, using information technology, aligning payment policies with quality improvement, and preparing the workforce (IOM, 2001). These IOM reports increased public, provider, and healthcare administrator awareness of the state of healthcare quality and safety in the United States and the necessity for improvement. Addressing the adoption of information technology, the IOM committee recommendations also included implementing the electronic medical record (EMR) to improve the quality of patient care. The recommendations from the IOM helped facilitate the passing of the Health Information Technology for Economic and Clinical Health (HITECH) Act in 2009 by the Office of the National Coordinator (ONC). The act includes the Meaningful Use (MU) of EMRs, which encouraged organizations to implement electronic health records (EHRs) and receive reimbursement for doing so by submitting evidence of meaningful usage, hence MU (CMS, 2021g).

To prove this, ONC specified what information to standardize and then report to the government. This required creating clinical quality measures and core measure sets to assess the quality of care provided to the patient (Office of the National Coordinator for Health Information Technology [ONC], 2018j). MU required specific documentation to improve communication about the patient, between providers, and the quality of care. Hospitals received reimbursement initially and, later, penalties if they did not meet the specified criteria by meeting the requirements. Stage 3 of MU, renamed promoting interoperability or PI and subsequently now referred to as PI for the entire program, focuses on "improving access to health information and reducing the time and cost required…" (CMS, 2018j, para.1). There are four sets of guidelines or "stages" of MU (Figure 2).

Figure 2: How do you Measure Meaningful Use

Meaningful Use Stage 1: Data Capturing and Sharing, 2011 to 2012	Meaningful Use Stage 2: Advancement of Clinical Processes, 2014 to 2015	Meaningful Use Stage 3: Improving Patient Outcomes, 2016 to 2017	Meaningful Use Stage 4: Promoting Interoperability 2018
• Capture data in electronic format • Clinical quality measures (15 in total) are used as measurement for quality of care • Begin process of reporting measures to Centers for Medicare and Medicaid Services • Utilization of information to engage patients and families	• Implementation of rigorous health information exchange to transmit data to other healthcare organizations • Requirement of e-prescribing and incorporation of laboratory results • Increase in patient controlled data	• Implementation of clinical decision support and other processes to improve quality, safety, and efficiency of health care • Clinical decision support is focused on high-priority health conditions • Patient access to personal health records to engage patients in their care • Implement processes to track and improve population health	• Coordination of care through patient engagement • Health information exchange • Public health reporting

Note: Adapted from Alabama Regional Extension (n.d.) How do you measure Meaningful Use? http://www.al-rec.org/member-resources/faq/how-do-you-measure-meaningful-use/ Centers for Medicare and Medicaid Services. (2018j). Stage 3 program requirements for providers attesting to their state's Medicaid promoting interoperability (PI) programs. https://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Stage3Medicaid_Require.html

Quality measurement outcomes continue to increase and evolve, consistent with healthcare reform and movement toward value-based care (Teisberg et al., 2020). These outcomes include several quality indicators measured and reported by healthcare organizations, and in some cases, the organizations are reimbursed or paid for reporting the data (pay for reporting) or for performance (pay for performance). Healthcare providers and healthcare organizations have varied requirements for reporting quality measures at the federal, state, insurer, and regulator levels and reporting to scorecards or report cards.

Along with the measurement of outcomes, the movement in healthcare to provide high-quality care is directly tied to reimbursement. Financial incentives or penalties are associated with clinical quality measures stipulated by the US government (CMS, 2021g) for Medicare and Medicaid, with private insurers

often following suit. Mandatory reporting of the measures to the Centers for Medicare and Medicaid Services (CMS) provides a method of determining the amount of reimbursement to the healthcare institution. In addition, financial incentives associated with the achievement of clinical quality measures are also set in a variety of alternative quality contracts between commercial health plans with hospitals and health systems. These electronic clinical quality measures or eCQMs are "tools that help measure and track the quality of health care services that eligible professionals (EPs), eligible hospitals (EHs), and critical access hospitals (CAHs) provide, as generated by a provider's electronic health record (EHR)" (CMS, 2021b, para.1). These reflect areas of patient care, including the following:

- Patient and family engagement.
- Patient safety.
- Care coordination.
- Population/public health.
- Efficient use of healthcare resources.
- Clinical process/effectiveness (CMS, 2021b).

EHRs are designed to have the ability to track the care provided to the patient and allow the clinician or healthcare organization to bill the patient or health insurance appropriately. This reliance on the documentation of care for billing purposes and regulatory reporting has partly led to the documentation burden blamed on EHRs that strive to use this recorded data (Moy et al., 2021).

Patients often get treated in multiple settings, often with different EHRs, and access to the information that resides in disparate systems can be challenging. Knowing the patient's entire clinical picture provides a more significant opportunity to prescribe the most appropriate treatment plan. The 21st Century Cures Act strives to assist in this endeavor with its information blocking rule. This ensures that "health information follows a patient preventing industrywide information blocking practices and other anti-competitive behavior by those entrusted to hold patients' electronic health information" (ONC, n.d., para 4), further stating that it is about access and choice. Patients should be able to access their medical records, and providers must easily access and exchange information across disparate health systems (ONC, n.d.). This course further discusses this topic under the Trusted Exchange Framework and Common Agreement (TEFCA).

In 2011, the US Department of Health and Human Services (HHS) released the National Strategy for Quality Improvement in Health Care (NQS) led by the Agency for Healthcare Research and Quality (AHRQ, 2017a). The NQS established three global aims "to guide and assess local, state, and national efforts to improve health and the quality of care" (AHRQ, 2017a, para. 4). These aims expanded on those of the Triple Aim and came to be known as "Better Care, Healthy People/Healthy Communities, and Affordable Care" and included six priorities to drive improvement in addressing the most common health concerns of the US population. These priorities are (AHRQ, 2017a, para. 5):

1. Making care safer by reducing harm caused in the delivery of care.
2. Ensuring that each person and family is engaged as partners in their care.
3. Promoting effective communication and coordination of care.
4. Promoting the most effective prevention and treatment practices for the leading causes of mortality, starting with cardiovascular disease.
5. Working with communities to promote wide use of best practices to enable healthy living.
6. Making quality care more affordable for individuals, families, employers, and governments by developing and spreading new healthcare delivery models.

Clinical quality measures

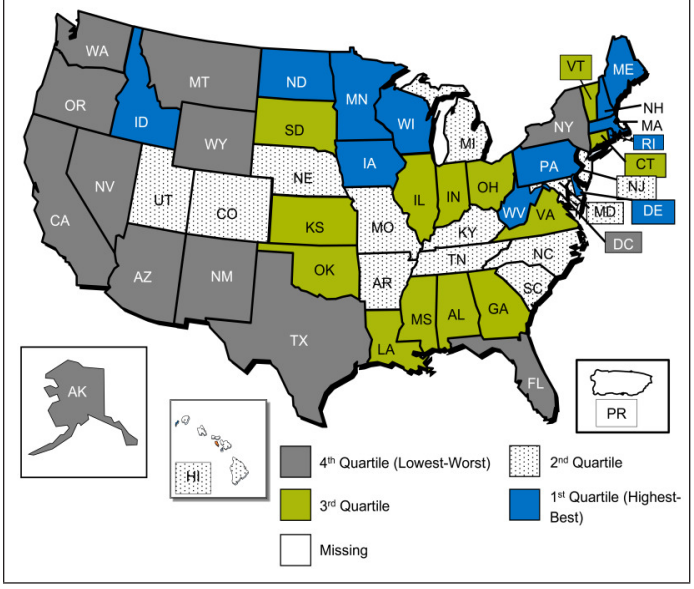
As part of the National Quality Strategy, the HHS Measurement Policy Council endorsed core measure sets currently used in national programs that are relevant and intend to minimize provider reporting burden. These topic-area measure sets include hypertension control, hospital-acquired infections, Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS), smoking cessation, depression screening and care coordination, HIV/AIDS, perinatal, and obesity/body mass index (AHRQ, 2017a), and reflect the previously mentioned clinical quality measures (eCQMs). The CMS and The Joint Commission endorse the use of these measures to evaluate the quality of care provided to patients.

Nursing Consideration: The clinical quality measures affect what must be documented in the electronic medical record. This should be incorporated into the workflow as a by-product of patient care observations instead of separate documentation.

In line with the National Quality Strategy and its aims, the AHRQ developed an annual report, the National Healthcare Quality and Disparities Report, "to provide a comprehensive overview of the quality of health care received by the general U.S. population and disparities in care experienced by different racial and socioeconomic groups" (AHRQ, 2017b, para.1).

The following two figures (Figure 3 and Figure 4) are included here to provide an overall perspective of progress in the quality of care in the United States. Each figure reflects the variation in the quality of care by state and trends in the quality of healthcare by priority areas.

Figure 3: Overall quality of care, by state, 2014-2018



Note: All state-level measures with data are used to compute an overall quality score for each state based on the number of quality measures above, at, or below the average across all states. States were ranked and quartiles are shown on the map. The states with the worst quality score are in the fourth quartile, and states with the best quality score are in the first quartile. Historically, the NHQDR has included state-specific estimates for selected AHRQ Quality Indicators (QIs) based on Healthcare Cost and Utilization Project (HCUP) data. The 2019 NHQDR does not include state-specific QI estimates based on 2017 HCUP data because the International Classification of Diseases, Tenth Revision, Clinical Modification/ Procedure Coding System version of the QI software used did not include risk adjustment. State-specific QIs will be reported in future NHQDRs when the estimates can be risk adjusted.

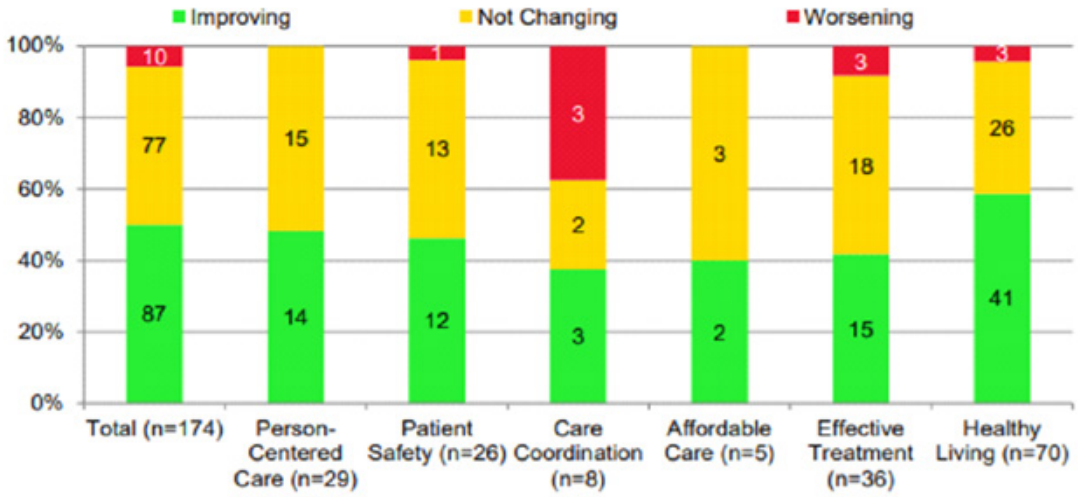
https://www.ahrq.gov/sites/default/files/wysiwyg/research/findings/nhqrdr/2019qdr-cx061021.pdf

Figure 4 provides a view of the six priority areas of focus: person-centered care, patient safety, healthy living, effective treatment, care coordination, and affordable care (AHRQ, 2019).

Figure 4: Quality of healthcare

Quality of healthcare improved generally through 2018, but the pace of improvement varied by priority area.

Figure 1. Number and percentage of all quality measures that were improving, not changing, or worsening, total and by priority area, from 2000 through 2018



Key: n = number of measures.

Note: For each measure with at least four data points over time, the estimates are realigned to the negative direction. Then, unweighted log-linear regressions is used to calculate average annual percentage change and to assess statistical significance. Progress on individual measures is determined as follows:

- Improving = The average annual percentage change is 1% or greater in the desirable
- Not Changing = The average annual percentage change is less than 1% in either the desirable or undesirable direction or $p>0.10$
- Worsening = The average annual percentage change is 1% or greater in the undesirable direction, and $p<0.10$
- Through 2018, across a broad spectrum of measures of healthcare quality, 50% showed improvement (Figure 1).
- Almost half of measures of person-centered care improved (48%).
- Almost half (46%) of patient safety measures and almost 60% of healthy living measures improved.
- More than 40% of effective treatment measures improved.
- Nearly 40% of care coordination measures improved.
- Forty percent of affordable care measures improved.

https://www.ahra.gov/sites/default/files/wvsiwva/research/findings/nhardr/2019adr-cx061021

More than 250 measures of quality and disparities over various healthcare services and settings are included in the report. These are related to access to care, affordable care, care coordination, effective treatment, healthy living, patient safety, and person-centered care (AHRQ, 2019). Findings related to health disparities include race and ethnicity, income, and other social determinants of health (AHRQ, 2019). The executive summary of the 2019 National Healthcare Quality and Disparities Report (NHQDR) included the following:

- **Access to Care (2000 through 2016-2018):** Of the twenty access measures, eleven showed improvements, five remained the same, and four worsened.
- **Quality**: The quality of healthcare improved overall from 2000 through 2018, but the pace of improvement varied by priority area (AHRQ, 2019, p.3).
- **Person-Centered Care**: Almost half (14 of 29) of person-centered care measures were improving overall.

- **Patient Safety**: Nearly half (12 of 26) of patient safety measures were improving overall.
- **Healthy Living**: Almost 60% (41 of 70) of healthy living measures were improving overall.
- **Effective Treatment**: More than 40% (15 of 36) of effective treatment measures were improving overall.
- **Care Coordination**: Nearly 40% (3 of 8) of care coordination measures were improving overall.
- **Care Affordability**: Forty percent (2 of 5) of affordable care measures were improving overall.
- **Disparities**: Some disparities were getting smaller from 2000 through 2016-2018, but many still persist, and some even worsened, especially for poor and uninsured populations in all priority areas (NHQDR, 2020).

  Disparities by race and ethnic group:
  - African Americans and American Indians and Alaskan Natives received worse care than Whites for about 40% of quality measures.
  - Hispanics received worse care than Whites for more than one-third of quality measures.
  - Asians received worse care than Whites for nearly 30% of quality measures but better care than Whites for nearly one-third of the quality measures
  - Native Hawaiians/Pacific Islanders received worse care than Whites for one-third of quality measures.
- Disparities vary by residence location:
  - For nearly 25% of quality measures, residents of large, central metropolitan areas received worse care than residents of large fringe metropolitan areas.
  - For one-third of quality measures, residents of micropolitan and noncore areas received worse care than residents of large, fringe metropolitan areas.
  - For slightly less than 20% of quality measures, medium and small metropolitan residents received worse care than residents of large fringe metropolitan areas (NHQDR, 2020).

Nursing Consideration: Nurses are often the first contact with patients and often the first to observe a disparity in care. Having the ability to safely discuss needs, available resources can be referred and/or provided in collaboration with others on the care team.

Self-Assessment Quiz Question #6

In line with the National Quality Strategy and its aims, the AHRQ develops an annual report called:

a. The Future of Nursing Report.
b. The IOM Report.
c. National Healthcare Quality and Disparities Report.
d. Dept of HHS Meaningful Use Report.

The programs established by the ACA to improve healthcare quality include two programs that have demonstrated a faster movement away from patient-volume-focused, fee-for-service (FFS) payment to payment based on provider performance: the Hospital Readmissions Reduction Program and the Hospital-Acquired Condition Reduction Program. Since October 2012, hospitals with higher-than-expected rates of readmissions of Medicare patients within 30 days of discharge have been subjected to financial penalties (CMS, 2018e). Under the Hospital-Acquired Condition program, hospitals that performed in the lowest quartile concerning hospital-acquired conditions, including hospital-acquired infections, falls, pressure ulcers, and adverse drug events (also referred to as "never events"), have been financially penalized (CMS, 2018d).

Evidence-Based Practice! The Centers for Disease Control and Prevention (2018) stated, "Reducing disparities requires national leadership to engage a diverse array of stakeholders; facilitate coordination and alignment among federal departments, agencies, offices, and nonfederal partners; champion the implementation of effective policies and programs; and ensure accountability" (CDC, 2018, para.7).

The drive for data and quality in healthcare

The Trusted Exchange Framework and Common Agreement (TEFCA) establishes universal interoperability to exchange primary clinical data across different care networks. Having access to clinical information, regardless of where the patient was previously treated, provides a better plan and care delivery. This supports the efforts to improve the quality of patient care by providing more comprehensive information to any care provider treating a patient. TEFCA further requires that patients have easier access to their health information (HealthIT.gov, 2022). This access will require the exchange of data identified in the United States Core Data for Interoperability (USCDI), which includes health data classes and respective data elements listed in Figure 5 below.

Nursing Consideration: Data are only as good as the person putting the information into the EHR. Be clear, concise, and accurate when documenting patient care. Incorrect entries can impact clinical decisions, affecting patient care. Whenever possible, discrete data entry instead of narrative text entry is preferred. Data from monitoring devices should be interfaced with the EHR to remove the burden of redundant documentation and protentional for transcription error. Standardization of discrete data improves the ability to exchange data and usability in clinical decision support algorithms.

Figure 5

Data Class and Data Element Changed from NPRM
Data class is cell header. Data elements are bulleted.

Changed Data Elements NPRM to USCDI v1	
Proposed USCDI	**Final Cures Rule (USCDI v1)**
Patient Demographics • Address	**Patient Demographics** • Current Address • Previous Address • Phone Number • Phone Number Type • Email Address
Provenance • Author • Author Organization • Author Time Stamp	**Provenance** • Author Organization • Author Time Stamp
Substance Reactions* (including Medication Allergies) • Substance* • Reaction*	**Allergies and Intolerances** • Substance (Medication) • Substance (Drug Class) • Reaction

* From Request for Comment on Alternative Approach to Representing Medication Allergies. https://www.healthit.gov/cures/sites/default/files/cures/2020-03/USCDI.pdf

HEALTHCARE SYSTEM REDESIGN

The movement toward value-based care involves a variety of care-delivery models and different types of payment models (Dzau et al., 2017). These options are designed to increase care coordination, the quality of care, and the efficiency of the healthcare system. It is vital to cite examples of these initiatives to recognize the dynamic nature of the healthcare system and the impetus toward value-based care.

Models of care

In the movement from healthcare driven by the volume of care to healthcare driven by value, it is necessary for both the delivery system and the payment system to evolve (Dzau et al., 2017). Movement away from Fee for Service (FFS) payment when a particular service is delivered has been supported because of its "failure to support many innovative approaches to care delivery and its administrative burden on clinicians and patients" (Dzau et al., 2017, p. 221).

Another component in the movement toward value-based healthcare involves exploring new models of care delivery (CHQPR, 2018). These include episodic care, centers for excellence, clinically integrated networks, primary care medical homes, and accountable care organizations (ACOs). Episodic care "is focused on a fixed period of time or a grouping of services for a condition or procedure" (Center for Healthcare Quality and Payment Reform [CHQPR] 2018, p. 20). In other words, episodic care means a pre-determined number of encounters to treat a specific condition. An example of episodic care would be related to a health condition such as chronic obstructive pulmonary disease or the delivery of a service or procedure such as hip replacement surgery. Care delivery environments expanded during the Coronavirus pandemic when Virtual Care, Telehealth, and Hospital at Home Care became appropriate alternatives to treat patients without bringing them into traditional settings.

Care is delivered through a center for excellence in a particular service line of care by a specific provider that has shown its services to be of higher quality but provided at the same or lower cost than other providers (CHQPR, 2018). Centers of excellence in specialty fields such as orthopedics, cardiology, diabetes, and bariatrics, offer multidisciplinary care across the care continuum. Care delivered through a clinically integrated network (CIN) has also risen post-ACA. A CIN is a group of providers from different specialties that creates processes and systems for managing and coordinating providers' care to individual patients. Among the goals of a CIN is a focus on providing value by utilizing evidence-based clinical practice guidelines and improving quality, efficiency, and care coordination (CHQPR, 2018).

Accountable Care Organizations (ACO)

An ACO is an organizational structure designed to deliver care responsibly, both medically and financially, for the patients it serves. Providers organize "in a way that enables them to take accountability for the overall quality of care and the total cost to payers of all or most of the healthcare services needed by a group of patients" (CHQPR, 2018, p. 3).

ACOs are often referred to as a means of caring for a population of patients or population health management. Corder (2018) notes that with the use of business intelligence tools, the analysis of patient data across this population of patients being cared for can improve clinical and financial outcomes (para., 12).

The group of providers in an ACO usually includes primary care physicians who take accountability for the costs of all services associated with their patients or groups of specialists who take accountability for the costs of all services associated with the particular health condition of their patients. The ACO will share in the savings it achieves if success is realized in the quality of care at a lower cost (CMS, 2021a). The CMS has developed several ACO-type organizational arrangements "to achieve better care for patients, better health for our communities, and lower costs through improvement for our health care system" (CMS, 2021a, para 1). Examples of ACO demonstration programs announced by the CMS include the Pioneer ACO, Next Generation ACO, and Medicare Shared Savings Program (MSSP), also known as Pathways to Success.

With the aim of better care for individuals, better care for populations, and lower costs, the Pioneer ACO model was established by the Center for Medicare and Medicaid Innovation of the CMS to take advantage of both the knowledge and capability of a healthcare setting (CMS, 2018h). The model began with 32 ACOs in 2012 and ended in 2016 with nine ACOs contributing. The characteristics of the chosen ACOs showed varying structures, with many being part of integrated delivery systems and others being part of hospital and medical practice partnerships, networks of individual medical practices, independent practice associations, and multiple-specialty practices. The ACOs choose varied financial risk-bearing arrangements. The improvement activities assumed by the Pioneer ACOs included the areas of provider engagement, care management, health information technology, beneficiary engagement, patient experience, and quality of care. By the end of the fifth performance year, some of the original Pioneer ACOs continued to function as a Pioneer ACO, with some considering the MSSP, a program that provides a pathway toward an ACO (CMS, 2018h).

Other ACOs with experience in care coordination for populations of patients joined the Next Generation ACO model. This model allows providers to assume a higher level of financial risk and reward, testing whether more substantial financial incentives, patient engagement, and care management will prove better health outcomes at a lower expense than traditional FFS recipients (CMS, 2018f). Once a high of 51 ACOs in the Next Generation ACO model, as of October 2021, 32 ACOs were partaking in this model (CMS, 2021a). Other ACO models include the Geographic Direct Contracting Model (GDCM), Primary Care First Model's Seriously Ill Population (SIP) option, the Kidney Care Choices (KCC) Model, and the Global and Professional Direct Contracting Models, with the most recent model identified as REACH (Realizing Equity, Access, and Community Health; CMS, 2022a).

The ACO REACH Model builds on the experience of these previous models to better advance health equity and aid in navigating a complex health system (CMS, 2022a). This model intends to reach underserved communities and address health disparities. Components of REACH include access to telehealth visits, home care post hospitalization, and assistance with co-pays. As an alternative to the federal ACO models, some providers have defined themselves as ACOs and are providing care as part of different care-delivery, and payment models for populations of patients with commercial health insurance and Medicaid plans that use different payment models than those used in the Medicare Shared Savings Plan.

The Partners Healthcare System is the largest healthcare system in Massachusetts and began its pilot ACO program in 2016 within its Medicaid program. It partnered with 17 pilot ACOs, including Partners. The healthcare organization created a " Partners Connect" program that includes team-based care delivery and case management for high-risk patients. Partners began this pilot after the organization's success in 2012 when it participated in the federal Pioneer ACO. That program produced $31 million in cost savings for Partners (Partners Healthcare, 2016).

Self-Assessment Quiz Question #7

Which of the following is not an example of an Accountable Care Organization (ACO)?

a. Pioneer Model.
b. Federated Model.
c. Next Generation.
d. Pathway to Success.

Integrated rural health networks

Access to healthcare in rural communities continues to be a challenge and can contribute to healthcare disparity. One model of care to better ensure alignment of minimal resources includes an Integrated Rural Health Network (IRHN). An IRHN consists of autonomous rural healthcare providers collaborating on resources (both social services and direct healthcare) to achieve economies of scale and efficiency, hence increasing value to the patients they serve (RHIhub, 2017). This includes clinical, functional, and financial integration and coordination as follows (RHIhub, 2017, para.2):

- Clinical integration (coordinating patient care services across units).
- Functional integration (coordinating administrative functions).
- Financial integration (sharing capital, risks, and profits).

These networks can be organized laterally or vertically (RHIhub, 2017). Lateral networks may be statewide critical access hospitals or health departments such as the Illinois Critical Access Hospital Network or S2AY Rural Health Network, a non-profit organization dedicated to Finger Lake, NY residents, focusing on health equity. A vertical network often includes a variety of provider types such as community representative and health centers, social workers, schools, and behavioral health services, among others.

Comprehensive Primary Care Initiative

The ACA has also promoted programs to improve and transform the delivery of primary care (CMS, 2018b). For example, the Comprehensive Primary Care Initiative (CPC), launched in 2012, is a 4-year program that functioned in seven geographic regions (see below), including 442 practice sites. Though no longer active, the initiative helped primary care practices provide the following comprehensive primary care functions for their patients: access and continuity, planned care for chronic conditions and preventive care, risk-stratified care management, patient and caregiver engagement, and coordination of care across the medical neighborhood.

In 2017, the CPC provided the groundwork for Comprehensive Primary Care Plus (CPC+), a 5-year advanced primary care medical home model "that aims to strengthen primary care through regionally-based multi-payer payment reform and care delivery transformation" (CMS, 2022b, para.1). There are 2,965 primary care practices in 18 regions participating in this initiative (CMS, 2018c). CPC+ provides the same comprehensive primary care functions as CPC, with three payment elements that reflect the payment-reform components of the program and include the seven original CPC regions. This includes four that were statewide (Arkansas, Colorado, New Jersey, and Oregon) as well as New York (Capital District – Hudson Valley Region), Ohio and Kentucky (Cincinnati-Dayton Region) and Oklahoma (Greater Tulsa Region) (CMS, 2018b). These payment elements include a care management fee paid per beneficiary per month, a performance-based incentive payment, and payment under the Medicare Physician Fee for Service Schedule.

The Primary Care First model is based on the existing design of CPC+ and prioritizes the clinician-patient relationship. Similar to other models, it focuses on financial incentives to improve health outcomes but emphasizes the importance of the primary care provider, especially for those with chronic diseases. Available in six regions across the US, the first two cohorts embarked on this model in January of 2021 and January 2022 (CMS, 2022b).

Care transitions

The ACA also created the Community-Based Care Transitions Program that tested models for improving care transitions and communication from the hospital to other care and community settings, reducing patients' readmission rates, and reducing the cost of care. The program began in 2012 and ran for 5 years, with 101 sites participating (CMS, 2018a). In the evaluation of the program, it was identified that strategies used to prevent readmissions by some sites showed promise for the future development of "community organization/hospital cooperation, coordination, and intervention selection and implementation so that healthcare dollars are spent wisely, and the quality of care is improved" (Econometrica, 2017, p. 55). Though no longer active, this set the stage for many programs to follow (noted as a component in the REACH model), recognizing the importance of follow-up after a health event. Failure of follow-up after a health event can lead to costly and unnecessary adverse events, medication errors, and hospital readmissions (Earl et al., 2020).

An example of a community-based care transitions program is the Aging & In-Home Services of Northeast Indiana in Fort Wayne, Indiana. This nonprofit organization provides an integrated model for behavioral health, community services, and healthcare that serves the older adult and disabled populations in its community (Aging & In-Home Services of Northeast Indiana, 2018). This organization provides a nutrition program, transportation, and caregiver support to the people it serves in the community and has been nationally recognized as one of the first community-based care transition programs in the United States.

Nursing Consideration: Nurses often initiate the need for these programs before discharge and are often the main point of contact for them after discharge. Think about the most common diseases that affect the US population and how a nurse could coordinate care for them.

In summary, these programs represent varied and evolving care-delivery models to increase care coordination, quality, and efficiency. These models also include payment reforms that are being tested to move away from reimbursement to care providers for health services (volume) toward value-based care focused on outcomes (quality) and healthcare system efficiency (Dzau et al., 2017). A number of these innovative care delivery and payment reform initiatives were created through the Center for Medicare and Medicaid Innovation because of the ACA.

Healthcare payment and reform: Medical coding for payment

Healthcare organizations are mandated to use medical coding systems, such as the International Classification of Disease, 10th edition (ICD-10) and the Diagnosis Related Groups (DRGs), to adequately charge for services rendered by the healthcare organization. DRGs were introduced in 1983 and provide a means for Medicare to reimburse hospital stays based on a diagnosis. The reimbursement model allows the hospital to be paid a set fee for the diagnosis filed with the CMS. During the development of the DRG system, an algorithm was developed that included factors such as the patient's age and complicating diagnoses or comorbidities. The criteria then provided a means to select similar resources for that diagnosis group to allow for a single reimbursement rate (CMS, 2021c). The DRG system was later used as part of the Pay for Performance (P4P) model.

The ICD-10 was created in 1989 by the World Health Organization to replace the ICD-9. The United States fully adopted it in 2015. The ICD-10 contains two groups: the ICD-10 Clinical Modification (ICD-10 CM) and the ICD-10 Procedure Classification System (ICD-10 PCS). The CMS uses the ICD-10 to code and report on healthcare environments (CDC, 2021b).

The difference between the DRG system and the ICD-10 is the hospital environments in which they are used in the United States (CMS, 2021f). The DRG system is used by hospitals to reimburse for a single diagnosis when the patient is admitted or on observation status. The ICD-10 is used by physicians for the reimbursement of services for both inpatient and outpatient services rendered by that physician or department.

Nursing Consideration: Clear and concise documentation by all care providers of their observations of the patient's condition ensures accurate coding for appropriate reimbursement.

The healthcare system's experience with the DRG system, which promoted efficiency in coordinating care and controlling costs for hospital inpatient care, provided the foundation for Alternative Payment Models (APMs) described in the following section.

Models of payment

The evolution of care-delivery models is parallel efforts with alternative reimbursement models (APMs). In 2015, the Department of Health and Human Services (HHS) set goals and developed a framework to shift Medicare and the healthcare system toward paying care providers through these APMs, adding incentive payments for high quality and cost-efficient care (Burwell, 2016). Within this APM framework, four categories were developed for how care providers receive payment for the delivery of care services that they provide (see Figure 6 below). Moving from category 1 to category 4 would involve increasing risk for payment, with more required accountability for the cost of care and quality and clinical management of a population of patients.

Fee for Service (FFS) is a payment model in which a care provider pays a specific amount when a service is delivered to a patient (CHQPR, 2018). The payment can vary based on the service(s) delivered to the patient. It is a volume-of-care-based payment model and does not represent movement toward a value-based model linked to quality or efficiency.

Pay for Performance (P4P) is a payment model in which the care provider is paid for their services based on their performance, such as quality, patient experience, or cost (CHQPR, 2018). A P4P system can provide rewards through increases in payments for individual services or reductions in payments for services, or both. In addition, the model also provides penalties for poor performance. P4P is one of the models used by the CMS to reimburse healthcare organizations for the care provided. CMS reimburses or penalizes a healthcare organization based on patient outcomes using clinical quality measures. For example, the patient diagnosed with congestive heart failure must receive education regarding the diagnosis before discharge. If the patient does not receive the education and is readmitted to the hospital less than 30 days after discharge, CMS will not reimburse the healthcare organization for the services rendered.

A bundled or episode (of care) payment is a single payment made to care providers intended to cover all or most of the expected services and costs of treating a clinically defined episode of care. It is referred to as an episode payment or episode-of-care payment (CHQPR, 2018). For example, a bundled or episode-of-care payment for hip replacement surgery might include a single payment for the provision of rehabilitation services before surgery, services related to the surgery itself, services provided during recovery in the hospital, rehabilitation services after discharge from the hospital, and any other post-surgery care or office visits.

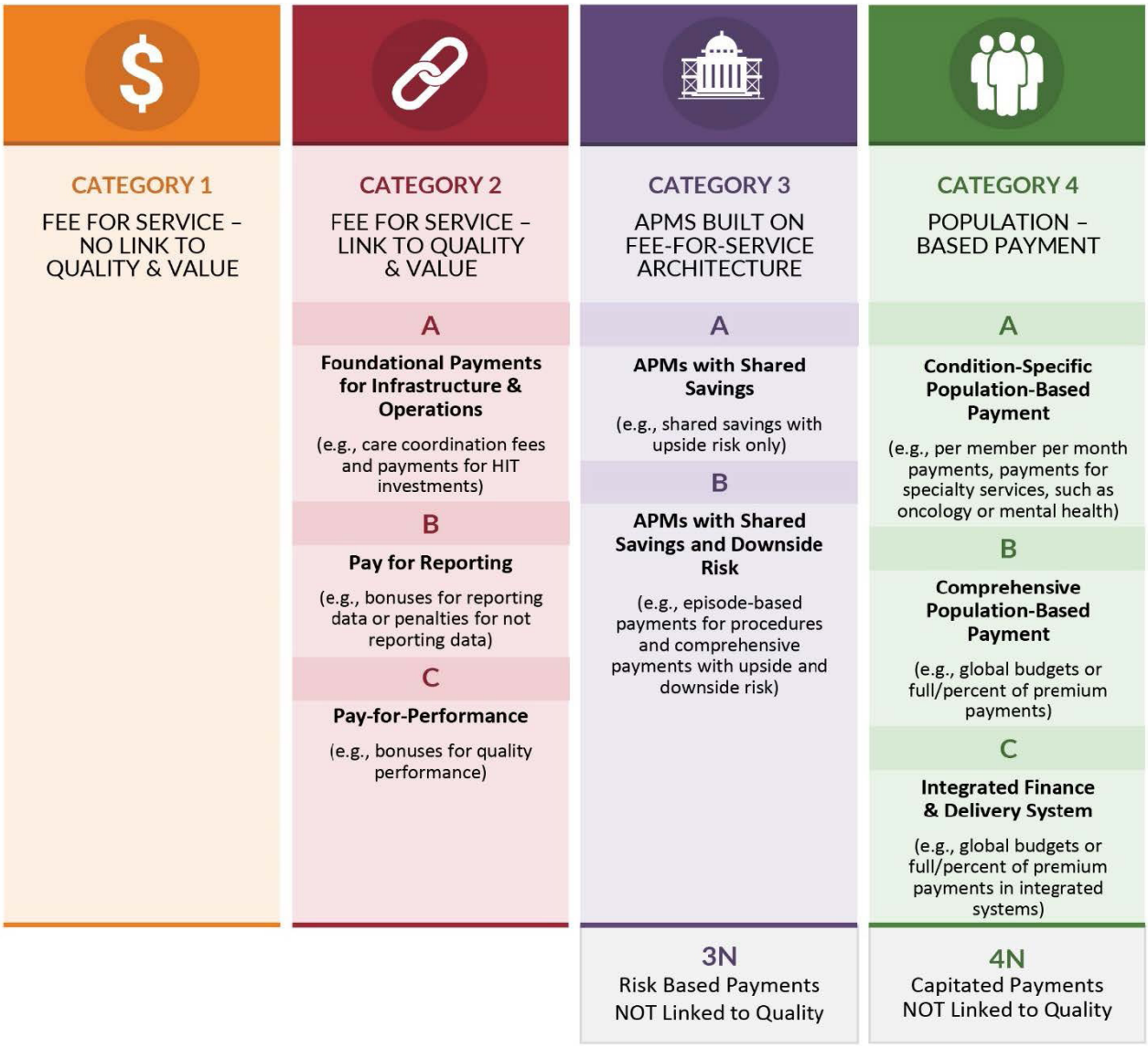
Shared savings is a payment agreement between the payer and care provider. Shared savings is based on aggregate spending for a set of services in comparison to a benchmark for these services. This can be combined with other services such as medical home expenses (CHQPR, 2018).

Global payment or capitation payment covers all or most of the services a patient needs from all care providers during a

particular period. It is generally used in reference to a payment that covers multiple episodes of care for multiple types of conditions (CHQPR, 2018). In a capitation payment model, care providers are paid based on the number of individuals cared for and comprehensive of all services they may need.

Alignment of the payment models described against the HHS framework for movement toward paying care providers through these APMs show the following in the Updated Alternative Payment Model Framework (Figure 6).

Figure 6: The Updated APM Framework



https://hcp-lan.org/workproducts/apm-refresh-whitepaper-final.pdf

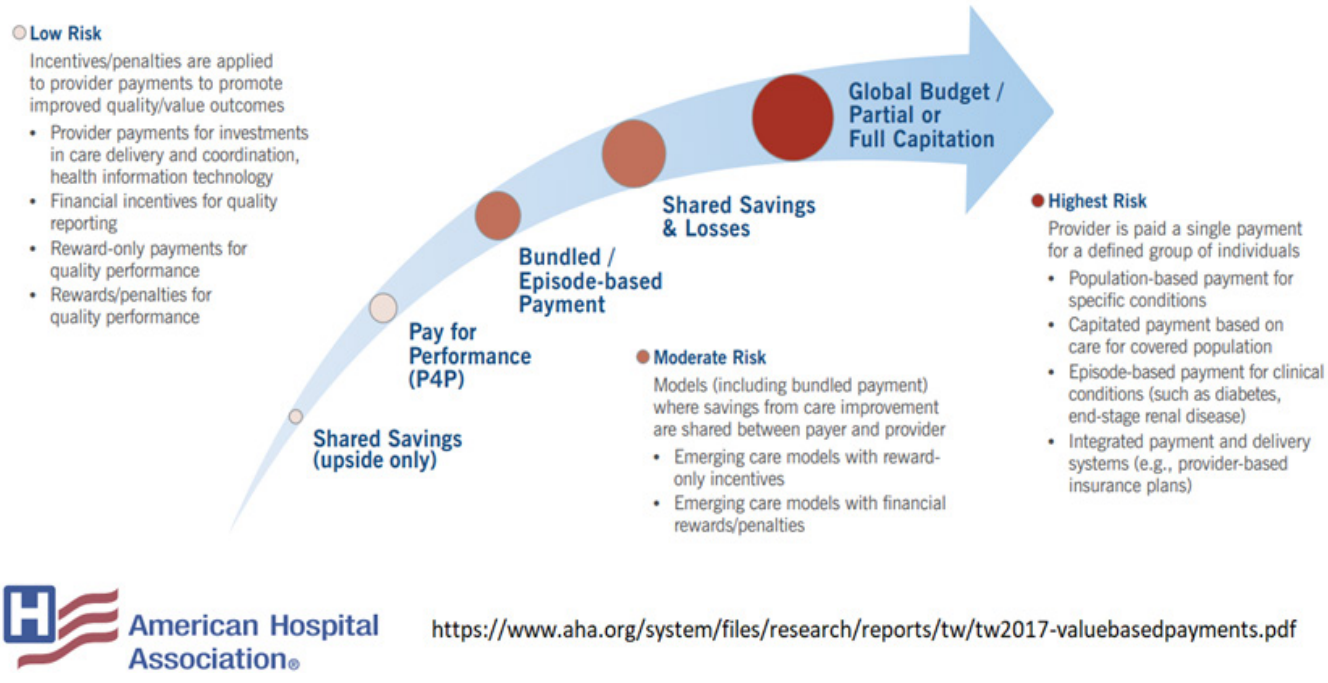
The Fee for Service (FFS) model aligns with Category 1, with no payment link to quality and value (Dzau et al., 2017). The P4P payment model aligns with Category 2, with some payment portions based on the quality or efficiency of healthcare delivery to patients. Bundled/episode-of-care payment and shared savings payment models with some financial risk align with Category 3, with some payment associated with effective management of an episode of care or a population of patients and payment prompted by the delivery of care services. Global payment or capitation payment models align with Category 4, with payment to clinicians and organizations for the care of a person over a long period. The delivery of care services does not prompt payment. This is a population-based payment model.

In the white paper highlighting the Updated Alternative Payment Model Framework Health Care Payment Learning & Action Network (HCP-LAN, 2017; Figure 6), the authors expect an increasing shift in payments from Categories 1 and 2 into Categories 3 and 4. Consequently, an increasing movement away from FFS and P4P models to APMs and population-based payment models will be seen. In addition, they note that over time, APMs within a particular category will increase the extent to which payments are linked to "provider accountability and innovation, impact of payments on cost and quality performance, delivery system integration and coordination, person-centered care" (HCP-LAN, 2017, p. 17).

Another view of these evolving payment models relates to increased risk, as shown in Figure 7, where payment is based

on the "providers' ability to deliver high-quality care in a cost-effective manner" (AHA, 2017, p. 2). The Pay for Performance (P4P) payment model is designated as low risk, with care provider payments intended to promote the advancement of quality and value outcomes. The bundled/episode-of-care payment and shared savings payment models are considered moderate risk, with achieved savings in care improvements from these emerging models shared between payers and care providers. The global payment or capitation payment models are designated as high risk, with payment to care providers based on a single payment for covered care for a defined population of patients.

Figure 7: Spectrum of Value-based Payment Models



Many different hospitals, health systems, and communities are involved in testing these diverse payment and care delivery models on the journey toward value-based healthcare. The CMS Quality Payment Program integrates the value-based model with quality to assess the amount reimbursed to healthcare organizations (CMS, 2018i). The program consists of two payment models, the merit-based incentive payment system (MIPS) and the advanced payment models (APMs).

The main goal of MIPS is to use data to drive improvement in healthcare while reducing costs. This is done by tying the payments to the data reported to the CMS. The better the quality and cost, the better the score, which directly affects the amount of money reimbursed to the healthcare provider or organization.

In the APMs payment approach, there are added incentive payments to clinicians that provide high-quality and cost-efficient care. This can be applied to specific clinical conditions, care episodes, or a population of patients. The focus can be on "data measures reported in the areas of quality, cost, improvement activities and promoting interoperability" (CMS, 2018i, p.5).

Self-Assessment Quiz Question #8

APMs require more accountability for care providers to manage:

a. Patient appointment schedules.
b. Patient treatments.
c. The cost of care.
d. The environment of care.

HEALTHCARE PROVIDERS

In its Vital Directions for Health and Healthcare initiative, members of the National Academy of Medicine (NAM) identified the workforce for 21st-century healthcare as an area of focus, with the core goal of achieving "high-value healthcare" (Dzau et al., 2017). This highlighted the need for a workforce prepared to care for four varied populations: those in good health, those who have acute illness or injury, those with chronic disease and multiple comorbidities, and those facing death and dying. Through this initiative, the priorities of pay for value, empowering people, activating communities, and connecting care emerged.

As the healthcare system continues its rapid evolution, the healthcare workforce is impacted by changes that affect clinical practice. These have been discussed throughout this course and include reform at the federal and state levels, expectations for data reporting and quality outcome measurement, electronic medical record implementation and requirements of use calls for increased transparency, new approaches to care delivery and payment transformation, and a more engaged and informed consumer.

As part of the healthcare evolution, there has been an increased focus on primary care as a career specialty, evidenced by the certification of medical homes, the incorporation of behavioral health expertise in primary care practices, and the addition of advanced practice providers, such as nurse practitioners and physician assistants. In 2010, in parallel with the ACA legislation, the IOM released an action-oriented blueprint for the future of nursing (IOM, 2011). The authors of *The Future of Nursing: Leading Change, Advancing Health* issued four key messages and eight recommendations for nurses to be instrumental in leading change to support a healthier society. The four key messages are as follows:

1. Nurses should practice to the full extent of their education and training.
2. Nurses should achieve higher levels of education and training through an improved education system that promotes seamless academic progression.
3. Nurses should be full partners with physicians and other healthcare professionals in redesigning healthcare in the United States.

4. Effective workforce planning and policy making require better data collection and an improved information infrastructure (NAS, 2021, p.23).

Four of the eight IOM recommendations that set the stage for nurses to advance their education and expand into varied and evolving career roles are as follows (IOM, 2011, p. 278-283):

1. Remove scope-of-practice barriers for nurses and advanced practice nurses.
2. Expand opportunities for nurses to lead and diffuse collaborative improvement efforts.
3. Increase the proportion of nurses with a bachelor of science in nursing degree to 80% by 2020.
4. Double the number of nurses with a doctorate by 2020

Evidence-Based Practice! Five years after the release of the Future of Nursing report, an assessment found significant progress had been made towards implementing its eight recommendations (IOM, 2016) and identified future recommendations to further affect the profession of nursing amid the changing healthcare system (IOM, 2011, p. 278 – 283): Build common ground around scope-of-practice and other issues in policy and practice.

- Continue pathways toward increasing the percentage of nurses with a baccalaureate degree.
- Create and fund transition-to-practice residency programs.
- Promote nurses' pursuit of doctoral degrees.
- Promote nurses' interprofessional and lifelong learning.
- Make diversity in the nursing workforce a priority.
- Expand efforts and opportunities for interprofessional collaboration and leadership development for nurses.
- Promote the involvement of nurses in the redesign of care-delivery and payment systems.
- Communicate with a wider and more diverse audience to gain broad support for campaign objectives.
- Improve workforce data collection.

In the ongoing movement toward value-based care and the trials with various care delivery and payment models, existing and new roles are evolving, new skill sets are being identified, and the clinician scope of practice is being evaluated and redefined. Telehealth nursing, for instance, is a growing field that provides an opportunity to reach remote locations where access to care is limited (Gaines, 2020).

Evidence-Based Practice! Studies have shown that the use of advanced practice registered nurses helps control costs. Advanced practice registered nurses are effective in improving patient outcomes and increasing reimbursement for care. They improve patient satisfaction, prevent patient injury or harm, and decrease the length of hospitalization (American Academy of Nursing, 2018).

Nurses will need basic skills and fundamental principles of population health management, care coordination, interdisciplinary teamwork, communication, data analytics, and information technology support to facilitate value-based care delivery (Randazzo, 2018). The roles of health coaches and peer coaches are emerging, focusing on the management of social determinants of health of patients in their communities. Other roles in these new models of care include care managers, patient care navigators, and care coordinators (Rutledge, & Gustin, 2021).

Case study 2: Diabetic care

Your healthcare organization has been part of an Accountable Care Organization (ACO). As they embark on value-based care, they have been reviewing the data from their ambulatory practices and health maintenance data. Their analytics have shown a good percentage of the population with increasing A1C and missed patient appointments. Since quality of care and improved outcomes are directly related to cost and reimbursement, the organization recognizes that efforts need to be put in place to improve health as well as patient engagement.

Questions: What data should be evaluated to monitor wellness and what programs should be put in place to improve both health outcomes and patient engagement?

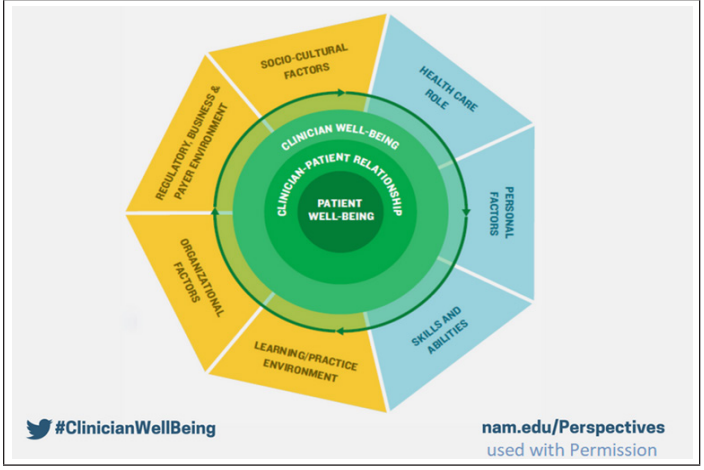
Discussion: Data analytics provides an opportunity to evaluate outcomes for an organization. Data can be filtered and drilled down to determine the root cause of a negative trend. By evaluating associated data to a section of the population of patients being seen for diabetes, a plan to address rising A1Cs can be put in place. Additional educational sessions, virtual visits, and reminders for upcoming appointments can all be implemented. Follow up texts or emails can be leveraged to continue to check on patients to see if they are continuing to follow healthy meal plans and medication regimens. Home monitoring can provide real time upload of data so care providers can follow patients more closely and intervene as soon as the patient starts trending in the wrong direction.

Well-being and resilience

The research presents mounting evidence that both physicians and nurses are experiencing burnout at increasing rates, which in turn appears to be affecting quality, safety, and health system performance (NAM, 2018). While this was exacerbated because of the extreme needs filled during the COVID crisis, members of the National Academy of Medicine (NAM) recognized this as a previous growing problem and launched the Action Collaborative on Clinician Well-Being and Resilience in 2017. In its Conceptual Model of Factors Affecting Clinician Well-Being and Resilience, the NAM is reflective of the understanding of burnout, resilience, and well-being (see Figure 8). The conceptual model includes the following definitions related to clinician burnout (Brigham et al., 2018, p.2):

- A clinician is defined as anyone training to and/or qualified to deliver healthcare within medicine, nursing, mental health, pharmacy, dentistry, and other disciplines.
- Burnout is a syndrome characterized by emotional exhaustion, depersonalization (i.e., cynicism), and loss of work fulfillment. Burnout is the chronic condition of perceived demands outweighing perceived resources.

Figure 8: Factors Affecting Clinician Well-Being and Resilience Conceptual Model



This model highlights the critical elements of *patient well-being* at the center of the model, surrounded by the *clinician-patient relationship* and then surrounded by *clinician well-being*. Encapsulating these three key elements is the myriad of clinician individual factors and external factors that can impact and influence the three key elements (Brigham et al., 2018). The graphic representation depicts both the magnitude of the problem and the urgency in providing solutions. The model is meant to "understand the causes and effects of burnout, identify strategies to prevent and treat burnout and promote well-being, and improve healthcare delivery and patient outcomes" (Brigham et al., 2018, p. 6).

Shah et al. (2021) evaluated nurses leaving the profession and found that 31.5% were leaving because of burnout. Factors contributing to burnout include demanding workloads, poor staffing ratios, long work hours, emotional fatigue, lack of communication between physicians and nurses, and lack of organizational leadership (p. 3). Resolving these will require reimagined workflow, additional staffing resources, and workplace support. The positive effect of increased staffing is exhibited in states where staffing ratios are mandated.

California and Massachusetts, for example, show a lower burnout percentage than other states (Shah et al., 2021). Lower burnout and greater job satisfaction also require a good work environment. A study by Ulrich et al. (2018) stated that a good work environment includes not only adequate staffing but good communication and leadership, meaningful recognition, and the opportunity to influence decision making.

Professional nursing organizations have embraced the fourth aim of the Quadruple Aim: "care of the patient requires care of the provider," recognizing the need to improve the work-life of healthcare clinicians and staff (Tuazone, 2019). Among those organizations that have focused on achieving this fourth aim are the ANA's Healthy Nurse Healthy Nation, the American Association of Critical Care Nurses (AACN) AACN Standards for Establishing and Sustaining Healthy Work Environments: A Journey to Excellence, and the American Organization of Nurse Executives (AONE)/Emergency Nurses Association's AONE Guiding Principles: Mitigating Violence in the Workplace (AONE, 2014).

The AACN issued AACN Standards for Establishing and Sustaining Healthy Work Environments: A Journey to Excellence in 2005, responding "to mounting evidence that unhealthy work environments contribute to medical errors, ineffective delivery of care, and conflict and stress among healthcare professionals" (AACN, 2016, p. 1). Six essential standards that must be in place to ensure a healthy work environment were developed. AACN later incorporated critical elements in their standards to address the health of the work environment and highlight the "inextricable links among the quality of the work environment, excellent nursing practice and patient care outcomes" (AACN, 2016, p. 1). The standards for establishing and sustaining healthy work environments include the following:

1. Skilled communication
    - Nurses must be as proficient in communication skills as they are in clinical skills.
2. True Collaboration
    - Nurses must be relentless in pursuing and fostering true collaboration.
3. Effective Decision Making
    - Nurses must be valued and committed partners in making policy, directing and evaluating clinical care, and leading organizational operations.
4. Appropriate Staffing
    - Staffing must ensure the effective match between patient needs and nurse competencies.
5. Meaningful Recognition
    - Nurses must be recognized and must recognize others for the value each brings to the work of the organization.
6. Authentic Leadership
    - Nurse leaders must fully embrace the imperative of a healthy work environment, authentically live it, and engage others in its achievement (AACN, 2016).

Adams et al. (2018) noted that years of research focusing on nurses' work environment reveals how to reduce clinician burnout and optimize clinician job satisfaction:

> "Many elements of the work environment identified as important to nurses, including effective leadership, support for autonomous practice, good communication and strong interdisciplinary relationships, are central to the shared lived experience of other clinicians and health care workers throughout the health system" (Adams et al., 2018, p. 2).

An increasing body of literature has demonstrated that mindfulness meditation and practices help an individual focus on one's thoughts, actions, and body, and help reduce stress, anxiety, and depression. An integrated literature review of small-scale studies by van der Riet et al. (2018) assessed the effectiveness of mindfulness meditation programs for nurses and nursing students and identified that "mindfulness meditation has a positive impact on nurses' and nursing students' stress, anxiety, depression, burnout, sense of well-being and empathy" (p. 201). As part of the ANA's Healthy Nurse, Healthy Nation initiative, a blog called "Channeling Mindfulness in Nursing" has been developed that provides education, research findings, and video productions of nurses using mindfulness in their practice. The blog shared that mindfulness can help manage pain and stress and help prevent burnout and compassion fatigue. Mindfulness practices can also benefit family, friends, co-workers, and patients (ANA, 2017).

The white paper "IHI Framework for Improving Joy in Work" (Perlo et al., 2017) included a guide for individuals, managers, and leaders, a practical conversation guide, and practical ideas and assessment tools for improving joy in work. It notes:

> *"Burnout affects all aspects of the pursuit of better health and health care. It leads to lower levels of staff engagement, which correlate with lower customer (patient) experience, lower productivity, and an increased risk of workplace accidents. These all significantly affect the financial vitality of an organization. The impact on patient care is even more worrying. Lower levels of staff engagement are linked with lower-quality patient care, including safety, and burnout limits providers' empathy – a crucial component of effective and person-centered care"* (para. 2).

The white paper provides four steps for healthcare leaders to take within their organizations:

1. Ask staff, "What matters to you?"
2. Identify unique impediments to joy in work in the local context.
3. Commit to a systems approach to making joy in work a shared responsibility at all levels of the organization.
4. Use improvement science to test approaches to improving joy in work in one's organization (Perlo et al., 2017).

To train and sustain a healthcare workforce prepared to care for varied and increasingly complex populations while achieving

high-value healthcare, training and skillsets must be modernized and reformed (Heeringa et al., 2020). Recommendations include adapting the training and practice of healthcare workers into coordinated, collaborative, interdisciplinary teams that become technically skilled and continually proficient with health information technology and data collection, analysis, and application of the findings. "Two separate and distinct areas must be understood: how technology will change the education of the future workforce and how technology will affect the way the workforce cares for individuals and how those individuals access and interact with their caregivers" (AHA, 2016, p. 21).

Healthcare consumers

In the movement toward value-based healthcare, the person's role as consumer, patient, and family has taken on more prominence in engagement, collaboration, and advocacy within the healthcare system (Cordina et al., 2018). The results of McKinsey & Company's 2017 Consumer Health Insights Survey suggest that consumer engagement can improve healthcare access, quality, and affordability; however, true collaboration is needed to achieve success. The survey found that respondents ranked healthcare coverage as the most important (23%), followed by customer service at 11%, cost at 7%, and access at 6%. The authors reported on the emergence of four themes from the survey results: affordability, continuity, digital, and engagement (Cordina et al., 2018).

The concerns by consumers over the affordability of healthcare included difficulties in understanding their basic medical costs, determining whether their treatment would be covered, and understanding their bill (Cordina et al., 2018). Continuity in their healthcare network found consumers citing a lack of continuousness in their health insurance and the providers where they receive care. The use of digital tools in healthcare was noted to be a preference compared to phone or in-person communications related to healthcare. The survey summary included the observation that the use of digital tools in healthcare is lower than in numerous other industries and that adoption is likely to grow as awareness of the tools rises among consumers. Consumers were willing to engage in solutions to reduce healthcare costs, but most believe they cannot do so today. The report summarized that it is critical for healthcare providers and insurers to engage with and collaborate with consumers, help them manage their healthcare delivery and healthcare costs, and manage and improve their health.

The willingness to adopt digital tools was borne out during the COVID outbreak. April of 2020 saw a nationwide average of 30% of visits performed via telehealth, whereas the national average before this was at 11-13% (Naureckas et al., 2021). Consumers enjoyed telehealth's convenience and providers were allowed to maintain a level of visits that would have been impossible without this technology. Post pandemic use of telehealth is uncertain, according to a survey by JAMA. Findings cited that while consumers are willing to use video visits, a preference for in-person visits still exists. When a decreased cost was offered for video visits, the survey did reveal an increase in interest (Predmore et al., 2021). Those in rural communities and underserved populations lacking health equity could benefit from telehealth. Encouragement to take advantage of this offering, as well as messaging around available services, needs to be put in place (Bendix, 2022).

Consumerism in Healthcare: The Next Chapter (2018) outlined the current state of unpredictability for consumers relating to the stability of their insurance coverage and the ability to manage out-of-pocket costs, such as high-deductibles and unclear healthcare pricing, as well as the lack of tools to support consumers in their decision making and purchasing. In terms of the future of consumerism, the author noted that "increasingly, healthcare leaders realize that a patient's financial experience is an important element of his or her overall healthcare encounter, one that affects not only patient satisfaction but also attitudes toward the hospital or system where the experience occurred" (Gundling, 2018, p. 13).

Gundling (2018) cites several recommendations to improve the patient's financial experience, including redesigning and clarifying medical bills, seeing bills through the eyes of the patient, improving quality and price-transparency information for healthcare services in advance of receiving those services, informing patients about the risk of surprise medical bills, and suggesting specific ways to help them avoid unexpected bills and improve the convenience of medical bill payment, such as through the use of apps. Physicians, hospitals, health systems, health plans, and consumers must collaborate to deliver improved value in the coming years. "As the volume-to-value transformation picks up steam, healthcare stakeholders must collaborate to deliver improved value to the people they serve. Value is the essence of consumerism" (Gundling, 2018, p. 15).

The Consumer Healthcare Payments Survey 2020 revealed a growing preference for contactless online payments for health insurance premiums as well as bill pay (InstaMed, 2020). The survey also cited that 80% of consumers were surprised by a medical bill in 2020.

The federal government has since instituted two efforts to address concerns regarding medical bills. The first bans surprise billing for emergency department visits and out-of-network charges (HHS, 2021). The second provides for hospital price transparency, requiring pricing information to be accessible and machine read-readable in a consumer-friendly format (shard).

An example of a consumer-oriented healthcare quality and pricing tool is CompareCare for Massachusetts consumers. Promulgated by state law and developed and launched by the Center for Health Information and Analysis, the tool contains specific payer-provider data (often referred to as a provider) for 295 standard procedures (Center for Health Information and Analysis, 2018). Consumers can search the online tool for access to each payer-provider procedure. Quality ratings for acute care hospitals in the state are also provided and explain the posted quality measures.

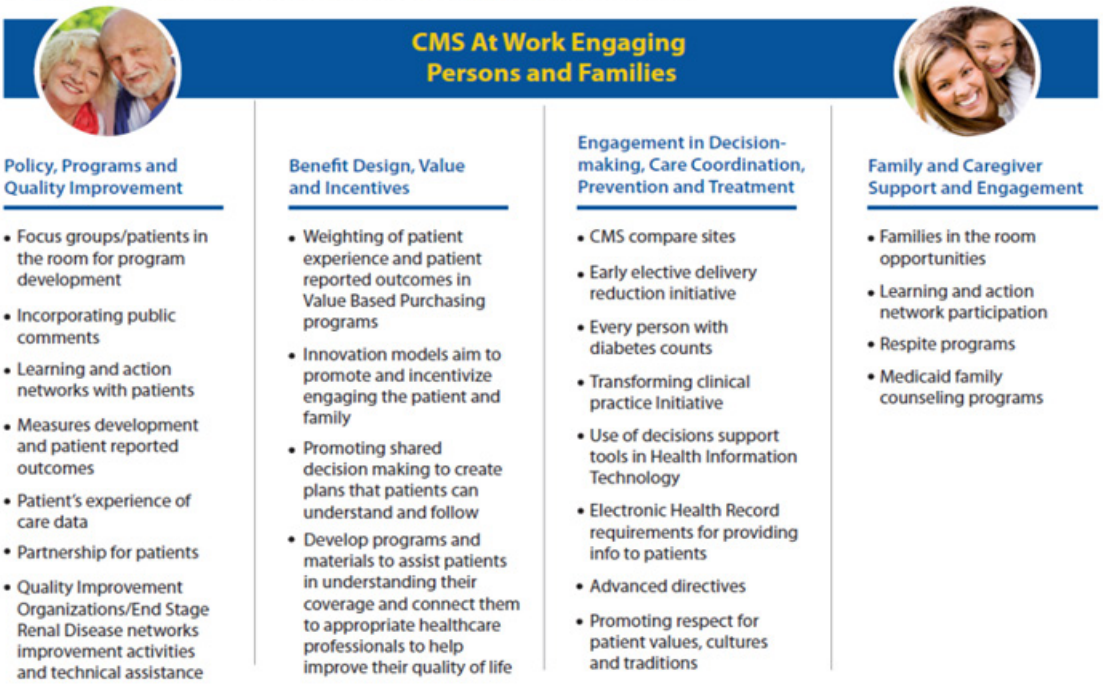
The CMS developed the Person and Family Engagement (PFE) Strategy to guide the implementation of person and family engagement throughout CMS policies and programs (CMS, 2018g). The PFE Strategy was also intended to align with the three broad aims of the National Quality Strategy of Better Care, Healthier People, Communities, and Affordable Care, aligning with the CMS Quality Strategy goals. The CMS defines person and family engagement as follows:

> *"Patients and families are partners in defining, designing, participating in and assessing the care practices and systems that serve them to assure they are respectful of and responsive to individual patient preferences, needs and values. This collaborative engagement allows patient values to guide all clinical decisions and drives genuine transformation in attitudes, behavior and practice"* (CMS, 2018g, pp. 4-5).

The PFE Strategy incorporates person-centered values, health literacy, accountability, and respect (CMS, 2018g). The CMS has endeavored to engage persons and families actively and strive toward alignment across quality measurement, quality improvement, payment policies, and oversight activities.

Figure 9 illustrates the different ways in which CMS strives to engage persons and families in its varied initiatives and programs. Several of the programs described in the figure have been highlighted in this course. One of the CMS Quality Strategy goals: "Strengthen persons and families as partners in their care" (CMS, 2018g, p. 10) aligns with the PFE Strategy and their four actionable goals to meet the overall person-and family-centric goal of welcoming the active involvement of persons and caregivers to contribute in creating an "inclusive, collaborative and aligned national person and family engagement framework" (CMS, 2018g, p. 6).

Figure 9



https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityInitiativesGenInfo/Downloads/Person-and-Family-Engagement-Strategic-Plan-12-12-16.pdf

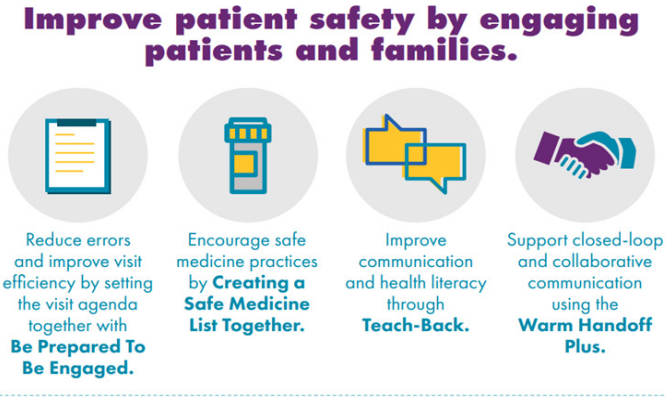
The four actionable goals of the PFE Strategy are as follows (CMS, 2018g, p. 10):

1. Actively encourage person and family engagement along the continuum of care within the broader context of health and well-being and in the communities in which they live.
2. Promote tools and strategies that reflect person and/or family values and preferences and enable them to actively engage in directing and self-managing their care.
3. Create an environment where persons and their families work in partnership with their healthcare providers to develop their health and wellness goals.
4. Improve experience and outcomes of care for persons, caregivers, and families by developing criteria for identifying person and family engagement best practices and techniques in the field.

An example of a strategy to build patient and provider engagement, partnership, and trust and thus promote safety is *The Guide to Improving Patient Safety in Primary Care Settings by Engaging Patients and Families*, released by the AHRQ in 2018. Breakdowns in patient safety in primary care include errors in diagnosis, communication failures, medication errors, and fragmentation of care and led to four evidence-based strategies to "support patient safety by engaging patients and families in closed-loop and collaborative communication within the primary care visit" (AHRQ, 2018, p. 2). These four strategies are as follows (Figure 10):

- Be prepared to be engaged.
- Create a safe medicine list together.
- Teach-back.
- Warm handoff plus.

Figure 10: Guide Strategies Aimed at Improving Patient Safety by Engaging Patients and Families



Note: From Agency for Healthcare Research and Quality (2018). The guide to improving patient safety in primary care settings by engaging patients and families. Rockville, MD: Author

Teach-back is an evidence-based health literacy intervention in which care providers teach information to the patient or family and then ask the patient or family to explain it or teach it back to the care provider. It is used to validate the effectiveness of the care provider's teaching (AHRQ, 2018).

A "warm handoff plus" engages the patient, improves communication, and is a safety check. It is "a handoff conducted in person, between two members of the healthcare team, in front of the patient (and family if present). It includes the patient as a team member so that he or she can hear what is being discussed about the clinical problem, current status, and plan of care" (AHRQ, 2018, p. 9).

Nursing Consideration: Nurses are often the last contact with a patient at the close of a health visit, whether an acute episode or a health maintenance visit (virtual or in-person). The healthcare team's review of information imparted to the patient can provide an opportunity for both hand-off and teach-back. This ensures that the patient understands and can institute the next step in their care.

The engagement of patients and families in their health extends beyond a critical event. While collaborative decision-making in those events is essential, this consumes a small portion of their lives for most of the population (Krist, 2017). The day-to-day life habits make a difference in overall health and chronic disease management. Consistent education and health coaching can keep patients engaged.

Digital tools such as patient portals and health apps can provide frequent touchpoints for messaging and tracking health progress. This can include patient-generated health data and wearables that upload patient data to the portal providing caregivers with objective data points. Clinicians monitoring this information can quickly intervene before a condition develops or worsens. Of concern are the patients without access to digital tools or lower health literacy (Krist, 2017).

Communities can take advantage of telehealth funding opportunities for training clinicians and providing tools for consumers (RHIhub, 2022.) The broader view of patient engagement includes involving patients in comment periods for regulations, research studies, survey responses, and community needs, resulting in an overall improvement in our healthcare system (Krist, 2017).

The engagement of persons, patients, and families will be needed to achieve the three tenets of the Triple Aim: better health, better patient experience, and lower costs. Fundamental to the person/patient engagement and trust are health literacy, accessible information, and knowledge; transparency around costs and quality; and seamless and coordinated care management activities. Strategies customized to patients' needs, preferences, and motivations, with increasing use of patient-generated health data and integration of patient-engagement efforts into everyday life, will further the success of person/patient engagement. Addressing the fourth domain of the Quadruple Aim, the healthcare team, nursing will be well-positioned to address patients' care needs wherever they receive care.

Conclusion

This course provided nurses with an overview of the elements comprising the business of healthcare in the industry movement toward a value-based healthcare system – toward person-centered healthcare. The elements explained in the course covered the state of the healthcare environment, encompassing the cost of care and the health of the population, the status of healthcare reform, the drive for data and quality in healthcare, healthcare system redesign, healthcare payment reform, and the impact of this movement on the consumer and healthcare provider.

Nurses may serve as primary care providers to individuals, communities, and society. They incorporate knowledge of these multiple change elements in the healthcare system in their practice. No matter the nurse's role in service to society, these dynamic and evolving change elements impact nurses and healthcare consumer, including their health and behaviors. Nurses must take these into account in the care that they provide to others and in terms of how they affect healthcare through the varied roles in their professional careers.

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Self-Assessment Answers and Rationales

1. The correct answer is B.
Rationale: Value based care models focus on providing better care for individuals and populations at a lower cost. Outcomes are measured to determine results and providers are rewarded based on improved outcomes as opposed to volume of services rendered.

2. The correct answer is E.
Rationale: Value-based care requires a focus on value or quality of healthcare outcomes over volume (number of patients seen and/or procedures performed). This keeps the patient at the center of care, provides access to care, and requires an IT infrastructure that can analyze the data to determine outcomes and reward accordingly.

3. The correct response is D.
Rationale: Although the higher rate of mortality is difficult to quantify, the United States pays higher prices for both supplies and services, including physicians, pharmaceuticals, and healthcare administration services. In addition, advanced technology such as MRIs and specialty procedures are performed at a higher rate than other countries. The US has the highest chronic disease burden and an obesity rate two times higher than the OECD average. Americans also had fewer physician visits than peers in most countries, which may be related to a low supply of physicians in the US.

4. The correct answer is D.
Rationale: The fourth domain, the Quadruple Aim, focuses on the well-being of the healthcare team. Care of the patient requires care of the providers of care. Increasing concern over the burden of documentation, regulatory requirements, and burnout identifies the need to improve healthcare worker satisfaction and a better work/life balance. The ANA supports this focus by adopting their "Healthy Nurse, Healthy Nation initiative." "A healthy nurse lives life to the fullest capacity, across the wellness/illness continuum, as they become stronger role models, advocates, and educators; personally, for their families, their communities and work environments, and ultimately for their patients" (ANA, 2017, para. 3).

5. The correct answer is C.
Rationale: The success of the ACA will continue to be measured in terms of its original goals: "increasing the number of the insured, improving the quality of care, and reducing the costs of health care" (Manchikanti, 2017). Some of these indicators will be reported publicly to improve transparency and some will have payment attached to achieving performance indicators.

6. The correct answer is C.
Rationale: In line with the National Quality Strategy and its aims, the AHRQ develops an annual report, the National Healthcare Quality and Disparities report, "to provide a comprehensive overview of the quality of healthcare received by the general U.S. population and disparities in care experienced by different racial and socioeconomic groups" (AHRQ, 2020)..

7. The correct answer is B.
Rationale: ACOs are a care delivery model with overall responsibility and accountability for both the quality of care and total cost to payers for a group of patients. Examples of Medicare ACO programs include the Next Generation ACO, Pioneer ACO, and Medicare Shared Savings Program (MSSP), also known as Pathways to Success. A Federated model is a type of Health Information Exchange (HIE; CMS, 2021a).

8. The Correct answer is C.
Rationale: Along with the evolution of care-delivery models are trials with alternative reimbursement models or alternative payment models called APMs. These involve increasing risk for payment with more accountability for the cost and quality of care and the management of a population of patients.

Elite
PO Box 37 | Ormond Beach, FL 32175
Questions? Call us toll-free: 1-866-344-0971

Michigan 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 faster service, we offer this course participant 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)** | **MI Nursing License Number (Please provide to receive course credit)**

E-Mail (include to receive processing confirmation and instant certificate access)

Payment Method

- ☐ Check / M.O. Enclosed for:
- ☐ Visa / Mastercard / AMEX / Discover

☐ Entire Package only $38.95 or

- ☐ Michigan Nurses Pain Assessment and Management - $20.95
- ☐ Crisis Resource Management for Healthcare Professionals - $23.95
- ☐ Documentation in the Electronic Age for Nurses - $23.95
- ☐ Management of Anxiety and Depression for Healthcare Professionals - $23.95
- ☐ Staying Healthy: Vaccine Preventable Diseases - $44.95
- ☐ The New Business of Healthcare - $26.95

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

ANCCMI2524

2481449811

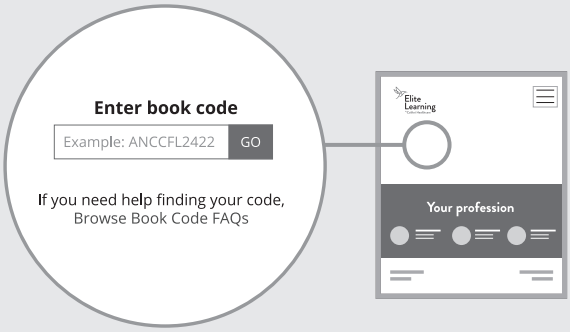
Test Expiration Date: 7/7/2024
1.ANCCMI02PM 2.ANCCMI03CR 3.ANCCMI03EA 4.ANCCMI03AD 5.ANCCMI10SH22 6.ANCCMI04NB

HOW TO COMPLETE THIS BOOK FOR CREDIT

Please read these instructions before proceeding.

IF YOU'RE COMPLETING ALL COURSES IN THIS BOOK:

- Go to **EliteLearning.com/Book** and enter code **ANCCMI2524** in the book code box, then click **GO**.
- If you already have an account created, sign in with your username and password. If you don't have an account, you'll be able to create one now.
- Follow the online instructions to complete your final exam. Once you finish your purchase, you'll receive access to your completion certificate.



IF YOU'RE ONLY COMPLETING CERTAIN COURSES IN THIS BOOK:

- Go to **EliteLearning.com/Book** and enter code that corresponds to the course below, then click GO. *Each course will need completed individually*

COURSES YOU'VE COMPLETED	CODE TO ENTER
All 25 hours in this correspondence book	**ANCCMI2524**
Michigan Nurses Pain Assessment and Management (Mandatory)	ANCCMI02PM
Crisis Resource Management for Healthcare Professionals	ANCCMI03CR
Documentation in the Electronic Age for Nurses	ANCCMI03EA
Management of Anxiety and Depression for Healthcare Professionals	ANCCMI03AD
Staying Healthy: Vaccine Preventable Diseases	ANCCMI10SH22
The New Business of Healthcare	ANCCMI04NB

By mail

- Fill out the answer 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 answer 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.

NURSING - COURSE EVALUATION (ANCCMI2524 - 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.	

	Michigan Nurses Pain Assessment and Management **2 Contact Hours**					Crisis Resource Management for Healthcare Professionals **3 Contact Hours**					Documentation in the Electronic Age for Nurses **3 Contact Hours**				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	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	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 Elite to use my comments. If you agree, please provide your name and title as you would like to see them to appear.

_____

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	Management of Anxiety and Depression for Healthcare Professionals - **3 Contact Hours**					Staying Healthy: Vaccine Preventable Diseases **10 Contact Hours**					The New Business of Healthcare **4 Contact Hours**				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	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	Excellent	Good	Average	Below Average	Poor
11	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
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_____

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❑ I agree to allow Elite to use my comments. If you agree, please provide your name and title as you would like to see them to appear.

_____