DELTA STATE UNIVERSITY, ABRAKA

OPEN AND DISTANCE LEARNING

FACULTY OF BASIC MEDICAL SCIENCES

DEPARTMENT OF NURSING SCIENCE

COURSE CODE: NSC 301

COURSE TITLE: MEDICAL SURGICAL NURSING I

COURSE TEAM

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Introduction

Medical and Surgical I (NSC 301) is a part of the Medical and Surgical Nursing course. Medical and Surgical Nursing is an area of specialty in nursing that focus on the care for medical and surgical conditions. Medical and Surgical Nursing course has four parts and NSC 301 in the first and introductory part that introduces student nurses to medical and surgical concepts, medical and surgical nursing modalities and some fundamental the medical and Surgical nursing. Therefore, to have a good knowledge and foundation on Medical and Surgical Nursing, it is important you read this course contents very well.

Course Objectives

At the end of this course, the student should be able to:

1. discuss the concept of medical and surgical nursing

2. provide some fundamental care for patients with stress, shock, pain, wound care, fluid and electrolyte imbalance

3. explain the care to provide for patients with special needs like the unconscious patient, patient with burns, those for surgery and the palliative care given to the dying and end of life care.

4. discuss the care given to patient with immunological system disorders and those with infectious disease.

Working through the Course

To achieve the maximum grade required in this course, you are expected to carefully and thoroughly read through the different modules and sections in the contents of this course. It is advised you read the references recommended for further reading.

Study Units

Module 1- Concept and Terminologies

Section 1: Concept of Medical and Surgical Conditions 239

Section 2: Tools used in the assessment of medical Surgical Cases

Section 3: Patients Preparation for Diagnostic Measure in Medical and Surgical Conditions

Module 2- Fundamentals of Medical Surgical Nursing

Section 1: Nutrition and Temperature Control

Section 2: Fluid and Electrolyte Balance

Section 3: Stress and Shock

Section 4: Pain and Sleep

Section 5: Skin Care and Wound management

Module 3- Caring for Patients with Special Needs

Section 1: Care of the Patient Having Surgery

Section 2: Care of Patients Experiencing Trauma and Unconscious Patients

Section 3: Care of Patients Receiving Palliative Care

Section 4: Care of Patients with Burns and cancer

Section 5: Loss, Grief and End of Life Care

Module 4- Immune System and Care of Patients with Infectious Diseases

Section 1: Caring for Patients with Altered Immune Status

Section 2: Caring for Patients with Inflammation

Section 3: Caring for Patients with Infectious Diseases

Course Evaluation

30% for in-course assignment

70% for final assignment

Grading Scale

A= 70-100

B= 60- 69

C= 50-59

F= ≤49

Self-Assessment Questions: This will be provided at the end of each module.

References: This will be provided at the end of each section in the different modules.

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SECTION 1: Concept of Medical and Surgical Conditions

CONTENT

1.0 Introduction

Medical and surgical conditions occur when there are deviations from the normal anatomical and physiological structure and functioning of the body. However, for appropriate care, nurses must be critical in thinking, have good interpersonal and communication skill, and be familiar with the models in which medical and surgical conditions are cared for. This section will examine these concepts in detail.

2.0 Learning Outcomes

At the end of reading this sections, the student should be able to explain the basic concepts in medical and surgical nursing conditions and practice, such as critical thinking, models of nursing care, communication and how to relate to different patients.

3.0. Main Content

3.1 Critical Thinking for Caring for Medical and Surgical Patient

Nursing students must learn to think critically; in other words, to think like a nurse. This means they must use their knowledge and skills to make the best decisions possible in patient care situations. Good thinking in nursing care has also been called clinical reasoning. Clinical reasoning is also defined as "thinking through the various aspects of patient care to arrive at a reasonable decision regarding the prevention, diagnosis, or treatment of a clinical problem in a specific patient." Good thinking requires critical thinking attitudes and skills, which are described in this section. It also requires a good knowledge base, so your thinking is based on correct factual material. Our goal in this text is to provide you with solid medical-surgical knowledge on which to base good decisions.

Traits of Critical Thinking

1. **Intellectual Humility** Have you ever known people who think they know it all? They do not have intellectual humility. People with intellectual humility have the ability to say, "I'm not sure about that . . . . I need more information." Certainly, we want our patients to think we are smart and know what we are doing, but patients also respect nurses who can say, "I don't know, but I'll find out." It is unsafe to care for patients when you are unsure of what you need to do.
2. **Intellectual Courage** Intellectual courage allows you to look at other points of view even when you may not agree with them at first. Maybe you really believe that 8-hour shifts are best for nurses, and you have a lot of good reasons for your belief. But if you have intellectual courage, you will be willing to really listen to the arguments for 12-hour shifts. Maybe you will even be convinced. Sometimes you have to have the courage to say, "Okay, I see you were right after all."
3. **Intellectual Empathy** Consider the patient who snaps as you enter her room, "I've been waiting all morning for my bath. If you don't help me with it right now I'm going to call your supervisor." The first response that comes into your head is, "I have five other patients; you're lucky I am here!" If you have intellectual empathy, however, you will be able to think, "If I were this patient, who is in chronic pain and is tired of being in the hospital, how would I feel?" Such thinking might change how you respond.
4. **Intellectual Integrity** One of your patients asks a hundred questions when you bring her a medication that has been newly prescribed for her high blood pressure. But later you notice she is taking an herbal remedy from her purse. It is good that she asks a lot of questions about her drug, which has been tested extensively by the Food and Drug Administration (FDA). Herbal remedies, however, are not held to the same standards as medications. Someone with intellectual integrity would want the same level of proof applied to both medications and herbal remedies to determine if they are safe and effective before using them.
5. **Intellectual Perseverance** Perseverance means you do not give up. Consider this scenario: You have concerns about some side effects you noticed after giving a new drug to a patient. You mention it to the health care provider, who says not to worry about it, but you are still concerned. If you have intellectual perseverance, you might do some research on the Internet, then go to your supervisor or the pharmacist to further discuss your concerns.

6. **Faith in Reason** If you have faith in reason, you believe in your heart that good clinical reasoning will result in the best outcomes for your patients. And if you really believe, you will be more likely to attend a seminar or read an article on developing your clinical reasoning skills.
7. **Fair-Mindedness** One of your coworkers wants to change the medication administration schedule on your unit. She says it will be better for the patients, but you think it might be because it is a better fit for her coffee-break schedule. If you have an intellectual sense of justice, you will be sure that your thinking is not biased by something that you just want for yourself, as seems to be happening with your coworker. You should examine your own motives as well as those of others when you are making decisions.

So what does all this mean to you as a nursing student? The term metacognition means to "think about thinking." It is important for you to try to develop the attitudes of a critical thinker and to learn to think clearly and critically about your patient care. To do that, you need to constantly reflect on how you are thinking. Are you practicing intellectual humility? Are you trying to be courageous and empathetic? These attitudes create an excellent base on which to build nursing knowledge and develop further thinking skills.

Critical Thinking Skills -Problem Solving

Problem solving is another way to think about clinical reasoning. Nurses solve problems every day. However, a problem can be handled in a way that may or may not help the patient. For instance, consider Mr. Frank, who is in pain and asks for pain medication. You check the medication record and find that his analgesic is not due for another 40 minutes. You can choose to manage this problem in several ways.

A standard problem-solving method: (1) gather data, (2) identify the problem, (3) decide what outcome is desirable, (4) plan what to do, (5) implement the interventions in your plan, and (6) evaluate the plan of care.

A few questions follow that you can ask yourself as you continue to develop your thinking skills. These are not in any order, nor would they all be asked for in a given situation. They are just some ideas to get you started.

1. Have I thought this through?
2. What information do I need?
3. How do I know?
4. Is someone influencing my thinking in ways I am not aware of?
5. What conclusions can I draw from the information I have?
6. Am I basing this decision on assumptions that may or may not be true?
7. Am I thinking creatively about this, or am I in a rut?
8. What do I need to watch for in order to prevent complications?
9. Is there an expert I can consult who can help me think this through?
10. Is there any supporting research or evidence that this is true?
11. Am I too stressed or tired to think carefully about this right now?

Six Components of Caring

When a family member is being treated, families often do not remember the medications and the machines as much as they remember the caring spirit of the nurses. Nursing is a caring discipline with a foundation of nursing science guided by the *application of moral and ethical principles of care and responsibility*. Caring, which is directly derived from the ethical principle of beneficence (a kind deed: an act which benefits someone else), is the core of nursing and constitutes the essence of nursing regardless of the level at which nursing is practiced and conceptualized. Caring represents the unique aspect of nursing and is reflected in conscience, confidence, compassion, commitment, competence, and comportment. Without these components, nursing is a scientific and technical skill-based body of knowledge. Adding the components of caring to this body of knowledge enables nursing to be identified as a holistic profession. Without caring the nurse will not see the psychological and spiritual sufferings of the patient. The definition of each component of caring is outlined here:

1. **Conscience** is possessing a moral sense of what is right and wrong. The nurse's conscience guides the nurse's practice and serves as a strong deterrent to providing minimal or inappropriate care. Conscience is not easily displayed, but every action is led by the conscience. The conscience helps nurses decide right from wrong and guides the care nurses give to patients.
2. **Confidence** is defined as having a full belief in the trustworthiness or reliability of a person. Confidence in oneself is the belief in your own knowledge and skills and the ability to use them when necessary. Confidence in a fellow nurse means that you are totally secure in the accuracy and efficiency of your colleague. Being confident in both yourself and your colleagues minimizes conflict and provides an optimal working environment that ultimately benefits the patient.
3. **Compassion** is having a sympathetic feeling for another with an aspiration to help that individual. This is not just a feeling one possesses; it is accompanied by an action to do good. Effective holistic nursing requires a feeling of compassion for people who are sick and injured.
4. **Commitment** means being obligated to see something through to completion. Nurses must value their profession and be committed to delivering the highest level of nursing care. Professional commitment is manifested in different ways. To achieve positive outcomes, nurses must be committed to their patients as well as their institution. The institution also has a duty to be supportive of its nurses, to assist them in increasing their knowledge and skills, and to provide current monitoring equipment that promotes a safe patient care environment.
5. **Competence** refers to being capable and qualified to perform a job. Caring as it relates to nursing is not simply a matter of good intentions or warm regard; there also must be a foundation of knowledge. The nurse has a responsibility to the patient to be knowledgeable about the disease process and about the skills necessary to ensure safe patient care.
6. **Comportment** means that one is aware of one's conduct and behavior around others. Professional comportment is an essential aspect of nursing because it is representative of the level of professionalism being exhibited. Additionally, it instills confidence in the patient and provides an atmosphere that alleviates anxiety. Nurses must conduct themselves professionally with their patients as well as their fellow health care workers. Being respectful of each other is germane to creating a positive work environment that promotes team building.

3.2 Standards of Nursing Practice

Nurses are accountable to the public for their practice. Standards of nursing practice are authoritative statements by which the nursing profession describes the common level of performance or care by which the quality of practice can be determined, and responsibilities for which its practitioners are accountable. There are two parts to the standards of practice: standards of care and standards of professional performance.

The standards of care are guidelines for nursing practice and are general to any setting or specialty, and follow the nursing process with the broad categories *of assessment, diagnosis, outcomes identification, planning, implementation, and evaluation.* Standards of professional performance address the professional nursing role with regard to education, ethics, research, collegiality, and resource utilization. Standards of practice and performance focus on the nurse as the provider of patient care. They are process oriented and relate to what is expected of the provider.

3.3 Types of nursing care delivery models.

a. Primary nursing.

(1) An RN is responsible for assigned patients throughout their hospitalization, 7 days a week, 24 hours a day (primary nurse).

(2) The primary nurse does not deliver all care personally, but is responsible for ensuring that comprehensive and individualized care is delivered.

(3) Primary nursing requires more registered nurses; however, it might not be more costly because it improves collaboration, avoids delays and supports comprehensive care.

(4) Communication is lateral; the primary nurse communicates directly with the nurses on the other shifts who are assigned to care for the patient.

(5) Variations of primary nursing.

Total patient-care: One nurse is responsible for the total care administered to a patient, but the nurse changes from shift to shift.

Modular nursing: Nurses are assigned to patients within a small segment of a nursing unit to ensure that patients receive care from the same personnel on a regular basis.

b. Team nursing.

(1) An RN team leader is responsible for a group of patients' plans of care and nursing care delivered and makes assignments based on the abilities of each team member, such as RNs, LPNs, and unlicensed nursing personnel.

(2) Team members work together and share the work to be accomplished for a group of patients.

(3) The team leader is responsible for coordinating the team, planning care, and collaborating with professionals in other disciplines and often does not provide direct patient care.
(4) Although the focus is on patient assignments rather than tasks, tasks are assigned within the team.
(5) Communication occurs in a matrix (i.e., between the team leader and members and among team members).

c. Functional nursing.

(1) Functional nursing is a task-oriented approach whereby tasks are assigned based on a person's educational preparation.
(2) It is based on clearly defined job descriptions, policies, and procedures.
(3) The focus is efficiency and productivity, but can lead to fragmentation of care and failure to meet the emotional needs of patients.
(4) Communication occurs in a hierarchy from the head nurse to subordinates.

d. Case management (total care) model.

(1) An RN is responsible for planning, implementing, and evaluating care for a specific patient.
(2) The case manager is responsible for patient care across the continuum of practice settings to promote continuity of care and limit fragmentation and redundancy of care.
(3) This model commonly relies on critical pathways to ensure appropriate delivery of care and facilitate evaluation of the achievement of expected outcomes

3.4 Health and Wellness Promotion Concept

The concept of health and wellness promotion has come to the fore front of healthcare issues. The focus has shifted from disease treatment to a holistic approach of disease prevention and promotion of wellness. People are more aware than ever before how the relationship between healthy lifestyles and habits impacts disease prevention. For example, most individuals regularly monitor their cholesterol and triglycerides and understand that lifestyle changes are necessary when the levels become elevated. Regular exercise programs and a well-balanced healthy diet have become a way of life for many individuals.

Health–Illness Continuum

The term health–illness continuum describes the continually shifting levels of health experienced by each person. One end of the continuum represents high-level health. The other end represents poor health and impending death. We all move about the continuum throughout our lives. A focus on prevention and providing services from birth to death under one integrated system is being used by many health care systems. Hospital consolidations led to health care systems that can cover large geographic areas. Hospitals provide the integrated care delivery network for the system.

Fundamental Concepts

Each body system performs specific functions to sustain optimal life for an organism. Compensatory mechanisms for adjusting internal conditions promote the steady state of the organism, ensure its survival, and restore balance in the body. Pathophysiologic processes result when cellular injury occurs at such a rapid rate that the body's compensatory mechanisms cannot make the adaptive changes necessary to remain healthy. Physiologic mechanisms must be understood in the context of the body as a whole. Each person has both an internal and external environment, between which information and matter are continuously exchanged. Within the internal environment, each organ, tissue, and cell is also a system or subsystem of the whole, each with its own internal and external environment, each exchanging information and matter. The goal of the interaction of the body's subsystems is to produce a dynamic balance or steady state (even in the presence of change) so that all subsystems are in harmony with each other. Four concepts—constancy, homeostasis, stress, and adaptation—are key to the understanding of steady state.

Constancy and Homeostasis

Claude Bernard, a 19th-century French physiologist, first developed the biologic principle that for life there must be a constancy or "fixity of the internal milieu" despite changes in the external environment. The internal milieu is the fluid that bathed the cells, and the constancy the balanced internal state maintained by physiologic and biochemical processes. His principle implies a static process.

Bernard's principle of "constancy" underpins the concept of homeostasis, which refers to a steady state within the body. When a change or stress occurs that causes a body function to deviate from its stable range, processes are initiated to restore and maintain dynamic balance. An example of this restorative effort is the development of rapid breathing (hyperpnea) after intense exercise in an attempt to compensate for an oxygen deficit and excess lactic acid accumulated in the muscle tissue. When these adjustment processes or compensatory mechanisms are not adequate, steady state is threatened, function becomes disordered, and dysfunctional responses occur. For example, in heart failure, the body reacts by retaining sodium and water and increasing venous pressure, which worsens the condition. Dysfunctional responses can lead to disease (an abnormal variation in the structure or function of any part of the body), which is a threat to steady state.

3.5 Communication

Communication is a dynamic, purposeful, reciprocal process of sending and/or receiving a message. The need to communicate is universal because it is the way people convey and fulfill needs.

A Concepts about Communication

1. All verbal and nonverbal communication transmits meaning.

2. Communication is a learned process
3. Communication can occur within the self (intrapersonal); between two people (interpersonal); or when sending a message to or communicating within a group, such as with public speaking, small self-help and social groups, and group therapy.
4. Recurring ideas and thoughts (themes) communicated during an interaction provide insight to a patient's feelings.
5. A trusting relationship is basic to effective communication.
6. A patient's degree of expression (emotional affect) reflects the patient's mood.
7. Humor is highly subjective; it can mean different things to different people
8. Patients have a potential for growth as a result of verbal and nonverbal communication.
9. Previous patterns of communication can become inadequate when one is ill or under stress.
10. Communication is confidential information and should be shared only with health team members.

B Elements of Communication

1. Sender(encoder/source): Person who conveys a message.
2. Message: Information communicated; includes language, words, voice intonation, and gestures.
3. Channel (mode): Vehicle used to convey a message; includes written, oral, and touch.
4. Receiver(decoder): Person who acquires a message.
5. Feedback(response): Response from the receiver to the sender.

C Factors Affecting the Communication Process

1. Attitudes, values, beliefs, and experiences.
2. Culture, education, and language.
3. Developmental level.
    a. The very young are concrete thinkers and have little or no experience.
    b. Adults are more abstract thinkers.
    c. Older adults may have vision and hearing loss that interferes with communication
4. Gender.
    a. Males and females generally communicate differently from an early age.
    b. Females seek intimacy and validation and reduce differences; boys use language to negotiate status and establish independence.
    c. Differences are changing as gender roles become less distinct.
5. Authority one ascribes to a role (e.g., some see nurses as authority figures, whereas others see nurses as servants).
6. Ineffective perception or selective inattention: May distort a message.

D Barriers to Communication

1. Unwillingness to listen to another point of view.
2. Physical factors, such as an uncomfortable environment (e.g., too hot or too cold), excessive noise, or distractions.
3. Adaptation to disease, such as impaired ability to communicate through speech, writing, or signs because of brain dysfunction (e.g., receptive or expressive aphasia); impaired ability to say words (dysarthria); impaired cognition (e.g., dementia or delirium); oral problems; fatigue; and pain.
4. Treatment related factors, such as laryngectomy, or artificial airways, such as tracheostomy or endotracheal tube.
5. Psychological factors, such as lack of privacy, anxiety, and fear.

E Phases of the Communication Process

1. **Preinteraction phase.**
   a. This phase occurs before meeting the patient.
   b. The nurse gathers information about the patient.
2. **Orientation phase.**
   a. Initially, the nurse is in the stranger role.
   b. The nurse meets a patient and begins to establish a relationship of rapport and trust.
   c. Introductions and initial exchange of information occurs.
   d. The purpose of the visit is explained, roles are clarified, and an agreement or contract about the relationship may be formulated.
   e. The termination phase is initiated in this phase.
3. **Working phase**.
   a. Most communication occurs during this phase.
   b. This phase is the active part of the relationship.
   c. The nurse and patient work together to address patient needs, feelings are shared, caring is demonstrated, and mutual respect is maintained.
   d. The nurse may function as caregiver, counselor, teacher, resource person, and so on.
   e. The nurse motivates a patient by identifying progress and supporting movement toward independence.
   f. Anxiety may increase during this phase as the patient may need to learn new adaptive behaviors. g. Preparation for the termination phase continues.
4. **Termination phase.**
   a. Actual termination occurs at the conclusion of a relationship.
   b. Termination occurs at discharge, at the end of a shift, or when the goals of the relationship are achieved.
   c. Goals and objectives are summarized, adaptive behavior is reinforced, and additional resources available are arranged for the patient.

d. Some patients become emotional during this phase because they feel angry, rejected, or fearful of leaving a safe environment; the nurse needs to address these feelings.

F. Modes of Communication

1. **Verbal communication:** Uses spoken or written words to communicate a message.
   a. Characteristics.
      I. Clarity: Simple words and sentence structure are better understood.
      II. Intonation: Reflects feeling behind words; loud or soft volume, cadence, and pitch can impart a message, such as anger, excitement, sarcasm, and fear.
      III. Pacing: Speed, rhythm, and patterns of delivery can convey anxiety, indifference, and attention; pace must be fast enough to maintain interest, but slow enough for receiver to decode the message.
      IV. Relevance: Message needs to be conveyed when the receiver is ready and able to receive the message; information has to be important to the patient.

   b. Nursing care.
      I. Build a therapeutic relationship.
         - Place oneself in the patient's place mentally and emotionally (empathy).
         - Acknowledge the patient's individuality; be flexible when meeting needs.
         - Address the patient by name; avoid using terms of endearment, such as "grandma" and "honey."
         - Respect values and beliefs.
         - Provide privacy.
         - Maintain credibility and genuineness; be truthful, respond to needs promptly, and follow through on promises.
      II. Let the patient take the lead in the communication process
      III. Use simple words and sentence structures; keep messages brief.
      IV. Ensure intonation and pace of words convey professional confidence, respect, interest, and acceptance of the patient.
      V. Ensure that message is relevant and a priority for the patient.
      VI. Use humor carefully; although it may lighten the mood, it can be misunderstood and offend a patient.
      VII. Validate congruence between verbal messages and nonverbal behavior.

2. **Nonverbal communication**: Message that is sent and received without use of spoken or written words; involves use of body language; may be more accurate than verbal communication because it is less consciously controlled
   a. Characteristics.

I. **Facial expression:** Can convey meaning or mask emotions; some expressions are universal, such as a smile (happiness) or a frown (displeasure); can be subtle, such as raising the eyebrows.
II. **Gestures:** Emphasize spoken word; some have same meaning regardless of culture, such as waving indicates hello or goodbye; different gestures may have similar meanings, such as shaking a fist versus cold, stillness when angry; shaking the head "yes" may indicate the message has been received even though message is not understood.
III. **Eye contact:** indicates interest and attention, whereas downcast eyes may indicate low self-esteem, powerlessness, and sadness; however, in some cultures, downcast eyes show respect
IV. **Posture and gait**: Erect posture, head held up with a rapid gait indicates well-being and confidence; slumped, slow, shuffling gait with head held low indicates illness, depression, or impaired self-esteem; crossing legs and arms indicates a defensive posture.
V. **Touch:** Generally conveys caring, concern, encouragement; some patients do not like to be touched, and touching is unacceptable in some cultures (e.g., only relatives can touch an orthodox Jewish man).
VI. **Territoriality and space**: People have a physical zone around the body that is culturally and individually defined.

Commonalities of Nursing Care

1. Reduce noise and minimize distractions.

2. Stand in front of the patient while making eye contact.

3. Be alert to nonverbal cues and behavior.

4. Explain everything that is going to be done and the reasons why using simple words and sentence structures.

5. Give the patient adequate time to formulate a message and respond to a message.

6. Seek feedback to ensure that the message is received as intended.

7. Repeat a message using different words if the message was not understood.

How to handle Patients Who Are Angry

1. Assess for the cause of anger because all behavior has meaning.

2. Assess for verbal and nonverbal signs of escalating aggression, such as a loud voice, clenched fist and jaw, narrowed eyes, and physical agitation.

3. Model acceptable behaviors, such as keeping a calm voice with a normal volume, tone, and pace.

4. Validate the patient's feelings.

5. Avoid touching the patient because it may be perceived as a threat

6. Do not turn your back to an angry patient or avert your eyes away from the patient; position yourself between the patient and the door.

How to handle Patients Who Have Aphasia

1. Assess the patient's ability to communicate through speech, writing, or alternate means of communication, such as gestures, a picture board, and computer programs.

2. Promote communication when the patient has an inability to formulate and/or send a message (expressive aphasia).

a. Use questions that require a one-word answer or a short response.
b. Give the patient ample time to formulate a message; do not complete sentences for the patient.
c. Use alternate means of communication, such as picture cards, blinking the eyes once for yes and twice for no, a computer, a puff activated communication device, or a voice synthesizer

3.Promote communication when the patient has an inability to understand communicated information (receptive aphasia).

a. Use simple words and sentences; vary words when repeating a message.
b. Augment verbal messages with gestures and facial expressions.
c. Augment verbal communication with picture cards or objects, such as holding up a cup of water to encourage fluid intake.

How to handle Patients Who Are Confused

1. Use short sentences and convey concrete ideas.

2. Speak slowly.

3. Use questions that require a one-word answer or a short response.

4. Break down instructions into simple steps.

5. Augment verbal communication with picture cards or objects, such as holding up a comb to indicate the need for hair care.

How to handle Patients Who Are Hearing Impaired

1. Ensure that the patient is wearing a hearing aid, if available; ensure that a hearing aid is functioning, is inserted properly, and is cleaned and stored with a label.

2. Stand on the patient's side with more acute hearing; speak at a normal pace using a low tone because high-pitched sounds are harder to hear; use a slightly louder volume, but do not yell.

3. Face the patient, enunciate words (without exaggeration), and to facilitate lip reading avoid chewing gum or holding a hand in front of the mouth when speaking.

4. Use gestures and facial expression to augment verbal communicate.

5. Determine whether the patient knows sign language, and seek the assistance of sign-language specialists if applicable.

6. Provide writing materials to support communication if the patient is able to write and is literate.

4.0 Tutor-Marked Assignment

1. As a medical and surgical nurse, how would you handle an angry patient?

2. Enumerate the 6 Components of care

Answer

1. Review the section above for management of an angry patient.

2. Components of care are: conscience, confidence, compassion, commitment, competence, and comportment.

5.0 References/ Further Reading

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Section 2: Tools used in the assessment of medical Surgical Cases

CONTENT

1.0 Introduction

For appropriate diagnosis of patients' medical and surgical conditions, some assessment tools are used. The importance of assessment and the different assessment tools will be discussed briefly.

2.0 Learning Objectives

After reading this section, the student should be able to

- Give the reasons for assessment of medical and surgical conditions
- Name to common tools for assessing medical and surgical cases
- Role of nurses during the assessment.

3.0 Main content

3.1 Reasons for Assessment of medical and surgical conditions

The information gathered from an assessment when the patient is first admitted to hospital or first visits an outpatient clinic needs to be recorded. It provides the evidence to support clinical decisions and a rationale for the individualized patient care plan. Ongoing or continuous patient assessment when monitoring to evaluate changes in a patient's condition in changing circumstances also needs to be recorded, and nursing actions documented.

Assessment is the first step in determining the condition of the patient's health and their immediate and long-term needs. The nursing assessment of patients on admission to hospital or on attendance at clinics is key to clinical decision-making and to planning patient care that takes account of the

individual patients' needs and circumstances. Nurses have responsibility for carrying out the initial and ongoing patient assessments, for initiating interventions that take patients' needs into consideration and for evaluating the effectiveness of these interventions.

The nursing assessment is one component within a larger, multidisciplinary team assessment during which the patient is assessed by different healthcare professionals as part of the care pathway and patient referral process. A multifactorial assessment of the older person for falls, for example, can involve the nurse, doctor, physiotherapist, occupational therapist, optician and other healthcare professionals working in specialist areas of practice such as cardiac assessment. As a member of the multidisciplinary team, the nurse often plays a key role in coordinating the patient assessment and ensuring that appropriate referrals are made and followed up. The purpose of assessment is to achieve the following:

1. **Obtain baseline data and track changes**. On admission to hospital or on a first visit to the clinic, it is important to carry out a comprehensive assessment of the patient to establish a set of baseline data against which subsequent assessments can be compared and any changes indicating a deterioration or improvement in the patient's condition tracked.
2. **Early recognition of the critically ill or deteriorating patient.** Identifying patients who are 'at risk' is key to initiating a rapid response from the medical emergency or rapid response team. '**Track and Trigger'** incorporate objective physiological and subjective criteria that can be used to support the nurse's decision about when to call the medical team for help and avert more serious patient emergency. If a Track and Trigger system has not been set up in the hospital, a nurse who is concerned about a patient should take urgent action and notify the medical team.
3. **Risk assessment.** Assessment is the first step in preventing complications, the aim being to identify patients who are 'at risk' of developing complications associated with their healthcare problem, hospitalization and reduced mobility. Key areas for risk assessment include pressure ulcers, infection, falls and constipation. Local hospital policy may include risk assessment tools as part of the admission procedure, for example the Braden, Waterlow and Norton scores to identify patients at risk of pressure ulcers and to activate an action plan and interventions to prevent pressure ulcers developing.
4. **Screening for health problems.** Nursing assessment provides an ideal opportunity for health promotion and for screening patients for risk factors associated with obesity, cancer, cardiovascular disease, diabetes mellitus and other major health problems. It also provides the opportunity to screen for specific problems such as emotional distress or organisms important in infection control (e.g. methicillin-resistant Staphylococcus aureus [MRSA] and vancomycin-resistant Enterococcus [VRE]).
5. **Identify actual and potential problems and prioritize care**. The patient's current problems (actual problems) and problems that could develop in the future (potential problems) need to be identified so that the care plan can be tailored to individual patient

needs. Importantly, once the range of patient problems has been identified, care can be prioritized so that major problems are dealt with first.

6. **Care planning, tailored to individual patient needs.** The purpose of assessment is not only to determine and document the patient's current condition, but also to provide evidence for the planning and provision of nursing care. Although standardized care plans are available in some units or hospitals, the nursing actions that are required to meet a patient's needs and problems should be tailored to take account of individual patient needs.
7. **Discharge planning.** Patient assessment also includes the early identification of patients' needs for forward planning and organizing the supports and community services necessary to facilitate a timely discharge from hospital. Recent trends indicate that patients' stay in hospital is shortening, the use of day surgery is increasing, and policies on early discharge and discharge planning are setting the standards for healthcare practice. Although the reasons for a delay in discharging the patient home from hospital are multifactorial, patient assessment that includes information about the patient's home and social circumstances, family and community supports will help prevent problems arising from a poor knowledge of a patient's home situation or the support available, and will avert delays related to non-medical reasons.

3.2 Assessment frameworks

An important principle underpinning the nursing approach to patient assessment is that it is systematic, comprehensive and person-centred. Many of the assessment frameworks used in clinical practice are linked to nursing theories such as the activities of living or the self-care deficit theory of nursing, or to other theory including Maslow's hierarchy of needs. Nursing models and theories serve as a guide for clinical practice and provide for a structured approach insofar as they map out what areas to include in a patient assessment. The number of new or modified assessment frameworks for nursing practice is ever increasing, but a common feature across different nursing assessments is the inclusion of the core aspects of physical, psychosocial and spiritual assessment within the context of family, community and environment. The decision of which assessment framework to use is made by healthcare organizations and nursing management, who then oversee its implementation in their admission procedures and nursing documentation. This is important because it provides a way of assuring a standardized approach to nursing assessment and quality patient care.

In terms of how this translates into practice and what information is gathered during the nursing assessment, the broad areas to consider include biographical and health data, a systematic review of patient systems and functions, and a social assessment:

Biographical and health data. Obtaining information about the patient's health history is vital for putting the current problem or illness into context.

Physical assessment. This involves a 'head-to-toe' systematic review of the patient. A review of systems and functions enables the nurse to elicit information about problems and provide vital clues to support a clinical diagnosis or uncover a problem of which the patient is unaware. The depth of the patient assessment will depend on the patient's condition and the urgency of the clinical situation.

Social assessment. Taking a social history enables an early identification of patients' needs and problems that might delay discharge from hospital. Social history-taking is always considered a priority in acute healthcare services, but it helps nurses to identify the patient's needs so that appropriate referrals can be made to the health and social services and service delivery is coordinate.

3.3 Methods of assessment

The methods of assessment that are used to gather the information for clinical decision-making include interviewing the patient and obtaining a health history, carrying out a physical examination, making clinical observations and using risk assessment tools.

1 Interviewing and obtaining a health history

Taking a patient history is an essential part of assessment as an accurate history can provide over 80% of the information required for diagnosis. Obtaining an accurate history is not just about asking a list of questions, but also requires establishing an effective patient–nurse relationship in which the patient feels that the nurse is interested in understanding their healthcare problems. This involves putting patients at their ease, providing as much privacy as possible, ensuring the nurse is familiar with any information already gathered, being sensitive to cultural differences and inviting patients to tell their story.

Once the introductions have been completed, obtaining a health history begins with inviting the patient to tell their story and using an open question such as, 'Can you tell me what has brought you here today?' After an explanation has been given, the nurse moves to asking key and targeted questions to build up a comprehensive picture of the patient's problem: 'How has it affected you? Have you noticed what makes it worse or what helps? Have you noticed any changes in . . . ? How does this compare with previous times you have had this problem?' More targeted questions are used to focus on eliciting whether there are any associated symptoms so the nurse needs to be familiar with the patterns associated with specific health problems. Investing in the end of the interview and considering the closing questions is vital to ensuring ongoing continuity in the patient–nurse relationship in future consultations. Ending the interview involves summarizing, framing information using the patient's perspective and providing opportunity for the patient to add further information. A closing question such as 'Is there anything else we haven't covered that you would like to discuss?' enables patients to provide additional information. During the first

nurse–patient encounter, some patients may find it difficult to disclose problems and may be unwilling to do so until they know and have established a trusting relationship with the nurse. One helpful way in which the nurse can let the patient know there will be further opportunities to discuss issues is by saying, for example, 'If you think of anything else later on, let me know and we can have a chat then.'

2 Physical examination

Physical examination provides objective data and is used to corroborate evidence gathered from the patient interview and clinical observation. Examination involves measurement of the 'vital signs', including temperature, heart rate, respiratory rate and blood pressure. The patient's weight is recorded and, if indicated, the patient's body mass index may also be calculated to determine whether the patient has a normal weight or is under- or overweight. Urinalysis using a dipstick reagent strip and a clean sample of fresh urine from the patient is used to screen for abnormal substances such as glucose or protein. Any abnormalities detected in the urinalysis should be followed up by more specific laboratory tests to investigate the cause and perhaps detect a previously undiagnosed condition such as diabetes mellitus. The patient's skin condition is examined; in addition to carrying out a pressure ulcer risk assessment, any abnormalities such as the presence of bruises, rashes and peripheral edema are noted.

3 Clinical observation

Observation is an integral part of patient assessment as it provides an additional layer of information gathered during the patient–nurse interaction, physical examination and routine ward-based tests. Observation provides a means of gathering vital indicators about the patient's condition and well-being, and this information contributes to the overall evidence supporting clinical decision-making.

During the interaction with the patient, the nurse takes note of non-verbal cues. Indicators of patient anxiety or distress can prompt the nurse to investigate further using gentle questioning or to return for a follow-up visit if the patient is unwilling or not ready to discuss their problems at that time. Observing patients as they walk around the ward, move from chair to bed, get dressed and close buttons or zips can provide important information about their mobility, balance and dexterity. Observing the patient's general appearance includes noting the color of the face and body and any abnormal signs such as nasal flaring, which can indicate respiratory distress. Abnormal smells or odors such as the odor of ketones on the patient's breath may indicate fasting or diabetic ketoacidosis. Observing the patient's behavior noting inappropriate responses and actions can indicate neurological, metabolic, endocrine or mental health problems.

Information gathered from observing the patient is used along with that assimilated from the patient interview and physical examination to make sense of the patient's health problem and to support clinical decision-making.

Focus of assessment

The traditional steps to proper assessment are focused on four aspects. These are: inspection, palpation, auscultation and percussion.

1. **Inspection** is the first technique that includes the physical assessment and observation of each relevant body system in a more detailed way. It is inclusive of health history and general body observation for skin color, presence and size of lesions, edema, erythema, symmetery and pulsations. Specific body movements are noted for spasticity, muscle spasms, and abnormal gait.
2. **Palpation** is vital during the physical examination. Structures of the body that are not visible are assessed through this method. The technique used might be light or deep palpation. For example the superficial blood vessels, lymph nodes, thyroid gland, organs of the abdomen and pelvis and rectum.
3. **Auscultation** is the skill used to listen to sounds in the body cavity. Example is breath sound, bowel sound, heart sound, and cardiac murmur. Physiological sound may be expected (normal heart sound, usually first and second heart sounds) or pathological sounds (especially heart murmur during diastole and crackles in the lungs). The sound produced by the body are characterized by their intensity, frequency and quality. The intensity or loudness which are associated with physiologic sound is low. Hence, the need for a stethoscope. The frequency or pitch in normal physiological condition is noisy but quite low. The quality of sound relates to overtones that allow one to distinguish among various sounds. Sound quality enables the examiner to distinguish between the musical quality of high-pitchec wheezing and the low-pitched rumbling of a diastolic murmur.
4. **Percussion** is the application of physical force into sound. It is needed to give more detailed information about disease process in the chest and abdomen. The principle behind the forced sound is to set the chest wall or abdominal wall into vibration by striking it with a firm object. Then, the sound produced reflects the density of the underlying structure. Percussion allows the examiner to assess structures such as the livers, and movement of diaphragm during inspiration. It can also be used to determine the level of a plural effusion and c]location of consolidated area caused by pneumonia or atelctasis.

Noted: when the abdomen is examined, auscultation is performed before palpation and percussion to avoid altering sounds.

3.4 Assessment tools

Nurses can make use of a range of assessment tools and rating scales as part of their assessment of the patient. These provide a standardized approach to assessing specific aspects of the patient's condition that can otherwise be difficult to measure. These tools include.

1. Using the **Glasgow Coma Scale,** the patient is assessed on three specific items **of (1) best eye-opening, (2) best verbal response, and (3) best motor response.** The patient's response on each of these items is converted into a numerical score, with the total score used to determine the level of consciousness. The Early Warning Score is an example of another type of tool that not only measures the patient's status, but also identifies an action plan for the healthcare professional to follow. In the EWS, the physiological parameters are set and used to initiate further interventions. For example, if a patient's temperature exceeds a predetermined level, blood cultures will be taken.
2. Other assessment tools are used to identify patients at risk, for example, of developing pressure ulcers. These predictive tools help nurses to **identify at-risk patients so that interventions can** be put in place to prevent pressure ulcers occurring. Pressure ulcer risk assessment tools are, however, only one component of risk assessment. Research found that tools such as the **Braden, Waterlow and Norton** scales are not always accurate as they can either over- or under predict risk. Therefore, pressure ulcer risk assessment tools serve as guides, and the nurse's own clinical judgment should also be taken into consideration.
3. Patient self-assessment tools are also available whereby patients use a visual analogue scale or brief questionnaire to assess themselves. The pain thermometer is one example – on this, the patient scores how severe the pain is by using a rating scale of 1–10 where 1 is no pain and 10 is the worst pain imaginable. Another example of such a tool is the patient distress self-assessment tool developed by the National Comprehensive Cancer Network in America. This uses a distress 'thermometer' along with a tick box checklist of practical, family, emotional and physical problems and spiritual or religious concerns encountered with cancer patients.
4. **Body Mass Index for** nutritional assessment. It is the ratio based on body weight and height. The values taken are noted and compared over time. People who have a BMI lower than 24 are at risk of health problems related to poor nutritional status

Documenting patient assessment and record-keeping

After assessing the patient, it is important that nurses record their findings and so provide documentary evidence about the patient's condition. This written information is vital for providing baseline data and ensuring continuity of patient care. It provides information that other nurses and healthcare professionals can refer to when planning and coordinating patient care. Although patient assessment forms and nursing documentation are set by local hospital policy and procedures, the national professional guidelines for recording nursing practice and patient assessment advise the following:

1. An accurate assessment of the person's physical, psychological and social well-being, and, whenever necessary, the views and observations of family members in relation to that assessment' should be included in a patient record.
2. Evidence in relation to the planning and provision of nursing care should be included as part of a patient record.
3. Record details of any assessment and reviews undertaken, and provide clear evidence of the arrangements made for future and ongoing care. This should also include details of information given about care and treatment.

4.0 Tutor-Marked Assignment

1. Assessment is the …… step in determining the condition of the patient's health needs.

2. Physical assessment involves a ……systematic review of the patient.

3. during clinical assessment, ……. relationship is very important

4. ……. tool is used to determine patients' nutritional status

5. ……is a skill used to listen to bowel sound, heart sound, and cardiac murmur and other cavity in the body.

Answers

1. First

2. Head-to-toe

3. Nurse-patient

4. Body Mass index

5. Auscultation

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Section 3: Patients Preparation for Diagnostic Measure in Medical and Surgical Conditions

CONTENT

1.0 Introduction:

This section will highlight some basic diagnostic measure used for medical and surgical conditions and the responsibilities of nurses towards the procedures.

2.0 learning outcomes

At the end of reading this section, the student should be able to

- Identify some basic diagnostic measures used in the assessment of the health problems for medical and surgical conditions
- The student should be able to know the indications for the diagnostic procedures
- The student nurse should be able to know their responsibilities expected for the procedures.

3.0 Main content

3.1 Computer tomography scan (CT scanning)

Computer tomography scan (CT scanning) combines radiology and computer analysis of tissue density (determined by the contrast dye absorption) to study structures. Although CT doesn't show blood vessels as well as does an angiogram, it carries less risk of complications and cause less trauma than angiography.

Indication for scan

1. A CT scan of the spine helps to assess spinal disorders such as
    - A herniated disk
    - Spinal cord tumors
    - Spinal stenosis
2. A CT scan of the brain can help detect
    - Brain contusion
    - Brian calcifications
    - Cerebral atrophy
    - Hydrocephalus
    - Inflammation
    - Space-occupying lesions (tumors, hematomas, abscesses)
    - Vascular anomalies (arteriovenous malformation, infarctions, blood clots, hemorrhage)

Role of Nurses for CT Scan

a) Explain procedure to the patient
b) Reassure the patient
c) Confirm that the patient is not allergic to iodine or shellfish. (A patient with these allergies may have an adverse reaction to the contrast medium and requires premedication with corticosteroids).
d) If the test calls for a contrast medium, explain that an I.V. catheter will be inserted for injection of the contrast medium
e) Explain to the patient that the contrast medium may cause a flushed feeling or a metallic taste in the mouth when it is injected (if used).
f) Tell the paitent that the CT scanner will circle the patient for 10-30 minutes (depending on the procedure and type of equipment) and that it is important to lie still during the test.
g) Encourage the patient to resume normal activities and a regular diet after the test
h) Explain that the contrast medium may discolour the urine for 24 hours and encourage patient to drink more fluids to help flush this medium out of the system.

3.2 Skull and spinal X-rays

Typically, the skull X-ray is taken from two angles: anteroposterior (AP) and lateral. The practitioner may also order other angles, including **Waters' view** to examine the frontal and maxillary sinuses, facial bones, and eye orbits and **Towne's view to** examine the occipital bone.

Indications

Skull X-rays help detect:

- fractures
- bony tumors or unusual calcifications
- Pineal displacement (indicates a space-occupying lesion)
- Skull or sella turcica erosion (indicates a space-occupying lesion)
- Vascular abnormalities.

Spinal X-rays help detect:

- Spinal fracture
- Displacement and subluxation (partial dislocation)
- Destructive lesions (such as primary and metastatic bone tumors)
- Arthritic changes or spondylolisthesis
- Structural abnormalities (such as kyphosis, scoliosis, and lordosis)
- Congenital abnormalities.

Role of Nurses for X-ray

- Reassure the patient that X-rays are painless.
- Assist the patient to wear appropriate clothing for the procedure
- Assist to assume the proper position for the procedure
- Administer an analgesic before the procedure, as ordered, if the patient has existing pain so it can be done more comfortably.
- Remove a cervical collar if cervical X-rays reveal that no fracture is present and the practitioner orders it.
- Encourage thepatient to resume normal activities, as ordered.

3.3 Angiographic studies

Angiographic studies include cerebral angiography and digital subtraction angiography (DSA).

Cerebral angiography

For cerebral angiography, the radiologist injects a radiopaque contrast medium, usually into the brachial artery (through retrograde brachial injection) or the femoral artery (through catheterization). This procedure highlights cerebral vessels, making it easier to:

- Detect stenosis or occlusion associated with thrombi or spasms
- identify aneurysms and arteriovenous malformations (AVMs)
- Locate vessel displacement associated with tumors, abscesses, cerebral edema, hematoma, or herniation
- Assess collateral circulation.

Role of Nurses for Cerebral Angiography

- Explain the procedure to the patient and answer any questions.
- Confirm that the patient isn't allergic to iodine or shellfish. (A patient with these allergies may have an adverse reaction to the contrast medium and require premedication with corticosteroids.)
- The patient will need to be taught to lie still during the procedure
- Explain to the patient it is not uncommon to feel flushed sensation in the face as the dye is injected.
- Maintain bed rest, as ordered, and monitor vital signs
- Monitor the catheter injection site for signs of bleeding.
- Monitor vital signs frequently for signs of internal bleeding.
- As ordered, maintain pressure over the injection site.
- Monitor the patient's peripheral pulse in the arm or leg used for catheter insertion (mark the site).
- Unless contraindicated, encourage the patient to drink more fluids to help flush remaining dye from the system.
- Monitor the patient for neurologic changes and such complications as hemiparesis, hemiplegia, aphasia,
- Monitor for an adverse reaction to the contrast medium, which may include restlessness, tachypnea and respiratory distress, tachycardia, facial flushing, urticaria, and nausea and vomiting.
- After consulting with physician, determine the amount of time needed to stop the medication prior to testing and establish how and when the patient should resume the medications as well as any follow-up testing to determine therapeutic levels.
- Inform the patient that he/she may not have anything to eat and/or drink at least 4 hours prior to the test.
- Explain that the test requires insertion of an I.V catheter and that it will be removed at the completion of the test, if done on an outpatient basis.
- The patient must remain still during the test.

- Explain that there will probably be a feeling of flushing or possibly a metallic taste in the mouth as the contrast medium is injected.
- Tell the patient to alert the doctor immediately if any feeling of discomfort or shortness of breath.
- After the catheter is removed, encourage the patient to resume normal activities.
- Encourage the patient to drink more fluids for the rest of the day to help flush the contrast medium from the system.

3.4 Electrophysiologic studies

Electrophysiologic studies are commonly performed and include EEG and electromyography.

Electroencephalography (EEG)

Indications for EEG

By recording the brain's continuous electrical activity, EEG can help

- identify seizure disorders,
- head injuries, intracranial lesions (such as abscesses and tumors),
- TIAs,
- stroke,
- brain death.

In EEG, electrodes attached to standard areas of the patient's scalp record a portion of the brain's activity. These electrical impulses are transmitted to an electroencephalogram, which magnifies them 1 million times and records them as brain waves on moving strips of paper.

Role of Nurses for EEG

- During an EEG, the patient is positioned comfortably in a reclining chair or on a bed.
- Explain that a technician will apply paste and attach electrodes to areas of skin on the patient's head and neck after these areas have been lightly abraded to ensure good contact.
- Explain that the patient must remain still throughout the test.
- Discuss any specific activity that the patient will be asked to perform, such as hyperventilating for 3 minutes or sleeping, depending on the purpose of the EEG.
- Use acetone to remove any remaining paste from the patient's skin.
- Encourage the patient to resume normal activities, as ordered

Electromyography (EMG)

Electromyography records a muscle's electrical impulses to help distinguish lower motor neuron disorders from muscle disorders—for example, amyotrophic lateral sclerosis (ALS) from muscular dystrophy. It also helps evaluate neuromuscular disorders such as myasthenia gravis. In this test, a needle electrode is inserted percutaneously into a muscle. The muscle's electrical discharge is then displayed and measured on an oscilloscope screen.

Role of Nurses for EMG

- Tell the patient that the test may take 1 hour to complete and that the test is done with the patient either sitting or laying down during the procedure.
- Warn the patient about a possible feeling of discomfort when the doctor inserts a needle attached to an electrode into the muscle andwhen a mild electrical charge is delivered to the muscle.
- Explain that the patient must remain still during the test except when asked to contract or relax a muscle.
- Explain that an amplifier may emit crackling noises whenever a muscle moves.
- Encourage thepatient to resume normal activities, as ordered.
- Explain the importance of not taking any stimulants, depressants, or sedatives for 24 hours before the test.

3.5 Magnetic resonance imaging (MRI)

MRI generates detailed pictures of body structures. The test involves the use of a contrast medium such as gadolinium. Compared with conventional X-rays and CT scans, MRI provides superior contrast of soft tissues, sharply differentiating healthy, benign, and cancerous tissue and clearly revealing blood vessels. In addition, MRI permits imaging in multiple planes, including sagittal and coronal views in regions where bones normally hamper visualization. MRI is especially useful for studying the CNS because it can detect the structural and biochemical abnormalities associated with such conditions as transient ischemic attacks (TIAs), tumors, multiple sclerosis (MS), cerebral edema, and hydrocephalus.

Role of Nurses for MRI

- Explain to the patient that the procedure can take up to 1½ hours and that it will be important to remain still for intervals of 5 to 20 minutes.
- Have the patient remove all metallic items, such as hair clips, bobby pins, jewelry (including body piercing jewelry), watches, eyeglasses, hearing aids, or dentures.
- Ask the patient about feeling claustrophobic in confined spaces.
- Obtain an order for an anti-anxiety medication as needed.

- Explain that the test is painless, but the machinery may seem loud and frightening and the tunnel confining.
- Tell the patient that the technician will provide earplugs for the noise, but there is also constant communication with the technician.
- Provide sedation, as ordered, to promote relaxation during the test.
- Encourage the patient to resume normal activities, as ordered.

3.6 Electrocardiography

This common noninvasive diagnostic test records the electrical activity of the heart and is useful for detecting cardiac dysrhythmias, location and extent of MI, and cardiac hypertrophy, and for evaluation of the effectiveness of cardiac medications.

Nursing Interventions

a. Determine the patient's ability to lie still; advise the patient to lie still, breathe normally, and refrain from talking during the test.
b. Reassure the patient that an electrical shock will not occur.
c. Document any cardiac medications the patient is taking

3.7 Echocardiography.

This noninvasive procedure is based on the principles of ultrasound and evaluates structural and functional changes in the heart. It is used to detect valvular abnormalities, congenital heart defects, wall motion, ejection fraction, and cardiac function. Transesophageal echocardiography may be performed, in which the echocardiogram is done through the esophagus to view the posterior structures of the heart; this is an invasive exam and requires preparation and care similar to endoscopy procedures.

Nursing Interventions: Advise the patient to lie still, breathe normally, and refrain from talking during the test.

3.8 Exercise electrocardiography testing (stress test)

This noninvasive test studies the heart during activity and detects and evaluates coronary artery disease. Treadmill testing is the most commonly used mode of stress testing. If the patient is unable to tolerate exercise, an intravenous (IV) infusion of dipyridamole or dobutamine hydrochloride is given to dilate the coronary arteries and simulate the effect of exercise; the patient may need to be NPO (nothing by mouth) for 3 to 6 hours preprocedure.

Preprocedure interventions.

- Ensure that an informed consent is obtained if required.
- Encourage adequate rest the night before the procedure.

- Instruct the patient having a noninvasive test to eat a light meal 1 to 2 hours before the procedure.
- Instruct the patient to avoid smoking, alcohol, and caffeine before the procedure
- Instruct the patient to ask the primary health care provider (PHCP) or cardiologist about taking prescribed medication on the day of the procedure; theophylline products are usually withheld 12 hours before the test, and calcium channel blockers and beta blockers are usually withheld on the day of the test to allow the heart rate to increase during the stress portion of the test.
- Instruct the patient to wear nonconstrictive, comfortable clothing and supportive rubber-soled shoes for the exercise stress test.
- Instruct the patient to notify the PHCP if any chest pain, dizziness, or shortness of breath occurs during the procedure.

Postprocedure interventions: Instruct the patient to avoid taking a hot bath or shower for at least 1 to 2 hours

3.9 Cardiac catheterization

An invasive test involving insertion of a catheter into the heart and surrounding vessels. Obtains information about the structure and performance of the heart chambers and valves and the coronary circulation

Preprocedure interventions

a. Ensure that informed consent has been obtained.
b. Assess for allergies to seafood, iodine, or radiopaque dyes; if allergic, the patient may be premedicated with antihistamines and corticosteroids to prevent a reaction.
c. Withhold solid food for 6 to 8 hours and liquids for 4 hours as prescribed to prevent vomiting and aspiration during the procedure.
d. Document the patient's height and weight, because these data will be needed to determine the amount of dye to be administered.
e. Document baseline vital signs and note the quality and presence of peripheral pulses for postprocedure comparison.
f. Inform the patient that a local anesthetic will be administered before catheter insertion.
g. Inform the patient that she or he may feel a fluttery feeling as the catheter passes through the heart, a flushed and warm feeling when the dye is injected, a desire to cough, and palpitations caused by heart irritability.
h. The insertion site is prepared by shaving or clipping the hair and cleaning with an antiseptic solution
i. Administer preprocedure medications such as sedatives if prescribed. j. Insert an IV line if prescribed.

Postprocedure interventions

a. Monitor vital signs and cardiac rhythm for dysrhythmias at least every 30 minutes for 2 hours initially.
b. Assess for chest pain and, if dysrhythmias or chest pain occurs, notify the PHCP
c. Monitor peripheral pulses and the color, warmth, and sensation of the extremity distal to the insertion site at least every 30 minutes for 2 hours initially.
d. Notify the PHCP if the patient reports numbness and tingling; if the extremity becomes cool, pale, or cyanotic; or if loss of the peripheral pulses occurs. This could indicate clot formation and is an emergency.
e. Apply a sandbag or compression device (if prescribed) to the insertion site to provide additional pressure if required.
f. Monitor for bleeding; if bleeding occurs, apply manual pressure immediately and notify the PHCP.
g. Monitor for hematoma; if a hematoma develops, notify the PHCP.
h. Keep the extremity extended for 4 to 6 hours, as prescribed, keeping the leg straight to prevent arterial occlusion.
i. Maintain strict bed rest for 6 to 12 hours, as prescribed; however, the patient may turn from side to side. Do not elevate the head of the bed more than 15 degrees.
j. If the antecubital vessel was used, immobilize the arm with an armboard.
k. If the PHCP uses a vascular closure device to seal the arterial puncture site, there is no need for prolonged compression or bed rest, and patients may be out of bed in 1 to 2 hours.
l. Encourage fluid intake, if not contraindicated, to promote renal excretion of the dye and to replace fluid loss caused by the osmotic diuretic effect of the dye.
m. Monitor for nausea, vomiting, rash, or other signs of hypersensitivity to the dye.

4.0 Tutor-Marked Assignment

Describe the following investigation and highlights the required nurses roles for them.

1. Magnetic Resonance Imaging

2. Chest X-ray

3. Computed Tomography Scan

4. Echocardiography

Answer

Review the nursing responsibilities in the various investigations above.

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Self Assessment Questions

1. Discuss the concept of Care in medical and Surgical nursing

2. A patient has just been admitted from the outpatient clinic for further investigation to confirm diagnosis. Explain the modalities in physical assessment of a patient.

3. Identify five (5) commonly used diagnostic test used in medical and surgical conditions and state the nursing responsibilities for them.

MODULE 2

FUNDAMENTALS OF MEDICAL SURGICAL NURSING

Section 1: Nutrition and Temperature Control

Section 2: Fluid and Electrolyte Balance

Section 3: Stress and Shock

Section 4: Pain and Sleep

Section 5: Skin Care and Wound management

Section 1: Nutrition and Temperature Control

CONTENT

1.0 INTRODUCTION

Nutrition plays a crucial role in both the prevention and treatment of disease. Inadequate nutrition can compromise the body's support system. Likewise, temperature control is a mechanism by which the human body maintains temperature with tightly controlled self-regulated independence of external temperature. This section will explain in detail nutrition assessment, nutritional therapy and temperature control.

2.0 Learning Outcomes

At the end of reading this section, the student should be able to

1. Explain components of a comprehensive nutrition assessment as part of the nursing care process.
2. Apply the nutritional component of national standards for disease prevention and treatment.
3. Discuss the metabolic effects of physiological stress and the potential impact on nutrition status.

4. Outline the nutrition therapy guidelines for patients with physiological stress
5. Differentiate among the principles of medical nutrition therapy in treating general medical conditions.
6. Explain the indications and nursing interventions associated with enteral and parenteral nutrition support.
7. Defend the important role of nursing care in successful medical nutrition therapy.

8. Explain temperature control and its mechanism.

3.0 MAIN CONTENT

3.1 NUTRITION

Nutrition plays a crucial role in both the prevention and treatment of disease. Both overnutrition and undernutrition can lead to negative health outcomes. For example, **overnutrition** from excess intake of calories and fat can result in weight gain, elevated blood lipids, and risk of hypertension, diabetes, and some cancers. **Undernutrition,** in which dietary intake is less than the body's requirement, can result in impaired wound healing, poor response to medical treatment, and loss of functional capacity.

Medical nutrition therapy is an integral part of the health care process. Proper nutrition, whether accomplished through a therapeutic diet, nutrition support, or general healthy eating, is associated with positive outcomes. The nurse is uniquely positioned to take an active role in the nutrition care process of medical and surgical patients. The nutrition care process involves assessment, evaluation, and setting of patient goals and objectives in a fashion that can be easily dovetailed into the nursing care process. The registered dietitian is the health care professional with the primary responsibility for overseeing medical nutrition therapy in most settings. However, the nurse's active position on the front line of patient care presents an important opportunity for improving nutritional care with efficient screening and assessment of nutrition status, appropriate and timely referrals, reinforcement of patient education, and close monitoring of nutrition intervention.

Nutrition Assessment

The cornerstone of all nutritional care is based on the foundation of a well-done nutrition assessment. Objective and subjective data gathered as part of the nursing assessment can be evaluated to determine a patient's existing or potential risk for undernutrition or overnutrition. Appropriate nursing diagnoses and interventions can then be developed based on findings from the nutrition assessment.

No one parameter or single piece of data should be used as an indicator of nutrition status. Data gathered during the physical exam and laboratory assays together with subjective data from the focused interview provide a comprehensive set of information on which to base a nutritional assessment. A nutrition assessment based on limited data has limited clinical value since many

parameters used in a nutrition assessment can be influenced by non-nutritional factors. When compiling a nutrition assessment, the nurse should use as many sources of data as are available along with sharp clinical judgment.

Physical Assessment

The physical assessment portion of a nutrition assessment includes the clinical exam along with anthropometric measurements. Pertinent data from the medical history and treatment plan should be considered for any influence on nutrition status because of alterations in physical health. The presence of pain, gastrointestinal symptoms, medication side effects, and impaired cognition or mobility are examples of physical factors that can have negative effects on nutrition status. Observations from the clinical examination can be incorporated into the nutrition assessment. Nutritional deficiencies can have few, if any, clinical symptoms until nutrient status is compromised for a length of time. The nurse should not dismiss suspicion of poor nutrition health simply because no physical findings are apparent.

Anthropometric measurements are an important component of the assessment and include any scientific measurement of the body. Measured current weight and height should be obtained during an initial assessment. Weight should be measured at regular intervals thereafter. Self-reported height and weight

are not considered accurate and are subject to over-reporting and underreporting bias by adults of all ages

A weight history should also be obtained and confirmed by checking medical records. An unplanned weight loss of >5% in 1 month or >10% in 6 months is clinically significant and warrants attention. Patients who cannot stand to be measured or weighed can be measured using alternative methods. Chair and bed scales can be used to obtain current weight while arm span, knee height, or recumbent measures will provide estimates of height. Recumbent height will yield an overestimation of height by approximately 4 cm (1.5 in.) from changes in spinal compression when standing.

Body mass index (BMI) is used to calculate appropriate weight for height using the formula weight (kg)/height2 (m).Morbidity and mortality statistics have been employed to determine cutoff points to define overweight, obesity, underweight, and healthy weight. Because BMI calculations use simple height and weight measurements, its use does not take into account body composition. Individuals with large bone structure or ample muscle mass can be categorized erroneously as overweight using this single assessment tool. The nurse should discover this discrepancy when conducting a physical exam. Waist circumference can be used in a nutrition assessment, especially when cardiovascular disease risk is suspected or known. Deposition of excess abdominal fat is considered to be an independent risk factor for heart disease in adults.

A waist circumference of >102 cm (40 in.) in men or >88 cm (35 in.) in women is associated with risk. Measurement should be made following proper technique with use of bony landmarks. Simply measuring waist circumference just below the umbilicus is not accurate in the obese patient in whom the position of the umbilicus has changed with weight gain. Waist circumference measurements are not of nutritional value in patients who are pregnant or have ascites or other fat free mass increases in abdominal girth because of disease.

Biochemical Assessment

Biochemical assessment reflects both the tissue level of a given nutrient and any abnormality of metabolism in the utilization of nutrients. These determinations are made from studies of serum (albumin, transferrin, retinolbinding protein, electrolytes, hemoglobin, vitamin A, carotene, vitamin C, and total lymphocyte count) and studies of urine (creatinine, thiamine, riboflavin, niacin, and iodine). Some of these tests, while reflecting recent intake of the elements detected, can also identify below-normal levels when there are no clinical symptoms of deficiency. Low serum albumin and prealbumin levels are most often used as measures of protein deficit in adults. Albumin synthesis depends on normal liver function and an adequate supply of amino acids. Because the body stores a large amount of albumin, the serum albumin level may not decrease until malnutrition is severe; therefore, its usefulness in detecting recent protein depletion is limited. Decreased albumin levels may be caused by overhydration, liver or renal disease, or excessive protein loss due to burns, major surgery, infection, or cancer. Serial measurements of prealbumin.

Dietary Data Commonly used methods of determining individual eating patterns include the food record, the 24-hour food recall, and a dietary interview. Each of these methods helps estimate whether food intake is adequate and appropriate. If these methods are used to obtain the dietary history, instructions must be given to the patient about measuring and recording food intake.

Methods of Collecting Data

- **Food Record**.

The food record is used most often in nutritional status studies. A person is instructed to keep a record of food actually consumed over a period of time, varying from 3 to 7 days, and to accurately estimate and describe the specific foods consumed. Food records are fairly accurate if the person is willing to provide factual information and is able to estimate food quantities.

- **24-Hour Recall.**

As the name implies, the 24-hour recall method is a recall of food intake over a 24-hour period. A person is asked to recall all foods eaten during the previous day and to estimate the quantities of each food consumed.

Because information does not always represent usual intake, at the end of the interview the patient is asked whether the previous day's food intake was typical. To obtain supplementary information about the typical diet, it is also necessary to ask how frequently the person eats foods from the major food groups.

- **Dietary Interview.**

The success of the interviewer in obtaining information for dietary assessment depends on effective communication, which requires that good rapport be established to promote respect and trust. The interviewer explains the purpose of the interview. The interview is conducted in a nondirective and exploratory way, allowing the respondent to express feelings and thoughts while encouraging him or her to answer specific questions. The manner in which questions are asked influences the respondent's cooperation. The interviewer must be nonjudgmental and avoid expressing disapproval, either by verbal comments or by facial expression.

RISK FACTORS for Poor Nutrition Health

- **Chronic disease, acute illness and injury**. Disease symptoms (including pain) or treatment can reduce appetite, reduce intake, cause malabsorption, or change nutritional requirements
- **Multiple medications:** Gastrointestinal side effects, altered taste, decreased saliva, nutrient interactions
- **Restrictive eating** Chronic dieting, disordered eating, food beliefs, or faddism can lead to poor intake
- **Poor oral health** Loose, missing teeth, ill-fitting dentures, gum disease, and mouth sores can reduce intake
- **Alcohol abuse** Poor dietary intake and nutrient absorption
- **Psychosocial issues** Depression, bereavement, social isolation can lead to reduce intake. Lack of finances or access to adequate food impairs intake. Lack of nutrition knowledge or food preparation skills can yield poor-quality intake
- **Altered functional status** Immobility, altered cognition can reduce intake
- **Sensory changes** Vision, hearing, taste alterations alter ability to prepare or enjoy food or dining.

Analysis of Nutritional Status

Physical measurements (BMI, waist circumference) and biochemical, clinical, and dietary data are used in combination to determine a patient's nutritional status. Often, these data provide more information about the patient's nutritional status than the clinical examination, which may not

detect subclinical deficiencies unless they become so advanced that overt signs develop. A low intake of nutrients over a long period may lead to low biochemical levels and, without nutritional intervention, may result in characteristic and observable signs and symptoms. A plan of action for nutritional intervention is based on the results of the dietary assessment and the patient's clinical profile. To be effective, the plan must meet the patient's need for a healthy diet, maintain (or control) weight, and compensate for increased nutritional needs.

Special Considerations Affecting Nutrition Care

Both malnutrition and physiological stress place additional nutritional requirements on the medical-surgical patient. Existing malnutrition can compromise medical treatment and contribute to adverse medical and surgical outcomes. The presence of physiological stress increases nutritional requirements in the patient who may already be at nutritional risk because of a medical condition or disease.

Malnutrition

Malnutrition can be defined as a deficiency of one or more nutrients. The terms *undernutrition* and *malnutrition* are used interchangeably. A deficiency of macronutrients (carbohydrate, protein, and fat) can result in weight loss from insufficient energy and muscle wasting. Often the general term *malnutrition* is synonymous with the specific term **protein-calorie malnutrition.** Deficiency of any micronutrient may initially be less physically evident than with macronutrient deficiency because a lack of vitamins and minerals can take many weeks or months to manifest clinical symptoms.

Malnutrition occurs because of decreased intake, increased losses, or unmet increased needs for energy or any nutrient. Patients have decreased intake for a number of medical and psychosocial reasons. Nutrient losses can occur from malabsorptive disease or drug interactions. Hypermetabolism during physiological stress, or increased energy needs because of growth, development, and physical activity can cause increased nutritional needs that must be met or malnutrition will develop.

Malnutrition has adverse consequences such as poor wound healing, risk of decubitus ulcer development, loss of muscle mass (including respiratory and heart) with subsequent loss of strength and functional decline, diminished immune-competence, and altered pharmacokinetics

Successful treatment of malnutrition is contingent on discovery of the underlying etiology. Provision of adequate nutrition in a well-tolerated form is best based on the recommendations of a registered dietitian who is trained to assess the impact of physiological stress, disease, and alterations in metabolism on baseline nutritional requirements across the life span.

RISK FACTORS for Malnutrition

Decreased Intake

• Anorexia

• Gastrointestinal symptoms: nausea, vomiting, diarrhea

• Medication side effects
• Pain
• Dysphagia
• Poor dental health or chewing difficulties
• Sensory changes: loss of vision, taste, neuropathy
• Depression, anxiety, cognitive impairment, or other neuropsychological symptoms
• Socioeconomic issues: lack of finances, food insecurity, social isolation, bereavement, dependency on others for food or feeding
• Alcoholism.

Increased Nutrient Losses

• Malabsorptive disease
• Short bowel syndrome
• Alcoholism
• Drug–nutrient interactions.

Increased Nutrient Requirements

• Fever
• Infection or sepsis
• Wounds
• Fracture
• Hypermetabolic disease
• Increased energy expenditure from increased physical activity.

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Physiological Stress

A hypermetabolic response to injury or disease can have significant nutritional ramifications. Major surgery, thermal injury, sepsis, and trauma are examples of **physiological stress**. Unlike periods of inadequate energy intake that result in weight loss and some muscle wasting, a hypermetabolic response because of physiological stress can lead to rapid protein catabolism even when it seems energy and protein intake are sufficient. The body's response to this metabolic stress leads to a cascade that includes release of catecholamines and cortisol, and a systemic inflammatory response.

The result can be catabolization of skeletal muscle to provide substrate for gluconeogenesis and a degradation of plasma proteins, such as albumin, that are considered acute-phase reactant proteins. Resting energy needs are elevated, which is referred to as **hypermetabolism**. Thus, physiological stress results in hypermetabolism and hypercatabolism. **Hypercatabolism** occurs when catabolism exceeds normal physiological rates. Each of these represents a nutritional challenge that is compounded when present together. The patient who is already malnourished before surgery, injury, or disease will have less available body stores to draw on during ametabolically challenging circumstance. In severe circumstances the rate of protein degradation exceeds the body's ability

to replenish muscle and plasma stores and, thus, physical and biochemical evidence of malnutrition ensues.

The severe muscle wasting seen with physiological stress is referred to as **cachexia.** When cachexia becomes evident, nutritional repletion is difficult because of the confounding chronic systemic inflammatory response. High energy and protein intake alone often does not overcome the effects.

Medical Nutrition Therapy for Medical–Surgical Patients

Medical nutrition therapy (MNT) plays a central role in the care of the medical or surgical patient. MNT includes the use of specific nutrition guidelines, nutrients, or therapeutic diets to treat an illness or medical condition. Therapeutic diets are used in the treatment of many diseases and conditions.

Many patients may not require a therapeutic diet while hospitalized. A house or regular diet is ordered for such patients. Some patients have a temporary or permanent need for atexture-modified or liquid diet while hospitalized. Clear liquid diets can be used postoperatively or as part of preparation for diagnostic testing. A clear liquid diet contains little in the way of adequate nutrition for the patient and should not be used for more than a day or two without consideration given to additional nutrition intervention. Many institutions require daily renewable prescriptions for a clear liquid diet in the hope it fosters regular reevaluation of the need for the diet. A registered dietitian should be consulted when patients remain on a clear liquid diet as the sole form of nutrition for more than a few days.

Weight Management

Care of the patient who is either overweight or underweight requires a central nutrition component. The approach to medical nutrition therapy in the area of weight management is constantly evolving and requires the need to keep a current knowledge base. Both overweight and underweight states can lead to additional health risks in the medical–surgical patient.

Oeverweight and Obesity

A nutrition assessment focusing on parameters to measure weight status is an intuitive step before determining treatment interventions for the overweight patient. Overweight is defined as a BMI of 25 to 29.9. Obesity is defined as a BMI greater than 30. Additional stratification exists to denote different classes of obesity. Other considerations to include in the assessment process are the presence of obesity risk factors, weight and dieting history (including failures and successes), and patient readiness to attempt weight loss.

- The nurse needs to assess the patient’s readiness for weight loss based on the Stages of Change model. This model can be used to assess readiness for any behavior change and categorizes individuals according to where they are on a spectrum of thinking or action

about new behavior using the terms precontemplation, contemplation, action, and maintenance

- Patients not ready or unwilling to attempt weight loss should be encouraged to prevent further weight gain
- The nurse can guide the patient in establishing a reasonable weight loss goal. Generally a goal of 5% to 10% loss of weight is recommended over a 6-month period and is associated with a reduction in health risks associated with obesity.
- Many patients wish to attempt a larger weight loss, but this should be discouraged because weight loss maintenance of larger losses can prove frustrating and difficult and lead to weight regain
- The nurse should encourage the patient to attempt weight loss by stressing the associated health benefits with even modest loss. Less than half of obese patients surveyed reported being advised by a health care provider to lose weight.
- Physical activity and a reduction in sedentary activity should be encouraged. Adults with long-term success at weigh loss report ongoing physical activity as a major contributing factor
- Behavior modification is essential for long-term weight loss maintenance and relapse prevention. Weight loss maintenance is a bigger challenge than the initial weight loss for many patients. A lifestyle approach to weight maintenance and healthy social support and coping mechanisms are important.
- Bariatric surgery is a treatment option for select clinically severe obese patients (BMI 40 or >35 with comorbidities).Gastric reduction surgery, including vertical banded gastroplasty, and gastric bypass surgery, such as the Roux-en-Y procedure, are types of bariatric surgery. Weight loss occurs over many months postoperatively. Bypass procedures produce greater weight loss than simpler gastric reduction surgery

Disordered Eating

Disordered eating consists of behavioral, psychological, and physical symptoms that surround abnormal perceptions regarding food and body weight. Disordered eating patterns occur along a continuum from minor alterations in food-related behaviors to a clinical eating disorder that meets all established diagnostic criteria.

Clinical eating disorders include anorexia nervosa, bulimia nervosa, and eating-disorders-not-otherwise-specified (EDNOS), which includes binge-eating disorder and disordered eating not meeting the strict criteria for anorexia or bulimia.

Populations at Risk for Eating Disorders

- Athletes in sports).
- Fashion models

- People who are obese
- Young people with limited diets because of disease (e.g. diabetes)
- Family history of mood, anxiety disorder, substance abuse
- Family environment of adverse, critical, controlling, or distance parenting; family dieting; comments on physical appearance

Nutrition and Cardiovascular Disease

Nutrition intervention can have a significant impact on risk reduction with cardiovascular disease. Following lifestyle modifications, including nutrition recommendations, can help prevent or manage hypertension and coronary artery disease. Medical nutrition therapy is also indicated in the treatment of heart failure.

Hypertension Lifestyle modifications, including diet, have been shown to have both clinical and public health significance in reduction of blood pressure in people with hypertension and those with high normal blood pressure, or prehypertension.
Lifestyle modifications recommended for prevention and management of high blood pressure include several nutrition centered modifications as well as engaging in regular physical activity The nurse is uniquely positioned to be instrumental in detecting elevated blood pressure and educating patients on prevention and management of hypertension.
Reduction of dietary sodium intake has been reported to lower systolic blood pressure as a single intervention or in conjunction with other lifestyle modifications or pharmacology. Further, a low sodium intake compared with usual sodium intake has been reported to reduce the amount of antihypertensive medication needed in some patients. The primary source of sodium in the diet f most people, especially in the western part of the world is from packaged, processed, and ready-to-eat food prepared outside the home. Discretionary added sodium in the form of table salt used in the home only accounts for 20% to 30% of sodium consumption. The nurse should question the patient about eating patterns and preparation methods during the nutrition portion of a nursing assessment. Specifically asking about frequency of restaurant meals and use of convenience products is important to estimate sodium intake.

Coronary Heart Disease Aggressive management of serum lipids is recommended as a primary strategy in the prevention and treatment of cardiovascular disease. Management of elevated serum low-density lipoprotein (LDL) cholesterol should receive priority attention because of its established association with increased risk of coronary heart disease. Total cholesterol and high-density lipoprotein (HDL) cholesterol levels are also important predictors of cardiac risk. The general population as well as those patients with established coronary heart disease can benefit from dietary approaches aimed at reducing serum lipids, controlling blood pressure, and managing body weight in an effort to reduce cardiac risk. Diet modifications, called therapeutic lifestyle

changes (TLC), are recommended as an initial strategy for treating elevated LDL cholesterol or in conjunction with pharmacologic intervention when indicated. Medical nutrition therapy for hyperlipidemia and coronary heart disease targets reduction of both lipid and nonlipid cardiac risk factors. A fat-controlled diet coupled with weight management and increased physical activity comprises the foundation of the therapeutic lifestyle changes.

Saturated Fats and Cholesterol

Saturated fats exist primarily in fats from animal-based foods such as fatty meats or whole-milk dairy products. Tropical fats are also saturated fats and include palm oil, coconut oil, and cocoa butter. Hydrogenated and trans fats are included in the recommendation to reduce saturated fat intake. These fats originate as unsaturated oils, but become saturated during food processing when the manufacturer removes hydrogen molecules to make a fat that is more solid at room temperature. Examples include fats used in shortening, stick margarine, and many baked goods and snacks. High intake of dietary cholesterol is associated with increased LDL cholesterol. Dietary cholesterol is present only in foods of animal origin. Fatty and organ meats, egg yolks, and shellfish are among the higher sources of dietary cholesterol.

Diabetes Mellitus

Medical nutrition therapy is an essential lifestyle component in the management of diabetes. Nutrition choices and habits following recommended guidelines can improve glycemic control and reduce the risk of diabetic complications such as macrovascular disease in patients with existing disease. Additionally, lifestyle modifications, including diet, have a positive effect on disease reduction in those with impaired glucose tolerance and at risk for type II diabetes.

Medical Nutrition Therapy Goals for Diabetes

Attain and maintain optimal metabolic outcomes including:

- Blood glucose levels in the normal range or close to normal to prevent or reduce risk of complications of diabetes.
- A lipid profile that reduces risk of macrovascular disease.
- Blood pressure levels that reduce the risk of vascular disease.
- Prevent and treat chronic complications of diabetes. Modify nutritional intake and lifestyle as appropriate for prevention and treatment of obesity, dyslipidemia, cardiovascular disease, hypertension, and nephropathy.
- Improve health through healthy food choices and physical activity.
- Address individual nutritional needs taking into consideration personal and cultural preferences and lifestyle.

Disorders of the Gastrointestinal Tract

Disorders of the gastrointestinal (GI) tract can affect overall health by altering digestion or absorption of food and nutrients. Minor GI complaints are commonplace and may have little

impact on nutrition health if short term. Chronic GI conditions or disease can lead to altered intake of food or compromised absorption. Medical nutrition therapy plays a central role in the treatment of most GI diseases

Swallowing Dysfunction

Dysphagia, or difficulty swallowing, can occur for a number of reasons. Dysphagia is associated with head and neck trauma or disease, neuromuscular disease, stroke, and dementia. Sedation and other medication side effects can impact swallowing directly or indirectly because of diminished saliva production. The patient who experiences dysphagia is at risk for "starvation, dehydration and aspiration". Difficulty swallowing can lead to inability to handle oral liquid boluses. Aspiration or loss of fluid volume from drooling or spitting liquids can also lead to dehydration because of diminished intake.

Patients can become fearful of drinking liquids and voluntarily self-restrict fluid. Similarly, chewing and swallowing more solid foods can be risky or difficult, so patients may be unable to safely consume adequate nutrition orally. The nurse should conduct a bedside evaluation to screen for dysphagia. The presence or absence of a gag reflex is not considered an accurate assessment tool.

Warning signs of dysphagia during feeding include

- drooling or food spilling from the mouth;
- pocketing of food in the cheek, under the tongue or palate;
- repeated attempts to swallow a single food bolus;
- complaint of food sticking or heartburn while eating;
- frequent throat clearing or coughing while eating

Nutrition Therapy for Gastro Esophageal Reflux Disease

- **Limit foods that predispose to reduce lower esophageal sphincter pressure:**
  Fat
  Alcohol
  Coffee,
  tea,
  cola
  Chocolate
  Carminatives (mint).
- **Limit foods that irritate esophagus:**
  Citrus
  Tomato
  Spicy.
- **Limit gastric pressure:**
  Avoid tight clothing,belts.

Avoid large meals and excessive carbonated drinks.
Avoid recumbency after meals.
Lose weight if indicated.

Dumping Syndrome

Dumping syndrome is a condition often resulting from full or partial gastric resection or the removal of the pyloric sphincter. Symptoms include abdominal cramping, diarrhea, sweating, and shakiness following a meal because of rapid emptying of gastric contents into the small intestine. Dumping syndrome can also result following bariatric surgery for morbid obesity. The goals of nutrition treatment of dumping syndrome include the prevention of rapid gastric emptying and the reduction of hyperosmolar intestinal contents. Foods high in simple sugars have a concentrated, or hyperosmolar, content that will draw fluid into the gut because of a concentration gradient between plasma and the intestine. This rapid entry of fluid into the gut can contribute to the symptoms of dumping syndrome. Large meals, fluids with meals, and extreme food temperatures (very hot or very cold) can promote more rapid gastric emptying than usual. Eating smaller meals, avoiding liquids at mealtime, and lying down following a meal can be helpful

Nutrition Guidelines for Dumping Syndrome

- Limit consumption of simple sugars and carbonated drinks.
- Avoid extremes of hot or cold foods.
- Eat small meals.
- Save liquid for between meals.
- Lie down if needed after eating

Nursing Interventions in Enteral Nutrition Support

1. Problem Intervention Potential for food borne illness
    - Wash hands before handling formula and equipment.
    - Wipe off top of formula container before opening.
    - Label, cover, and store open formula in refrigerator for not >24 hours.
    - Limit “hang time” to 4 hours if water or other additions made to formula. Otherwise 8- to 12-hour hang time allowed if canned formula w/no additives is being used.
2. Aspiration
    - Check gastric residuals. Hold feeding for large volume (>150 mL but treat individually and according to physician’s order).
    - Elevate head of bed to at least a 30-degree angle.
    - Avoid bolus feedings.
    - Consider smaller bore or longer tube if nasally intubated. Routinely confirm tube placement.

- Consider G-tube or J-tube if long-term feeding is required.

3. Clogged tube
    - Administer feeding with pump versus gravity drip.
    - Administer room temperature feeding. High-temperature storage or heating of formula will cause protein content to coagulate.
    - Follow guidelines for medication administration:
      1. Flush tube with 20 to 30 mL water before, between, and after each single medication. 2. Consult pharmacist regarding suitability of crushing medication with a small amount of water and availability of medication elixirs.
4. Diarrhea
    - Administer feeding at room temperature. Cold feeding increases gut peristalsis.
    - Consider lactose-free formula.
    - Consider formula with fiber.
    - Consider medications with cathartic effect: antibiotics, magnesium, potassium, digoxin, theophylline, acetaminophen elixir, and others.
    - Administer continuous drip versus bolus.
    - Consult registered dietitian regarding temporarily altering formula concentration or rate of delivery.
    - Rule out infection, Clostridium difficile, medical etiology.
5. Constipation
    - Consider formula with added fiber.
    - Monitor hydration; ensure adequate intake.
    - Encourage ambulation as indicated.
    - Assess for contributing medications (e.g., narcotics, some antacids).
    - Consider obstruction or medical causes.
6. Dehydration
    - Monitor hydration: weight, intake and output, physical signs.
    - Ensure adequate free water intake. Need 1 mL water per 1 kcal of intake. Most formulas are 50%–75% free water (formula with >1 kcal/mL or high protein content have less free water).

Parenteral Nutrition

Parenteral nutrition support is indicated in the patient who is unable to tolerate adequate enteral nutrition for more than 1 week. Bowel obstruction, severe intolerance to enteral feeding (such as can occur with short bowel syndrome), and with bone marrow transplant are situations where parenteral nutrition is used. Parenteral formula delivered via a central line is referred to as total parenteral nutrition (TPN).This is indicated in patients requiring support for at least 10 days. Formula delivered via a peripheral vein is called peripheral parenteral nutrition (PPN) and must

be isotonic. PPN is used as short-term nutrition intervention to offset nutritional requirements until transition to alternative enteral nutrition is initiated. TPN is able to meet most patients' complete nutritional requirements. PPN is limited by the volume of fluid that can be tolerated peripherally and the lower concentration of nutrients that is required to maintain an isotonic concentration. Thus, it may not provide complete nutrition for some patients and is only a short-term solution.

Nursing intervention for patient needing Parenteral Support

- Vitamins, minerals, and electrolytes are also administered with the formula admixture and can be customized to meet patient needs.
- The nutrition support team makes recommendations on formula choice after a thorough assessment of the patient's nutritional, metabolic, and medical needs.
- Parenteral support is initiated at a low rate (about 50 mL/hr) and increased gradually to reach recommended volume.
- Maximum rates and volumes for both dextrose and fat administration are individually adjusted to avoid hyperglycemia, poor lipid clearance, and fatty liver.
- Blood glucose and triglyceride levels are monitored to assess tolerance to formula composition of dextrose and lipid loads, respectively.
- The nurse is involved in the close monitoring of parenteral nutrition whether as a member of the nutrition support team or as a staff nurse. Most hospitals or institutions have clinical pathways or protocols that dictate frequency and type of nursing interventions in the care of patients on parenteral support.
- The nurse should become familiar with the specific protocol. Meticulous care of the access site for parenteral nutrition is imperative to avoid local or systemic infection risk because the high dextrose load of the feeding is fuel for bacteria.
- Accurate fluid balance calculations along with daily weights are essential. A short-term weight gain of >1 kg is more likely associated with fluid gain than accumulation of lean or adipose tissue.
- Before parenteral nutrition is discontinued, it should be documented consistently that the patient is able to tolerate a diet or enteral formula and consume two-thirds or more of estimated nutritional needs. Parenteral nutrition may be weaned to allow for appetite stimulation.

3.2 Temperature Control

Temperature regulation is a type of homeostasis and a means of preserving a stable internal temperature in order to survive. Humans have a normal core internal temperature of 37 degrees Celsius measured with a thermometer.

When the body's ability to thermo-regulate becomes disrupted, it can result in overheating (hyperthermia) or being too cold (hypothermia). Either state can have deleterious effects on the

various body systems, most significantly reduced blood flow leading to ischemia and multiple organ failure.

Cellular Level

Viral illness or another infectious disease can cause a person to develop a fever, raising the core temperature above 37 degrees Celsius. Fever is a result of the body releasing pyrogens such as cytokines, prostaglandins and thromboxane. These pyrogens induce cylooxygenase 2 (COX2) to convert arachidonic acid to prostaglandin E2 (PGE2). PGE2 binds to receptors in the hypothanlamus, increasing the thermogenic set point. This elevated temperature set point results in the body working to achieve a higher internal temperature.

Brian Involvement in Temperature Control

The brain, more specifically the hypothalamus, controls thermoregulation. If the hypothalamus senses internal temperatures growing too hot or too cold, it will automatically send signals to the skin, glands, muscles and organs. For example, if the body is generating heat during high-level exercise or if the external ambient temperature is elevated enough to cause a rise in the core temperature, afferent signals to the hypothalamus result in efferent signals to the cells of the skin to produce sweat. Sweating is one mechanism the body can use to cool itself as heat is lost through the process of sweat evaporation. In contrast, when the body experiences a cold environment, a shivering reflex results in skeletal muscles contracting and generating heat; additionally, the arrector pili muscles raise the body hair follicles to trap the heat generated.

Organ Systems involvement

Multiple organs and body systems are affected when thermoregulations is impaired. During a heat-related illness, insufficient thermoregulation can result in multiple organ and system impairments.

- The heart experiences increased work as it increases both heart rate and cardiac output.
- The circulatory system can experience intravascular volume depletion
- The brain can experience ischemia and/ or edema.
- The gastrointestinal tract is vulnerable to hemorrhage and infection as the intestinal mucosa becomes increasingly permeable.
- The lungs become impaired if sustained hyperventilation, hyperpnea, and pulmonary vasodilation lead to acute respiratory distress syndrome (ARDS).
- Acute renal failure is an effect of intravascular volume depletion and impaired circulation.
- Liver cells suffer because of the fever, ischemia and cytokine increase in the intestinal tract.
- Electrolyte abnormalities are likely as well as hypoglycemia, metabolic acidosis and respiratory alkalosis.

When body temperature is severely decreased in hypothermia, the body's system are also adversely affected. The cardiovascular system is susceptible to dysrhthmias such as ventricular fibrillation. The central nervous system (CNS) electrical activity is noticeably diminished. Noncardiogenic pulmonary edema can occur as well as cold dieresis. Also, hypothermia causes preglomerular vasoconstriction which leads to decreased glomerular filtration rate (GFR) and decreased renal blood flow rate.

Temperature Control Function

The core body temperature is tightly controlled in a narrow range although slight changes in core body temperature occur every day, depending upon variables such as circadian rhythm and menses. When a person is unable to regulate his/her body temperature, various pathologies ensue. The body has four different methods for maintaining core temperature

- Vaporization
- Radiation
- Convection
- Conduction.

To keep the body functioning, it must be at its ideal temperature. This requires sufficient intravascular volume and cardiovascular function as the body must be able to transport the rising internal heat to its surface for release. The elderly are at risk for disorders of thermoregulation due to a generally decreased intravascular volume and decreased cardiac function.

4.0 Tutor-Marked Assignment

1. Malnutrition develops when there is deficiency of ……

2. Severe muscle wasting seen with physiological stress is referred……..

3. What could be recommended to reduce saturated fat intake?

4. What part of the brain is responsible for thermoregulation?

Answer

1. Protein and Calorie

2. Cachexia

3. Hydrogenated and trans fats

4. Hypothalamus

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Section 2: Fluid and Electrolyte Balance

CONTENT

1.0 Introduction

The body undergoes continuous dynamic change. The proper amount of fluid is needed to support these changes and to transport building and waste materials. Approximately 60% of a young adult's body weight is water. Elderly people are less than 50% water, and infants are between 70% and 80% water. Women have less body water because they have more fat than men. Fat cells do not contain water. In addition to water, body fluids also contain solid substances that dissolve, called solutes. Some solutes are electrolytes and some are non-electrolytes. Electrolytes are chemicals that can conduct electricity when dissolved in water. Examples of electrolytes are sodium, potassium, calcium, magnesium, acids, and bases; these are discussed later in this section. Non-electrolytes do not conduct electricity; for example, glucose and urea.

2.0 Learning Outcomes

At the end of reading this section, the student should be able to:

1. Explain the purposes of fluids and electrolytes in the body
2. Discuss the signs and symptoms of common fluid imbalances
3. Identify patients are at the highest risk for dehydration and fluid excess
4. What data should you collect in patients with fluid and electrolyte imbalances
5. Explain the common causes, signs and symptoms, and treatments for sodium, potassium, calcium, and magnesium imbalances

3.0 Main Content

3.1 Fluid Balance

Fluids are located both inside the cells (intracellular fluid [ICF]) and outside the cells (extracellular fluid [ECF]). ECF can be further divided into three types: interstitial fluid, intravascular fluid, and transcellular fluid. Interstitial fluid is the water that surrounds the body's cells and includes lymph. Fluids and electrolytes move between the interstitial fluid and the intravascular fluid, which is the plasma of the blood. Transcellular fluids are those in specific compartments of the body, such as cerebrospinal fluid, digestive juices, and synovial fluid in joints.

Control of Fluid Balance

The primary control of water in the body is through pressure sensors in the vascular system, which stimulate or inhibit the release of antidiuretic hormone (ADH) from the pituitary gland. A diuretic is a substance that causes the kidneys to excrete more fluid. ADH works in just the opposite way. ADH causes the kidneys to retain fluid. If fluid pressures within the vascular system decrease, more ADH is released and water is retained. If fluid pressures increase, less ADH is released and the kidneys eliminate more water.

Movement of Fluids and Electrolytes in the Body

Fluids and electrolytes move in the body by active and passive transport systems. Active transport depends on the presence of adequate cellular adenosine triphosphate for energy. The most common examples of active transport are the sodium-potassium pumps. These pumps, located in the cell membranes, cause sodium to move out of the cells and potassium to move into the cells when needed. In passive transport, no energy is expended specifically to move the substances. General body movements aid passive transport. The three passive transport systems are diffusion, filtration, and osmosis.

- Diffusion is a process in which the substance moves from an area of higher concentration to an area of lower concentration. If you pour cream into a cup of coffee, the movement of the molecules causes the cream to eventually be dispersed throughout the beverage. If you stir the coffee, this process occurs at a faster rate. Body movement assists passive transport, like stirring the coffee. It causes the diffusion to occur at a faster rate.
- Filtration is the movement of both water and smaller molecules through a semipermeable membrane. The semipermeable membrane works like a screen that keeps the larger substances on one side and permits only the smaller molecules to filter to the other side of the membrane. Filtration is promoted by hydrostatic pressure differences between areas.
- Hydrostatic pressure is the force that water exerts; sometimes called water pushing pressure. In the body, filtration is important for the movement of water, nutrients, and waste products in the capillaries. The capillaries serve as semipermeable membranes allowing water and smaller substances to move from the vascular system to the interstitial fluid, but larger molecules and red blood cells remain inside the capillary walls.

- Osmosis is the movement of water from an area of lower substance concentration to an area of higher concentration. The substances exert an osmotic pressure sometimes called water pulling pressure. The term osmolarity refers to the concentration of the substances in body fluids. The normal osmolarity of the blood is between 270 and 300 milliosmoles per liter (mOsm/L).

3.2 Fluid Imbalances

Fluid imbalances are common in all clinical settings. Elderly people are at the highest risk for life-threatening complications that can result from either fluid deficit, more commonly called dehydration, or fluid excess. Infants are at risk for fluid deficit because they take in and excrete a large proportion of their total body water each day. Dehydration Although there are several types of dehydration, only the most common type is discussed in this section. Dehydration occurs when there is not enough fluid in the body, especially in the blood (intravascular area).

Pathophysiology

The most common form of dehydration results from loss of fluid from the body, resulting in decreased blood volume. This decrease is referred to as hypovolemia. Hypovolemia occurs when the patient is hemorrhaging or when fluids from other parts of the body are lost. For example, severe vomiting and diarrhea, severely draining wounds, and profuse diaphoresis (sweating) can cause dehydration. Hypovolemia may also occur when fluid from the intravascular space moves into the interstitial fluid space. This process is called third spacing. Examples of conditions in which third spacing is common include burns, liver cirrhosis, and extensive trauma. The body initially attempts to compensate for fluid loss by a number of mechanisms. If the cause of dehydration is not resolved or the patient is not able to replace the fluid, a state of dehydration occurs.

Common Causes of Dehydration

- Long-term nothing by mouth (NPO) status
- Hemorrhage
- Profuse diaphoresis (sweating)
- Diuretic therapy
- Diarrhea
- Vomiting
- Gastrointestinal suction
- Draining fistulas
- Draining abscesses Severely draining wounds Systemic infection Fever Frequent enemas Ileostomy Cecostomy Diabetes insipidus

Signs and Symptoms

Thirst is the initial symptom experienced by otherwise healthy adults in response to hypovolemia. As the percentage of water in the blood goes down, the percentage of other substances goes up, resulting in the thirst response. As the blood volume decreases, the heart pumps the remaining blood faster but not as powerfully, resulting in a rapid, weak pulse and a low blood pressure. The body pulls water into the vascular system from other areas, resulting in decreased tear formation, dry skin, and dry mucous membranes. The individual with dehydration has poor skin turgor. Turgor is poor if the skin is pinched and a small "tent" remains (called tenting). Temperature increases because the body is less able to cool itself through perspiration. Temperature may not appear elevated in an elderly person because an elder's normal body temperature is often lower than a younger person's. Urine output decreases and the urine becomes more concentrated as water is conserved. Dehydration should be considered in any adult with a urine output of less than 30 mL per hour. The urine may appear darker because it is less diluted. The patient becomes constipated as the intestines absorb more water from the feces. A major method of evaluating dehydration is weight loss.

Prevention

- You can help prevent dehydration by identifying patients who have the highest risk for developing this condition. High-risk patients include the elderly, infants, and children.
- Adequate hydration is another important intervention to help prevent dehydration.
- You should encourage patients to drink adequate fluids. Adults need 30 mL/kg /day of fluids.
- If a patient is unable to take enough fluid by mouth, alternate routes may be necessary.
- In a patient with moderate or severe dehydration, IV therapy is used. Isotonic fluids that have the same osmolarity as blood are typically administered.

Fluid Excess

Fluid excess, sometimes called overhydration, is a condition in which a patient has too much fluid in the body. Most of the problems related to fluid excess result from too much fluid in the bloodstream or from dilution of electrolytes and red blood cells.

Pathophysiology

The most common result of fluid excess is hypervolemia in which there is excess fluid in the intravascular space. Healthy adult kidneys can compensate for mild to moderate hypervolemia. The kidneys increase urinary output to rid the body of the extra fluid. The causes of fluid excess are related to excessive intake of fluids or inadequate excretion of fluids. Conditions that can cause excessive fluid intake are poorly controlled IV therapy, excessive irrigation of wounds or body cavities, and excessive ingestion of water. Conditions that can result in inadequate excretion of

fluid include renal failure, heart failure, and the syndrome of inappropriate antidiuretic hormone. These conditions are discussed elsewhere in this book.

Prevention

One of the best ways to prevent fluid excess is to avoid excessive fluid intake. For example, you should monitor the patient receiving IV therapy for signs and symptoms of fluid excess. In at-risk patients, an electronic infusion pump or a quantity-limiting device, such as a burette, should be used to control the rate of infusion. Also monitor the amount of fluid used for irrigations. For example, when a patient's stomach is being irrigated (gastric lavage), be sure an excessive amount of fluid is not absorbed.

Signs and Symptoms

The vital sign changes seen in the patient with fluid excess are the opposite of those found in patients with dehydration. The blood pressure is elevated, pulse is bounding, and respirations are increased and shallow. The neck veins may become distended, and pitting edema in the feet and legs may be present. The skin is pale and cool. The kidneys increase urine output, and the urine appears diluted, almost like water. The patient rapidly gains weight. In severe fluid excess, the patient develops moist crackles in the lungs, dyspnea, and ascites (excess peritoneal fluid).

Diagnostic Evaluation

In the patient experiencing fluid excess, the BUN and hematocrit levels tend to decrease from hemodilution. The plasma content of the blood is proportionately increased when compared with the solid substances. The specific gravity of the urine also diminishes as the urinary output increases.

Management

Once the patient's breathing has been supported, the goal of treatment is to rid the body of excessive fluid and resolve the underlying cause of the excess. Drug therapy and diet therapy are commonly used to decrease fluid retention.

- **Positioning.** To facilitate ease in breathing, the head of the patient's bed should be in semi-Fowler's or high Fowler's position. These positions allow greater lung expansion and thus aid respiratory effort. Once the patient has been properly positioned, oxygen therapy may be necessary.
- **Oxygen Therapy.** Oxygen therapy is typically used to ensure adequate perfusion of major organs and to minimize dyspnea. If the patient has a history of chronic obstructive pulmonary disease, such as emphysema or chronic bronchitis, do not administer more than 2 L per minute of oxygen. At higher oxygen doses, the patient may lose the stimulus to breathe and may suffer respiratory arrest.

- **Drug Therapy.** Diuretics are frequently administered to rapidly rid the body of excess water. A diuretic is a drug that increases elimination by the kidneys. The drug of choice for fluid excess when the patient has adequately functioning kidneys is usually furosemide (Lasix). Furosemide is a loop (high-ceiling) diuretic that causes the kidneys to excrete sodium and water. Sodium (Na) and water tend to move together in the body. Potassium (K), another electrolyte, is also lost, which can lead to a potassium deficit, which is discussed later in this section. Furosemide may be given by the oral, intramuscular, or IV route. The oral route is used most commonly for mild fluid excess. IV furosemide is administered by a registered nurse (RN) or physician for severe excess. The patient should begin diuresis within 30 minutes after receiving IV furosemide. If not, another dose is given. Strict intake and output should be monitored when a patient is receiving IV furosemide.
- **Nutrition**. Mild to moderate fluid restriction may be necessary, as well as a sodium-restricted diet. In collaboration with the dietitian, a physician prescribes the specific restriction necessary, usually a 1- to 2-g Na restriction for severe excess. Different diuretics result in differing electrolyte elimination. Specific diet therapy depends on the medications the patient is receiving and the patient's underlying medical problems

3.3 ELECTROLYTE BALANCE

Natural minerals in food become electrolytes or ions in the body through digestion and metabolism. Electrolytes are usually measured in milliequivalents per liter (mEq/L) or in milligrams per deciliter (mg/dL). Electrolytes are one of two types: cations, which carry a positive electrical charge, and anions, which carry a negative electrical charge. Although there are many electrolytes in the body, this section discusses the most important ones, including sodium (Na), potassium (K), calcium (Ca2), and magnesium (Mg2). These electrolytes are maintained in different concentrations inside the cell and outside the cell because of pumps in the cell wall.

Electrolyte Imbalances

The two types of electrolyte imbalances are deficit and excess. In general, if a patient experiences a deficit of an electrolyte, the electrolyte is replaced either orally or intravenously. If the patient experiences an excess of the electrolyte, treatment focuses on getting rid of the excess, often by the kidneys. The underlying cause of the imbalance must also be treated. The most important aspect of nursing care is preventing and assessing electrolyte imbalances. High-risk patients should be identified and monitored carefully. Serum electrolytes are measured on a regular basis. As a general rule, patients should be checked for electrolyte imbalance when there is a change in their mental state (either increased irritability or decreased responsiveness) or when muscle function changes. Patient education is another important nursing role for patients with electrolyte imbalances.

1. Sodium Imbalances

The normal level of serum sodium is 135 to 145 mEq/L. Because sodium is the major cation in the blood, it helps maintain serum osmolarity. Therefore, sodium imbalances are often associated with fluid imbalances. Sodium is also important for cell function, especially in the central nervous system. The two sodium imbalances are hyponatremia (sodium deficit) and hypernatremia (sodium excess).

Hyponatremia

Hyponatremia occurs when the serum sodium level is less than 135 mEq/L.

Pathophysiology

Many conditions can lead to either an actual or a relative decrease in sodium. In an actual decrease, the patient has inadequate intake of sodium or excessive sodium loss from the body. As the percentage of sodium in the ECF decreases, water is pulled by osmotic pressure into the cells. In a relative decrease, the sodium is not lost from the body but leaves the intravascular space and moves into the interstitial tissues (third spacing). Another cause of a relative decrease occurs when the plasma volume increases (fluid excess), causing a dilutional effect. The percentage of sodium compared with the fluid is diminished.

Prevention Additional sodium is commonly administered to patients at high risk for hyponatremia (usually by the IV route. Individuals who have high fevers or who engage in strenuous exercise or physical labor, especially in the heat, need to replace both sodium and water. Hyponatremia is especially dangerous for the elderly patient.

Manifestation

Unfortunately, the signs and symptoms of hyponatremia are vague and depend somewhat on whether a fluid imbalance accompanies the hyponatremia. The patient with sodium and fluid deficits has signs and symptoms of dehydration (discussed previously). The patient with a sodium deficit and fluid excess has signs and symptoms associated with fluid excess. In addition, the patient experiences mental status changes, including disorientation, confusion, and personality changes caused by cerebral edema (fluid around the brain). Weakness, nausea, vomiting, and diarrhea may also occur.

Conditions that Place Patients at High Risk for Hyponatremia

- Nothing by mouth (NPO)
- Excessive diaphoresis (sweating)
- Diuretics

- Gastrointestinal suction
- Syndrome of inappropriate antidiuretic hormone
- Excessive ingestion of hypotonic fluids
- Freshwater near-drowning
- Decreased aldosterone

Complications.

In severe hyponatremia, respiratory arrest or coma can lead to death. The patient who also has fluid excess may develop pulmonary edema, another life threatening complication.

Diagnostic Tests.

The primary diagnostic test is to obtain the serum sodium level, which is lower than the normal value when hyponatremia is present. The serum osmolarity also decreases in patients with hyponatremia. Other laboratory tests may be affected if the patient experiences an accompanying fluid imbalance. Serum chloride (Cl), an anion, is often depleted when sodium decreases because these two electrolytes commonly combine as NaCl (salt in solution, or saline).

Management

Management is focus on resolving the underlying cause of hyponatremia and replacing the lost sodium. The physician orders IV saline for patients who have hyponatremia without fluid excess. For patients who have a fluid excess, a fluid restriction is often ordered. Diuretics that rid the body of fluid but do not cause sodium loss may also be used. For patients with cerebral edema, steroids may be prescribed to reduce intracranial swelling. I&O are strictly monitored, and the patient is weighed daily.

Hypernatremia

Hypernatremia occurs when the serum sodium level is above 145 mEq/L.

Pathophysiology

Serum sodium increase may be an actual increase or a relative increase. In an actual increase, the patient receives too much sodium or is unable to excrete sodium, as seen in renal failure. In a relative increase, the amount of sodium does not change but the amount of fluid in the intravascular space decreases. The percentage of sodium (solid) is increased in relationship to the amount of plasma (water). In mild hypernatremia, most excitable tissues, such as muscle and neurons of the brain, become more stimulated. The patient becomes irritable and has tremors. In severe cases, these tissues fail to respond.

Prevention

Prevention of hypernatremia is not as simple as prevention of hyponatremia. Most patients have a sodium excess as a result of an acute or chronic illness. Patients with a potential for electrolyte imbalance must always have their IV fluids carefully regulated.

Manifestation

Thirst is usually one of the first symptoms to appear. If you eat salty foods, such as potato chips, the amount of sodium in the body increases and you become thirsty. Other signs and symptoms of hypernatremia are vague and nonspecific until severe excess is present. Like the patient with a sodium deficit, the patient experiencing sodium excess has mental status changes, such as agitation, confusion, and personality changes. Seizures may also occur. At first, muscle twitches and unusual contractions may be present. Later, skeletal muscle weakness occurs that can lead to respiratory failure. If fluid deficit or fluid excess accompanies the hypernatremic state, the patient also has signs and symptoms associated with these imbalances.

Complications

The patient experiencing severe hypernatremia may become comatose or have respiratory arrest as skeletal muscles weaken.

Diagnostic Tests

The most reliable diagnostic test is the serum sodium level, which indicates an increase above the normal level. Serum osmolarity may also increase. If the patient has a fluid imbalance, other laboratory values, such as BUN, hematocrit, and urine specific gravity, are affected (see earlier discussion).

Management

If a fluid imbalance accompanies hypernatremia, it is treated first. For example, fluid replacement without sodium in a patient with dehydration should correct a relative sodium excess. If the kidneys are not excreting adequate amounts of sodium, diuretics may help if the kidneys are functional. If the kidneys are not functioning properly, dialysis may be ordered. I&O and daily weights are strictly monitored. The cause of hypernatremia is also treated in an attempt to prevent further episodes of this imbalance. For some patients, a sodium-restricted diet is prescribed.

2. Potassium Imbalances

Potassium is the most common electrolyte in the ICF compartment. Therefore, only a small amount, 3.5 to 5 mEq/L, is found in the bloodstream. Minimal changes in this laboratory value cause major changes in the body. Potassium is especially important for cardiac muscle, skeletal

muscle, and smooth muscle function. As the serum potassium level falls, the body attempts to compensate by moving potassium from the cells into the bloodstream. The two potassium imbalances are hypokalemia (potassium deficit) and hyperkalemia (potassium excess). Hypokalemia is the most commonly occurring imbalance.

Hypokalemia

Hypokalemia occurs when the serum potassium level falls below 3.5 mEq/L.

Pathophysiology

Most cases of hypokalemia result from inadequate intake of potassium or excessive loss of potassium through the kidneys. Hypokalemia most often occurs as a result of medications. Potassiumlosing diuretics (e.g., furosemide [Lasix]), digitalis preparations (e.g., digoxin [Lanoxin]), and corticosteroids (e.g., prednisone [Deltasone]) are examples of drugs that cause increased excretion of potassium from the body. Potassium may also be lost through the gastrointestinal (GI) tract, which is rich in potassium and other electrolytes. Severe vomiting, diarrhea, and prolonged GI suction cause hypokalemia. Major surgery and hemorrhage can also lead to potassium deficit.

Prevention Most patients having major surgery receive potassium supplements in their IV fluids to prevent hypokalemia. For patients receiving drugs known to cause hypokalemia, foods high in potassium may prevent a deficit. Patients receiving digitalis must be closely monitored because hypokalemia can enhance the action of digitalis and cause digitalis toxicity.

Manifestation Many body systems are affected by a potassium imbalance. Muscle cramping occurs with either a deficit or an excess of potassium. Vital signs change because the respiratory and cardiovascular systems need potassium to function properly. Skeletal muscle activity diminishes, resulting in shallow, ineffective respirations. The pulse is typically weak, irregular, and thready because the heart muscle is depleted of potassium. A major danger is an irregular heartbeat (dysrhythmia), which can lead to a cardiac arrest. Orthostatic (postural) hypotension may also be present. The nervous system is usually affected as well. The patient experiences changes in mental status followed by lethargy. The motility of the GI system is slowed, causing nausea, vomiting, abdominal distention, and constipation. Vomiting may further increase potassium loss.

Complications If not corrected, hypokalemia can result in death from dysrhythmia, respiratory failure and arrest, or coma. The patient must be treated promptly before these complications occur.

Diagnostic Tests

The primary laboratory test is to obtain a serum potassium level. The patient's electrocardiogram (ECG) may show cardiac dysrhythmias associated with potassium deficit. In addition to a decrease

in the serum potassium level, the patient may have an acid-base imbalance known as metabolic alkalosis, which commonly accompanies hypokalemia. In metabolic alkalosis, the serum pH of the blood increases (above 7.45) so that the blood is more alkaline than usual.

Management

The goal of treatment is to replace potassium in the body and resolve the underlying cause of the imbalance. For mild to moderate hypokalemia, oral potassium supplements are given. For severe hypokalemia, IV potassium supplements are given. Because the kidneys eliminate excess potassium, potassium should be added to IV fluids only after the patient has voided. Potassium is a potentially dangerous drug, especially when administered intravenously. In too high a concentration, it causes cardiac arrest. Only IV solutions which are premixed and carefully labeled should be used. Potassium is never given by IV push. The patient's laboratory values must be monitored carefully to prevent giving too much potassium. Administration of IV potassium is done by a registered nurse. Teach the patient about the side effects of oral potassium and precautions associated with potassium administration.

Hyperkalemia

Hyperkalemia is a condition in which the serum potassium level exceeds 5 mEq/L. It is rare in a person with healthy kidneys.

Pathophysiology

Hyperkalemia may result from an actual increase in the amount of total body potassium or from the movement of intracellular potassium into the blood. Overuse of potassium-based salt substitutes or excessive intake of oral or IV potassium supplements can cause hyperkalemia. Use of potassium-sparing diuretics (e.g., spironolactone [Aldactone]) may also contribute to hyperkalemia. Patients with renal failure are at risk for hyperkalemia because the kidneys cannot excrete potassium. Movement of potassium from the cells into the blood and other ECF is common in massive tissue trauma and metabolic acidosis. Metabolic acidosis is an acid-base imbalance commonly seen in patients with uncontrolled diabetes mellitus.

Prevention

For patients receiving potassium supplements, hyperkalemia can be prevented by monitoring serum electrolyte values and the patient's signs and symptoms.

Manifestation

Most cases of hyperkalemia occur in patients who are hospitalized or those undergoing therapeutic interventions for a chronic condition. The classic manifestations are muscle twitches and cramps,

later followed by profound muscular weakness; increased GI motility (diarrhea); slow, irregular heart rate; and decreased blood pressure.

Complications

Cardiac dysrhythmias and respiratory failure can occur in severe hyperkalemia, causing death.

Diagnostic Tests

In addition to an elevated serum potassium level, an irregular ECG is associated with hyperkalemia. If the patient also has metabolic acidosis, the serum pH falls below 7.35.

Management

For mild, chronic hyperkalemia, dietary limitation of potassium-rich foods may be helpful. Potassium supplements are discontinued, and potassium-losing diuretics are given to patients with healthy kidneys. For patients with renal problems, a cation exchange resin, such as sodium polystyrene sulfonate (Kayexalate), is administered either orally or rectally. This drug releases sodium and absorbs potassium for excretion through the feces and out of the body. In cases in which cellular potassium has moved into the bloodstream, administration of glucose and insulin can facilitate the movement of potassium back into the cells. During treatment of moderate to severe hyperkalemia, the patient should be in the hospital on a cardiac monitor.

Guidelines for Patients Receiving Oral Potassium Supplements

- Do not substitute one potassium supplement for another.
- Dilute powders and liquids in juice or other desired liquid to improve taste and to prevent gastrointestinal irritation. Follow manufacturer's recommendations for the amount of fluid to use for dilution, most commonly 4 oz per 20 mEq of potassium.
- Do not drink diluted solutions until mixed thoroughly.
- Do not crush potassium tablets, such as Slow-K or K-tab tablets. Read manufacturer's directions regarding which tablets can be crushed.
- Administer slow-release tablets with 8 oz of water to help them dissolve.
- Do not take potassium supplements if taking potassium-sparing diuretics such as spironolactone or triamterene.
- Do not use salt substitutes containing potassium unless prescribed by the physician.
- Take potassium supplements with meals.
- Report adverse effects, such as nausea, vomiting, diarrhea, and abdominal cramping, to the physician.
- Have frequent laboratory testing for potassium levels as recommended by the physician.

3. Calcium Imbalances

Calcium is a mineral that is primarily stored in bones and teeth. A small amount is found in ECF. The normal value for serum calcium is 9 to 11 mg/dL, or 4.5 to 5.5 mEq/L. Minimal changes in serum calcium levels can have major negative effects in the body. Calcium is needed for the proper function of excitable tissues, especially cardiac muscle. It is also needed for adequate blood clotting. The two calcium imbalances are hypocalcemia and hypercalcemia.

Hypocalcemia

Hypocalcemia occurs when the serum calcium falls below 9 mg/dL, or 4.5 mEq/L.

Pathophysiology

Although calcium deficit can be acute or chronic, most patients develop hypocalcemia slowly as a result of chronic disease or poor intake. The woman who is postmenopausal is most at risk for hypocalcemia. As a woman ages, calcium intake typically declines. The parathyroid glands recognize this decrease and stimulate bone to release some of its stored calcium into the blood for replacement. The result is a condition known as osteoporosis, in which bones become porous and brittle and fracture easily. The woman who I postmenopausal has a decreased level of estrogens, hormones that help prevent bone loss in the younger woman. Immobility or decreased mobility also contributes to bone loss in many patients. The patients at highest risk for osteoporosis are thin, petite, Caucasian women. Hypocalcemia can also result from inadequate absorption of calcium from the intestines, as seen in patients with Crohn's disease, a chronic inflammatory bowel disease. An insufficient intake of vitamin D prevents calcium absorption as well. Conditions that interfere with the production of parathyroid hormone, such as partial or complete surgical removal of the thyroid or parathyroids, can also cause hypocalcemia. Finally, patients with hyperphosphatemia (usually those with renal failure) often experience hypocalcemia. Calcium and phosphate have an inverse relationship. When one of these electrolytes increases, the other tends to decrease and vice versa.

Prevention

The typical daily calcium intake is less than 550 mg. The adequate intake (AI) of calcium for adults ages 19 to 50 is 1000 mg; the AI for adults over age 50 is 1200 mg. Hypocalcemia can be prevented in premenopausal and postmenopausal women by consuming calcium-rich foods and by taking calcium supplements. These supplements can be purchased over-the-counter in any pharmacy or large food store. An inexpensive source of calcium for patients who do not require vitamin D supplementation is calcium carbonate (Tums), which provides 240 mg of elemental calcium in each tablet. Vitamin D supplementation may be required in addition to calcium for homebound or institutionalized patients who have no exposure to the sun. The ultraviolet light causes the skin to manufacture vitamin D.

Manifestation Chronic hypocalcemia is usually not diagnosed until the patient breaks a bone, usually a hip. Acute hypocalcemia, which can occur after surgery or in patients with acute pancreatitis, has several signs and symptoms. These include increased and irregular heart rate, mental status changes, hyperactive deep tendon reflexes, and increased GI motility, including diarrhea and abdominal cramping. Two classic signs that can be used to assess for hypocalcemia are Trousseau's sign and Chvostek's sign. To test for Trousseau's sign, inflate a blood pressure cuff around the patient's upper arm for 1 to 4 minutes. In a patient with hypocalcemia, the hand and fingers become spastic and go into palmar flexion. A positive Chvostek's sign test also indicates calcium deficit. To test for this sign, tap the face just below and in front of the ear. Facial twitching on that side of the face indicates a positive test.

Complications

In severe hypocalcemia, seizures, respiratory failure, or cardiac failure can occur and lead to death if not aggressively treated. The patient may have a sudden laryngospasm that will stop air from entering the patient's lungs.

Diagnostic Tests

The patient with hypocalcemia has a lowered serum calcium and an abnormal ECG. The parathyroid hormone level may be increased because it stimulates bone to release more calcium into the blood.

Management

In addition to treating the cause of hypocalcemia, calcium is replaced. For mild or chronic hypocalcemia, oral calcium supplements with or without vitamin D are given. Calcium supplements should be administered 1 to 2 hours after meals to increase intestinal absorption. For patients with acute or severe hypocalcemia, IV calcium gluconate or calcium chloride is given. When a patient has had thyroid or parathyroid surgery, this medication must be readily available for emergency use. For patients with hyperphosphatemia, usually those with renal failure, aluminum hydroxide is used to bind the excess phosphate for elimination via the GI tract. As the phosphate decreases, the serum calcium begins to increase closer to normal levels. Diet therapy is an important part of treatment. Teach the patient, family, or other caregiver which foods are high in calcium. Many foods today are fortified with calcium. Vitamin D foods are also encouraged, especially milk and other dairy products. For patients experiencing difficulty digesting dairy products and those who choose not to use dairy products, special attention must be paid to including other dietary calcium sources.

Hypercalcemia

Hypercalcemia occurs when the serum calcium is above 11 mg/dL, or 5.5 mEq/L.

Pathophysiology

Chronic hypercalcemia can result from excessive intake of calcium or vitamin D, renal failure, hyperparathyroidism, cancers, and overuse or prolonged use of thiazide diuretics, such as hydrochlorothiazide (HydroDiuril). Acute hypercalcemia can occur as an emergency in patients with invasive or metastatic cancers.

Prevention

Although many causes of increased calcium cannot be prevented, a person receiving calcium supplements should be monitored carefully. Some women believe that if 2 or 3 tablets a day are helpful, consuming twice that much will help even more. The result can be serum calcium excess. Educating the public about the proper amount of calcium needed each day and the danger of too much calcium is very important.

Manifestation

Patients who have mild hypercalcemia or a slowly progressing calcium increase may have no obvious signs and symptoms. However, acute hypercalcemia is associated with increased heart rate and blood pressure, skeletal muscle weakness, and decreased GI motility. The patient also has a decreased blood clotting capability.

Complications

In some cases, the patient may experience renal or urinary calculi (stones) resulting from the build-up of calcium. In more severe cases of acute hypercalcemia, the patient may experience respiratory failure caused by profound muscle weakness or heart failure caused by dysrhythmias.

Management

Patients with severe hypercalcemia should be hospitalized and placed on a cardiac monitor. Unless contraindicated by other conditions, the primary treatment is to give large amounts of fluids andpromote diuresis. Saline infusions are the most useful solutions to promote renal excretion of calcium. The physician also discontinues thiazide diuretics if the patient was receiving them and prescribes diuretics that promote calcium excretion, such as furosemide (Lasix). Other drugs that bind with calcium to lower calcium levels may also be used, such as plicamycin (Mithramycin, Mithracin) and D-penicillamine (Cuprimine). If hypercalcemia is so severe that cardiac problems are present, hemodialysis, peritoneal dialysis, or ultrafiltration may be necessary to cleanse the blood of excess calcium.

4. Magnesium Imbalances

Magnesium and calcium work together for the proper functioning of excitable cells, such as cardiac muscle and nerve cells. Therefore, an imbalance of magnesium is usually accompanied by an imbalance of calcium. The normal value for serum magnesium is 1.5 to 2.5 mEq/L. The magnesium imbalances are called hypomagnesemia and hypermagnesemia.

Hypomagnesemia

Hypomagnesemia occurs when the serum magnesium level falls below 1.5 mEq/L. It results from either a decreased intake or an excessive loss of magnesium. Causes of inadequate intake include malnutrition and starvation diets. Patients with severe diarrhea and Crohn's disease are unable to absorb magnesium in the intestines. One of the major causes of hypomagnesemia is alcoholism, which causes both a decreased intake and an increased renal excretion of magnesium. Certain drugs, such as loop (high-ceiling) and osmotic diuretics, aminoglycosides (e.g., gentamicin), and some anticancer agents (e.g., cisplatin), can increase renal excretion of magnesium. The signs and symptoms of hypomagnesemia are similar to those for hypocalcemia, including positive Trousseau's and Chvostek's signs. The goal of management is to treat the underlying cause and replace magnesium in the body. Magnesium sulfate is administered intravenously. If the serum calcium is also low, calcium replacement is prescribed. The patient is placed on a cardiac monitor because of magnesium's effect on the heart. Life-threatening dysrhythmias can lead to cardiac failure and arrest.

Hypermagnesemia

Hypermagnesemia results when the serum magnesium level increases above 2.5 mEq/L. The most common cause of hypermagnesemia is increased intake coupled with decreased renal excretion caused by renal failure. Signs and symptoms are usually not apparent until the serum level is greater than 4 mEq/L. Then the signs and symptoms include bradycardia and other dysrhythmias, hypotension, lethargy or drowsiness, and skeletal muscle weakness. If not treated, the patient experiences coma, respiratory failure, or cardiac failure. When kidneys are functioning properly, loop diuretics such as furosemide (Lasix) and IV fluids can help increase magnesium excretion. For patients with renal failure, dialysis may be the only option.

4.0 Tutor-Marked Assignment

1. Which of the following is the best resource for the nurse who has a question about implementation of IV therapy at a specific institution?

A. An experienced nurse

B. Institution policy

C. The physician

D. College of Nursing standards

2. A patient requests that an IV not be initiated in his hand. Which site is the next best choice?

A. Forearm

B. Antecubital fossa

C. Upper arm

D. Lower extremity

3. The nurse must initiate an infusion on a 21-year-old man who has a history of drug abuse, a diagnosis of septicemia, and multiple tattoos over his arms. What would be the best approach to be able to visualize and initiate a peripheral IV?

A. Place the arm in a dependent position.

B. Use a blood pressure cuff.

C. Use the multiple tourniquet technique.

D. Have another nurse hold the patient's arm.

4. Which of the following solutions is isotonic?

A. 0.45% NS

B. D5/0.2% NS

C. D5/0.45% NS

D. 0.9% NS

Answer

1. B

2. A

3. C

4. D

5.0 References / Further Reading

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SECTION 3: STRESS AND SHOCK

CONTENT

1.0 Introduction

When the body is threatened or suffers an injury, its response may involve functional and structural changes; these changes may be adaptive (having a positive effect) or maladaptive (having a negative effect). The defense mechanisms that the body uses determine the difference between adaptation and maladaptation—health and disease. This section will discuss stress, adaptation, health problems associated with maladaptation, and ways nurses can intervene to reduce stress and its health-related effects. Shock, types of shock and nursing management of shock will be discussed.

2.0 Learning Outcomes

At the end of reading this section, the student should be able to:

- Discuss stress, and adaptation to the concept of steady state.
- Identify the significance of the body's compensatory mechanisms in promoting adaptation and maintaining the steady state.
- Identify physiologic and psychosocial stressors.
- Describe the general adaptation syndrome as a theory of adaptation to biologic stress.
- Describe the relationship of the process of negative feedback to the maintenance of the steady state
- Define shock and its classification
- Highlight the principles of shock management
- Enumerate the complications of shock

3.0 Main Content

3.1 Stress and Adaptation

Stress is a state produced by a change in the environment that is perceived as challenging, threatening, or damaging to a person's dynamic balance or equilibrium. The person may feel unable to meet the demands of the new situation. The change or stimulus that evokes this state is the stressor. The nature of the stressor is variable; an event or change that is stressful for one person may not be stressful for another, and an event that produces stress at one time and place may not do so at another time and place. A person appraises and copes with changing situations. The desired goal is adaptation or adjustment to the change so that the person is again in equilibrium and has the energy and ability to meet new demands. This is the process of coping with the stress, a compensatory process that has physiologic and psychological components.

Adaptation is a constant, ongoing process that requires a change in structure, function, or behavior so that a person is better suited to the environment; it involves an interaction between the person and the environment. The outcome depends on the degree of "fit" between the skills and capacities of the person, the type of social support available, and the various challenges or stressors encountered. As such, adaptation is an individual process: Each person has varying abilities to cope or respond. As new challenges are met, this ability to cope and adapt can change, thereby providing the person with a wide range of adaptive ability. Adaptation occurs throughout the lifespan as the person encounters many developmental and situational challenges, especially related to health and illness.

The goal of adaptation is optimal wellness. Because both stress and adaptation may exist at different levels of a system, it is possible to study these reactions at the cellular, tissue, and organ levels. Biologists are concerned mainly with subcellular components or with subsystems of the total body. Behavioral scientists, including many nurse researchers, study stress and adaptation in individuals, families, groups, and societies; they focus on how a group's organizational features are modified to meet the requirements of the social and physical environment in which the group exists. In any system, the desired goals of adaptation are survival, growth, and reproduction.

Sources of stressors.

a. From within a person (internal), such as infection and fear.
b. From outside a person (external), such as death of a spouse and relocation.

Types of stressors.

a. **Situational stressors** are unpredictable and may occur anytime in the life span (e.g., divorce, illness, and death of a loved one).

b. **Psychological stressors** arise from events or in response to primary or secondary stressors (e.g., inconsistent care during childhood, violent environment, exposure to physical or emotional abuse, history of separation from parents, rejection by peers, mental illness, problems at work, and impaired family dynamics).
c. **Developmental stressors** are associated with a predictable event that occurs at an expected time in a person's life (e.g., beginning school, puberty, marriage, parenthood, pregnancy, commencement of a career, midlife crisis, family responsibilities, menopause, caring for parents, physical changes of aging, and retirement).
d. **Microbiological stressors** include bacteria, viruses, and fungi. Some infections precipitate psychological stress associated with the stigma of a disease (e.g., sexually transmitted diseases) or isolation (e.g., methicillin resistant Staphylococcus aureus, Clostridium difficile).
e. **Chemical stressors** are toxic substances that can precipitate physiological or psychological changes within an individual (e.g., smoking, drug or alcohol addiction, habitual use of prescribed or over-the-counter drugs).
f. **Physical and physiological stressors** are stimuli that change the structure or function within the body (e.g., pain, obesity, paralysis, loss of vision or hearing, incontinence, impaired function, disease, disfigurement, amputation, physical abuse or neglect, terminal illness) and that may precipitate an emotional response (e.g., impaired body image, feelings of loss).

Duration may also be used to categorize stressors, as in the following:

- An acute, time-limited stressor, such as studying for final examinations
- A stressor sequence—a series of stressful events that result from an initial event such as job loss or divorce
- A chronic intermittent stressor, such as daily hassles
- A chronic enduring stressor that persists over time, such as chronic illness, a disability, or poverty

Personal factors that influence adaptation to stress

a. Perception of the stressor (e.g., the extent to which the person's view of it is realistic or exaggerated).
b. General health (e.g., chronic illness can decrease a person's ability to adapt effectively).
c. Extent of support system (e.g., family, friends, neighbors, and religious groups).
d. Other factors (e.g., age, success of previous coping, and life experience).

Psychological Responses to Stress

After recognizing a stressor, a person consciously or unconsciously reacts to manage the situation. This is termed the mediating process. A theory developed by Lazarus in 1991 emphasizes cognitive appraisal and coping as important mediators of stress. Appraisal and coping are influenced by antecedent variables, including the internal and external resources of the individual person.

1. Appraisal of the Stressful Event

Cognitive appraisal is a process by which an event is evaluated with respect to what is at stake (primary appraisal) and what might and can be done (secondary appraisal). What a person sees as being at stake is influenced by his or her personal goals, commitments, or motivations. Important factors include how important or relevant the event is to the person, whether the event conflicts with what the person wants or desires, and whether the situation threatens the person's own sense of strength and ego identity.

Primary appraisal results in the situation being identified as either nonstressful or stressful. Secondary appraisal is an evaluation of what might and can be done about the situation. Reappraisal, a change of opinion based on new information, may occur. The appraisal process is not necessarily sequential; primary and secondary appraisal and reappraisal may occur simultaneously. The appraisal process contributes to the development of an emotion. Negative emotions such as fear and anger accompany harm/loss appraisals, and positive emotions accompany challenge. In addition to the subjective component or feeling that accompanies a particular emotion, each emotion also includes a tendency to act in a certain way. For example, unprepared students may view an unexpected quiz as threatening. They might feel fear, anger, and resentment and might express these emotions through hostile behavior or comments.

2. Coping With the Stressful Event

Coping consists of the cognitive and behavioral efforts made to manage the specific external or internal demands that tax a person's resources and may be emotion-focused or problem-focused. Coping that is emotion-focused seeks to make the person feel better by lessening the emotional distress. Problem-focused coping aims to make direct changes in the environment so that the situation can be managed more effectively. Both types of coping usually occur in a stressful situation. Even if the situation is viewed as challenging or beneficial, coping efforts may be required to develop and sustain the challenge—that is, to maintain the positive benefits of the challenge and to ward off any threats. In harmful or threatening situations, successful coping reduces or eliminates the source of stress and relieves the emotion generated.

Appraisal and coping are affected by internal characteristics such as health, energy, personal belief systems, commitments or life goals, self-esteem, control, mastery, knowledge, problem-solving skills, and social skills. The characteristics that have been studied most often in nursing research are health-promoting lifestyles and hardiness. A health-promoting lifestyle buffers the effect of stressors. From a nursing practice standpoint, this outcome—buffering the effect of stressors—supports nursing's goal of promoting health. In many circumstances, promoting a healthy lifestyle

is more achievable than altering the stressors. Hardiness is a general quality that comes from having rich, varied, and rewarding experiences. Hardy people perceive stressors as something they can change and therefore control. To them, potentially stressful situations are interesting and meaningful; change and new situations are viewed as challenging opportunities for growth.

Physiologic Response to Stress

The physiologic response to a stressor, whether it is physical or psychological, is a protective and adaptive mechanism to maintain the homeostatic balance of the body. When a stress response occurs, it activates a series of neurologic and hormonal processes within the brain and body systems. The duration and intensity of the stress can cause both short term and long-term effects. A stressor can disrupt homeostasis to the point where adaptation to the stressor fails, and a disease process results.

Selye's Theory of Adaptation

Hans Selye developed a theory of adaptation that profoundly influenced the scientific study of stress. Selye first described a syndrome consisting of enlargement of the adrenal cortex; shrinkage of the thymus, spleen, lymph nodes, and other lymphatic structures; and the appearance of deep, bleeding ulcers in the stomach and duodenum. He identified this as a nonspecific response to diverse, noxious stimuli. influenced the scientific study of stress.

A. General Adaptation Syndrome

Selye theory, called the general adaptation syndrome (GAS), has three phases: **alarm, resistance, and exhaustion**.

- During the alarm phase, the sympathetic fight-or-flight response is activated with release of catecholamines and the onset of the adrenocorticotropic hormone (ACTH)–adrenal cortical response. The alarm reaction is defensive and anti-inflammatory but self-limited. Because living in a continuous state of alarm would result in death, people move into the second stage— resistance.
- During the resistance stage, adaptation to the noxious stressor occurs, and cortisol activity is still increased. If exposure to the stressor is prolonged, the third stage—exhaustion—occurs.
- During the exhaustion stage, endocrine activity increases, which has negative effects on the body systems (especially the circulatory, digestive, and immune systems) that can lead to death. Stages one and two of this syndrome are repeated, in different degrees, throughout life as the person encounters stressors.

Selye compared the GAS with the life process. During childhood, too few encounters with stress occur to promote the development of adaptive functioning, and children are vulnerable. During adulthood, numerous stressful events occur, and people develop resistance or adaptation. During

the later years, the accumulation of life's stressors and wear and tear on the organism again decrease people's ability to adapt, resistance falls, and eventually death occurs.

Stages of Stress in Physiological Response

1 Alarm Stage The first stage of the stress response is the alarm reaction of the GAS, in which the individual experiences a stressor physically or mentally, and the fight-or-flight response is initiated. When the stressor is of sufficient intensity to threaten the steady state of the individual, a reallocation of energy is required so that adaptation can occur. This temporarily decreases an individual's resistance and may even result in disease or death if the stress is prolonged and severe (as in the case of burns or extreme temperature changes). The body has a limited amount of energy available for adapting to a stressor in this acute stage. The alarm stage can be divided into two parts: the shock phase and the countershock phase. During the shock phase, the stressor may or may not be perceived by the person. The autonomic nervous system reacts, and large amounts of epinephrine (adrenaline) and cortisone are released into the body, accounting for the fight-or-flight syndrome. This primary response is short lived, lasting from 1 minute to 24 hours. During the countershock phase, the changes produced in the body during the shock phase are reversed. Thus, a person is best prepared to react during the shock phase of the alarm reaction.

Physical Signs and Symptoms Physical signs and symptoms of the alarm reaction generally are those of the sympathetic nervous system stimulation. They include increased blood pressure, increased heart and respiratory rate, decreased gastrointestinal motility, pupil dilation, and increased perspiration. The patient also may complain of such symptoms as increased anxiety, nausea, fatigue, anorexia, and weight loss.

2 Resistance Stage The resistance stage reflects the individual's adaptation to the stressor. Ideally the individual moves from the alarm stage to the resistance stage quickly so that physiological forces are used to increase the resistance to stress. At this time, adaptation may occur, involving mediation of the external and internal environments. Resistance is high at this time compared with the normal state. The body attempts to cope with the stressor and to limit the stressor to the smallest area of the body that can deal with it. The amount of resistance varies among individuals, depending on the level of physical functioning, coping abilities, and total number and intensity of stressors experienced.

Physical Signs and Symptoms There are fewer signs and symptoms at this stage compared to the alarm or acute stage; however, the bodily symptoms of the alarm reaction disappear, and resistance rises above normal. For example, instead of continuing to lose weight, such as occurred in the alarm stage, the person returns to a "normal" weight. Throughout the resistance stage, the person is expanding energy in an attempt to adapt. This adaptive response is limited by the resources of the individual. When resources are adequate, the individual may successfully recover from a stressor such as surgery and return to a normal coping state. If adaptation does not occur, the person may move to the next stage of the GAS, the stage of exhaustion.

3 Exhaustion Stage The stage of exhaustion is the final stage of the GAS. The adaptation that the body made during the second stage cannot be maintained, meaning that the means used to cope with the stressor have been exhausted. This stage occurs only if the stress becomes overwhelming or is not removed, or if the individual is ineffective in dealing with it. If adaptation

has not overcome the stressor, the stress effects may either rest and return to normal, or death may be the ultimate consequence.

Physical Signs and Symptoms Physical symptoms of the alarm reaction may reappear briefly as the body makes a final attempt to survive. This is exemplified by a terminally ill person whose vital signs become stronger just before death. The individual in the stage of exhaustion usually becomes ill and may die if assistance from outside sources is not available. Often this stage can be reversed by external sources of adaptive energy such as medication, blood transfusion, and/or psychotherapy. The end of this stage largely depends on the adaptive energy resources of the individual, the severity of the stressor, and the external adaptive resources that are provided.

B. Local Adaptation Syndrome

According to Selye, a local adaptation syndrome also occurs. This syndrome includes the inflammatory response and repair processes that occur at the local site of tissue injury. The local adaptation syndrome occurs in small, topical injuries, such as contact dermatitis. If the local injury is severe enough, the GAS is activated as well. Selye emphasized that stress is the nonspecific response common to all stressors, regardless of whether they are physiologic, psychological, or psychosocial. The many conditioning factors in each person's environment account for why different demands are experienced by different people as stressors. Conditioning factors also account for differences in the tolerance of different people for stress: Some people may develop diseases of adaptation, such as hypertension and migraine headaches, whereas others are unaffected.

Interpretation of Stressful Stimuli by the Brain

Physiologic responses to stress are mediated by the brain through a complex network of chemical and electrical messages. The neural and hormonal actions that maintain homeostatic balance are integrated by the hypothalamus, which is located in the center of the brain, surrounded by the limbic system and the cerebral hemispheres. The hypothalamus is made up of a number of nuclei and integrates autonomic nervous system mechanisms that maintain the chemical constancy of the internal environment of the body. Together with the limbic system, which contains the amygdala, hippocampus, and septal nuclei, along with other structures, the hypothalamus regulates emotions and many visceral behaviors necessary for survival (eg, eating, drinking, temperature control, reproduction, defense, aggression).

Each of the brain structures responds differently to stimuli. The cerebral hemispheres are concerned with cognitive functions: thought processes, learning, and memory. The limbic system has connections with both the cerebral hemispheres and the brain stem.

In addition, the reticular activating system (RAS), a network of cells that forms a two way communication system, extends from the brain stem into the midbrain and limbic system. This network controls the alert or waking state of the body. In the stress response, afferent impulses are

carried from sensory organs (eye, ear, nose, skin) and internal sensors (baroreceptors, chemoreceptors) to nerve centers in the brain. The response to the perception of stress is integrated in the hypothalamus, which coordinates the adjustments necessary to return to homeostatic balance. The degree and duration of the response vary; major stress evokes both sympathetic and pituitary adrenal responses.

Neural and neuroendocrine pathways under the control of the hypothalamus are also activated in the stress response. Initially, there is a sympathetic nervous system discharge, followed by a sympathetic-adrenal-medullary discharge. If the stress persists, the hypothalamic-pituitary system is activated.

1. Sympathetic Nervous System Response

The sympathetic nervous system response is rapid and short-lived. Norepinephrine is released at nerve endings that are in direct contact with their respective end organs to cause an increase in function of the vital organs and a state of general body arousal. The heart rate is increased and peripheral vasoconstriction occurs, raising the blood pressure. Blood is also shunted away from abdominal organs. The purpose of these responses is to provide better perfusion of vital organs (brain, heart, skeletal muscles). Blood glucose is increased, supplying more readily available energy. The pupils are dilated, and mental activity is increased; a greater sense of awareness exists. Constriction of the blood vessels of the skin limits bleeding in the event of trauma. The person is likely to experience cold feet, clammy skin and hands, chills, palpitations, and "knots" in the stomach. Typically, the person appears tense, with the muscles of the neck, upper back, and shoulders tightened; respirations may be rapid and shallow, with the diaphragm tense.

2. Sympathetic-Adrenal-Medullary Response

In addition to its direct effect on major end organs, the sympathetic nervous system stimulates the medulla of the adrenal gland to release the hormones epinephrine and norepinephrine into the bloodstream. The action of these hormones is similar to that of the sympathetic nervous system and has the effect of sustaining and prolonging its actions. Epinephrine and norepinephrine are catecholamines that stimulate the nervous system and produce metabolic effects that increase the blood glucose level and increase the metabolic rate. This effect is called the "fight-or-flight" reaction.

3. Hypothalamic-Pituitary Response

The longest-acting phase of the physiologic response, which is more likely to occur in persistent stress, involves the hypothalamic-pituitary pathway. The hypothalamus secretes corticotropin-releasing factor, which stimulates the anterior pituitary to produce ACTH, which in turn stimulates the adrenal cortex to produce glucocorticoids, primarily cortisol. Cortisol stimulates protein catabolism, releasing amino acids; stimulates liver uptake of amino acids and their conversion to glucose (gluconeogenesis); and inhibits glucose uptake (anti-insulin action) by many body cells

but not those of the brain and heart. These cortisol-induced metabolic effects provide the body with a ready source of energy during a stressful situation. This effect has some important implications. For example, a person with diabetes who is under stress, such as that caused by an infection, needs more insulin than usual.

Any patient who is under stress (eg, illness, surgery, trauma, or prolonged psychological stress) catabolizes body protein and needs supplements. The actions of the catecholamines (epinephrine and norepinephrine) and cortisol are the most important in the general response to stress. Other hormones that play a role are antidiuretic hormone (ADH) released from the posterior pituitary and aldosterone released from the adrenal cortex. ADH and aldosterone promote sodium and water retention, which is an adaptive mechanism in the event of hemorrhage or loss of fluids through excessive perspiration. ADH has also been shown to influence learning and may thus facilitate coping in new and threatening situations. Secretion of growth hormone and glucagon stimulates the uptake of amino acids by cells, helping to mobilize energy resources. Endorphins, which are endogenous opioids, increase during stress and enhance the threshold for tolerance of painful stimuli. They may also affect mood and have been implicated in the so-called high that long-distance runners experience. The secretion of other hormones is also affected, but their adaptive function is less clear.

Immunologic Response

Research findings show that the immune system is connected to the neuroendocrine and autonomic systems. Lymphoid tissue is richly supplied by autonomic nerves capable of releasing a number of different neuropeptides that can have a direct effect on leukocyte regulation and the inflammatory response. Neuroendocrine hormones released by the central nervous system and endocrine tissues can inhibit or stimulate leukocyte function. The wide variety of stressors a person experiences may result in different alterations in autonomic activity and subtle variations in neurohormone and neuropeptide synthesis. All of these possible autonomic and neuroendocrine responses can interact to initiate, weaken, enhance, or terminate an immune response. The study of the relationships among the neuroendocrine system, the central and autonomic nervous systems, and the immune system and the effects of these relationships on overall health outcomes is called psychoneuroimmunology. Because one's perception of events and one's coping styles determine whether, and to what extent, an event activates the stress response system, and because the stress response affects immune activity, one's perceptions, ideas, and thoughts can have profound neurochemical and immunologic consequences.

Maladaptive Responses to Stress

The stress response, as indicated earlier, facilitates adaptation to threatening situations, and is retained from humans' evolutionary past. The "fight-or-flight" response, for example, is an anticipatory response that mobilized the bodily resources of our ancestors to deal with predators

and other harsh factors in their environment. This same mobilization comes into play in response to emotional stimuli unrelated to danger. For example, a person may get an "adrenaline rush" when competing over a decisive point in a ball game, or when excited about attending a party. When responses to stress are ineffective, they are referred to as maladaptive.

Maladaptive responses are chronic, recurrent responses or patterns of response that do not promote the goals of adaptation. The goals of adaptation are somatic or physical health (optimal wellness); psychological health or having a sense of well-being (happiness, satisfaction with life, morale); and enhanced social functioning, which includes work, social life, and family (positive relationships). Maladaptive responses that threaten these goals include faulty appraisals and inappropriate coping. The frequency, intensity, and duration of stressful situations contribute to the development of emotions and subsequent patterns of neurochemical discharge. By appraising situations adequately and coping appropriately, it is possible to anticipate and defuse some of these situations. For example, frequent stressful encounters (eg, marital discord) might be avoided with better communication and problem solving, or a pattern of procrastination (eg, delaying work on tasks) could be corrected to reduce stress when deadlines approach. Coping processes that include the use of alcohol or drugs to reduce stress increase the risk of illness.

Other inappropriate coping patterns may increase the risk of illness less directly. For example, people who demonstrate "type A" behaviors, including impatience, competitiveness, and achievement orientation, have an underlying aggressive approach to life and are more prone than others to develop stress-related illnesses. Type A behaviors increase the output of catecholamines, the adrenal-medullary hormones, with their attendant effects on the body. Other forms of inappropriate coping include denial, avoidance, and distancing. Denial may be illustrated by the woman who feels a lump in her breast but downplays its seriousness and delays seeking medical attention. The intent of denial is to control the threat, but it may also endanger life.

Models of illness frequently include stress and maladaptation as precursors to disease. A general model of illness, based on Selye's theory, suggests that any stressor elicits a state of disturbed physiologic equilibrium. If this state is prolonged or the response is excessive, it increases the susceptibility of the person to illness. This susceptibility, coupled with a predisposition in the person (from genetic traits, health, or age), leads to illness. If the sympathetic adrenal-medullary response is prolonged or excessive, a state of chronic arousal develops that may lead to high blood pressure, arteriosclerotic changes, and cardiovascular disease. If the production of ACTH is prolonged or excessive, behavior patterns of withdrawal and depression are seen. In addition, the immune response is decreased, and infections and tumors may develop. Selye proposed a list of disorders known as diseases of maladaptation: high blood pressure (including hypertension of pregnancy), diseases of the heart and blood vessels, diseases of the kidney, rheumatic and rheumatoid arthritis, inflammatory diseases of the skin and eyes, infections, allergic and hypersensitivity diseases, nervous and mental diseases, sexual dysfunction, digestive diseases, metabolic diseases, and cancer.

Indicators of Stress

The following are signs and symptoms of stress:

- Restlessness
- Depression
- Dry mouth
- Overpowering urge to act out
- Fatigue Loss of interest in life activities
- Intense periods of anxiety
- Strong startle response
- Hyperactivity
- Gastrointestinal distress
- Diarrhea
- Nausea or vomiting
- Changes in menstrual cycle
- Change in appetite
- Injury prone
- Palpitations
- Impulsive behaviours
- Emotional lability
- Concentration difficulties
- Feeling weak or dizzy
- Increased body tension
- Tremors
- Nervous habits
- Nervous laughter
- Bruxism (grinding of teeth)
- Difficulty sleeping
- Excessive perspiration
- Urinary frequency
- Headaches
- Pain in back, neck, or other parts of the body Increased use of tobacco
- Substance use or abuse
- Unintentional weight loss or gain

Stress Management: Nursing Interventions

Stress or the potential for stress is ubiquitous; that is, it is both everywhere and anywhere. Anxiety, frustration, anger, and feelings of inadequacy, helplessness, or powerlessness are emotions often associated with stress. In the presence of these emotions, the customary activities of daily living may be disrupted; for example, a sleep disturbance may occur, eating and activity patterns may be altered, and family processes or role performance may be disrupted. Many nursing diagnoses are possible for patients suffering from stress. One nursing diagnosis related to stress is Anxiety, which is defined as a vague, uneasy feeling, the source of which may be nonspecific or not known to the person. Stress may also be manifested as ineffective coping patterns, impaired thought processes, or disrupted relationships. These human responses are reflected in the nursing diagnoses of Risk-prone health behavior, Ineffective coping, Defensive coping, and Ineffective denial, all of which indicate poor adaptive responses.

Other possible nursing diagnoses include Social isolation, Risk for impaired parenting, Risk for spiritual distress, Readiness for enhanced family coping, Decisional conflict, Situational low self-esteem, and Risk for powerlessness, among others. Because human responses to stress are varied, as are the sources of stress, arriving at an accurate diagnosis allows interventions and goals to be more specific and leads to improved outcomes. Stress management is directed toward reducing and controlling stress and improving coping. The need to prevent illness, improve the quality of life, and decrease the cost of health care makes efforts to promote health essential, and stress control is a significant health promotion goal.

Stress reduction methods and coping enhancements can derive from either internal or external sources. For example, healthy eating habits and relaxation techniques are internal resources that help reduce stress, and a broad social network is an external resource that helps reduce stress. Goods and services that can be purchased are also external resources for stress management. It may be easier for people with adequate financial resources to cope with constraints in the environment, because their sense of vulnerability to threat is decreased compared to those without adequate financial resources.

Personal approaches to coping with stress

a. Actions that remove or change the stressor, such as resigning from an excessively demanding job.
b. Defense mechanisms help people to adapt to stress.
    I. Mainly unconscious mental processes used to protect the self from anxiety precipitated by external threats or internal tensions.
    II. Are adaptive because they protect a person from anxiety through the release of tension; however, when extreme, they become maladaptive.
c. Avoiding the stress, such as using stairs instead of an elevator if one is claustrophobic

3.2 Shock

Shock is a life-threatening condition. A patient in shock is in a state of circulatory collapse that results in organ damage and death without immediate treatment. Massive bleeding, overwhelming infection, severe allergic reactions, and cardiac failure are examples of conditions that may lead to shock. No matter what its source, shock is a medical emergency that requires rapid, comprehensive intervention in collaboration with the health care team. Shock is defined as "inadequate tissue perfusion," in which there is insufficient delivery of oxygen and nutrients to the body's tissues and inadequate removal of waste products from these tissues. All body systems are affected by reduced oxygen supplies. The resulting injury to the body can be treated in the early stages of shock, but if shock is prolonged, it leads to irreversible cell damage and death. By the time blood pressure drops, cellular and tissue damage have already occurred. Therefore, it is important to identify patients at risk for shock and carefully assess them to detect early symptoms.

Pathophysiology Of Shock

Tissue perfusion and blood pressure are maintained in the body by three mechanisms: (1) adequate blood volume, (2) an effective cardiac pump, and (3) effective blood vessels. The body is able to compensate for failure of one of these mechanisms by making a change in one or both of the other two. Shock occurs when compensatory mechanisms fail, resulting in inadequate tissue perfusion. Common causes of shock include inadequate cardiac output caused by heart failure, a sudden loss of blood volume resulting from hemorrhage, or a sudden decrease in peripheral vascular resistance caused by anaphylaxis, sepsis, and neurological alterations.

Metabolic and Hemodynamic Changes in Shock

When blood pressure falls, the body responds by activating the sympathetic nervous system. Epinephrine and norepinephrine are released from the adrenal medulla and increase cardiac output by causing the heart to beat faster and stronger. Blood is shunted away from the skin, kidneys, and intestines to preserve blood flow to the brain, liver, and heart. Epinephrine, cortisol, and glucagon raise blood glucose levels to supply cells with fuel. Stimulation of the renin-angiotensin-aldosterone system from decreased cardiac output causes vasoconstriction and retention of sodium and water to decrease further fluid loss. Respiratory rate increases to deliver more oxygen to the tissues. Together these compensatory responses produce the classic signs and symptoms of the initial stage of shock: tachycardia, tachypnea, restlessness, anxiety, and cool, clammy skin with pallor. If oxygen delivery remains inadequate, signs and symptoms of progressive and irreversible shock stages are seen.

Inadequate tissue blood flow causes an important change in cellular metabolism. When cells are deprived of oxygen, they shift to anaerobic metabolism to continue to receive nutrition and energy. As you may recall, anaerobic metabolism is an inefficient form of metabolism that can supply the energy needs of the cell for a few minutes only. After that, the body's metabolic rate and temperature begin to fall as a result of reduced energy production. Anaerobic metabolism results in the production of lactic acid as an unwanted by-product. Unless the lactic acid can be circulated

to the liver and thus removed from the bloodstream, the blood becomes increasingly acidic. Acidosis, which is a fall in blood pH below 7.35, is one of the classic signs of shock.

Effect on Organs and Organ Systems

Prolonged shock causes extensive damage to the organs and organ systems. Inadequate blood flow results in tissue ischemia and injury. Because blood is shunted away from the kidneys early in shock to save fluid and provide oxygen to vital organs, the kidneys commonly are injured first. The kidneys can tolerate reduced blood flow for about 1 hour before sustaining permanent damage. Cells in the kidneys die when there is a lack of oxygen and nutrients. If there is widespread damage to the kidneys, complete renal failure is likely. Renal failure resulting from inadequate blood flow to the kidneys can be prevented and treated by replacing lost fluids.

Several organs of the gastrointestinal system may be injured early in shock. Inadequate circulation to the intestines may result in injury of the mucosa and may even cause paralytic ileus. Toxemia may result when the body absorbs into the circulation normally occurring bacteria and endotoxins from inside the bowel. The liver may be injured both by ischemia and by toxins created by the shock state as blood is circulated through it for cleansing. Signs and symptoms of liver injury include decreased production of plasma proteins, abnormal clotting (because clotting factor production by the liver is impaired), and elevated serum levels of ammonia, bilirubin, and liver enzymes.

The immune system is also affected by shock. Many of the body's defenses become depleted from shock, leaving the body vulnerable to infection. Also, if the liver has been damaged, it is unable to assist the immune system in providing defense. The body attempts to preserve blood supply to the heart and brain because these are vital organs that require a continuous supply of oxygen. Shock places extra demands on the heart itself, creating a situation in which the heart is in extra need of oxygen at a time when oxygen supplies are already low. When the myocardium receives inadequate oxygenation, cardiac output decreases and shock worsens.

Classification of Shock

The different forms of shock are classified by their cardiovascular characteristics. The four shock categories are:

- **Hypovolemic** shock caused by a decrease in the circulating blood volume
- **Cardiogenic** shock caused by cardiac failure
- **Extracardiac** obstructive shock caused by a blockage of blood flow in the cardiovascular circuit outside the heart
- **Distributive** shock caused by excessive dilation of the venules and arterioles

Most cases of clinical shock show only some components of each of these categories. However, this classification system is helpful in understanding shock. The hallmark characteristic, exhibited in all forms of shock, is a decrease in blood pressure usually below the level required to provide an adequate supply of blood to the tissues.

Hypovolemic Shock

Any severe loss of body fluid may lead to hypovolemic shock. Hypovolemic shock can be caused by dehydration; internal or external hemorrhage; fluid loss from burns, vomiting, or diarrhea; or loss of intravascular fluid into the interstitium as a result of sepsis or trauma. Clinical signs and symptoms include pale, cool, clammy skin; tachycardia; tachypnea; flat, nondistended peripheral veins; decreased jugular vein circumference; decreased urine output; and altered mental status. The body is usually able to compensate for blood loss of less than 15% or 750 mL. The initial symptom may only be tachycardia. At 20% to 25% blood loss, tachycardia and mild to moderate hypotension are present. With a loss of 40% or greater (2000 mL), all clinical signs and symptoms of shock are present. Volume loss may not be the only contributing factor to hypovolemic shock, but also the patient's age, health status, and the time frame for fluid loss can be factors.

Cardiogenic Shock

Cardiogenic shock results when the heart fails as a pump. It occurs in 5% to 10% of patients with acute myocardial infarction (AMI). In most cases, approximately 40% of the myocardium must be lost to produce cardiogenic shock. Patients with cardiogenic shock have signs and symptoms similar to hypovolemic shock, except that they may display distended jugular and peripheral veins, as well as other symptoms of heart failure, such as pulmonary edema. The presence of pulmonary edema is what differentiates cardiogenic shock from other forms of shock. Other causes of cardiogenic shock include rupture of heart valves, acute myocarditis, end-stage heart disease, severe dysrhythmias, or traumatic injury to the heart.

Obstructive Shock

Extracardiac obstructive shock occurs when there is a blockage of blood flow in the cardiovascular circuit outside the heart. Several conditions may cause obstructive shock. Pericardial tamponade, which is the filling of the pericardial sac with blood, compresses the heart and limits its filling capacity. Tension pneumothorax compresses the heart from an abnormal collection of air in the pleural space and interferes with normal cardiac functioning. Acute pulmonary hypertension, a sudden abnormally elevated pressure in the pulmonary artery, increases resistance for blood flowing out the right side of the heart. All these conditions decrease cardiac output, which can lead to shock. Tumors or large emboli may also cause shock. Signs and symptoms of obstructive shock are similar to those of hypovolemic shock, except that jugular veins are usually distended.

Distributive Shock Distributive shock occurs when peripheral vascular resistance is lost because of massive vasodilation of the peripheral circulation. Distributive shock includes anaphylactic, septic, and neurogenic shock.

- **Anaphylactic Shock** Anaphylactic shock, the most severe type of distributive shock, occurs when the body has an extreme hypersensitivity reaction to an antigen. Death from anaphylactic shock may occur in minutes. It occurs most commonly from insect stings, antibiotics (especially penicillins), shellfish, peanuts, anesthetics, contrast dye, and blood products. The signs and symptoms are similar to those seen in hypovolemic shock. Additionally, patients may have symptoms specific to allergic reactions, including urticaria, pruritus, wheezing, laryngeal edema, angioedema, and severe bronchospasm. If conscious, patients may be extremely apprehensive and short of breath, and they may complain of a metallic taste.
- **Septic Shock** Septic shock, the most common type of distributive shock, is caused by systemic infection and inflammation. Extensive release of chemical mediators and endotoxins causes dilation of blood vessels and loss of fluid into the interstitial space. Most cases of sepsis are caused by gram-negative bacteria, although other bacteria and viruses may be the cause. In recent years, the number of cases of gram-negative shock has been decreasing, whereas there has been an alarming increase in the number of cases of septic shock from multidrug-resistant bacteria and fungi. Septic shock is the leading cause of death among critical care patients. Predisposing conditions include trauma, diabetes mellitus, corticosteroid therapy, immunocompromise (e.g., as seen in patients with human immunodeficiency virus [HIV] and in those undergoing chemotherapy treatment for cancer), burns, malnutrition, and invasive catheters. During the early, or warm, phase of septic shock (which may be referred to as “pink” shock), blood pressure, urine output, and neck vein size may be normal, but the skin is warm and flushed owing to vasodilation. Fever is present in the majority of patients, although some may have a subnormal temperature. Left untreated, septic shock progresses to a second phase with signs and symptoms similar to hypovolemic shock: hypotension, oliguria, tachycardia, tachypnea, flat jugular and peripheral veins, and cold, clammy skin. Body temperature may be normal or subnormal.
- **Neurogenic Shock** Neurogenic shock occurs when dysfunction or injury to the nervous system causes extensive dilation of peripheral blood vessels. It is a rarer form of shock, occurring most commonly as a result of injury to the spinal cord (referred to as spinal shock). It occurs due to factors that either stimulate the parasympathetic nervous system or block the sympathetic nervous system. Other causes include general anesthesia, fever, metabolic disturbances, and brain contusions and concussions. Signs and symptoms include hypotension and altered mental status and, during the early phases, bradycardia and warm, dry skin. As shock progresses, however, tachycardia and cool, clammy skin develop.

Management of a patient in shock

The order of interventions and testing is guided by the stability of the patient. Intervention priorities are as follows:

- Airway
- Breathing and respiratory support
- Cardiovascular support
- Maintenance of circulatory volume
- Control of bleeding if present
- Assessment of neurological status
- Treatment of life-threatening injuries
- Determination and treatment of the cause of shock

Nursing Interventions

- Maintain airway and provide oxygenation.
- Monitor vital signs.
- Monitor intake and output.
- Provide adequate fluid intake.
- Position patient appropriately (head elevated for patients with shortness of breath, increased intracranial pressure). Provide quiet, restful environment.
- Maintain body temperature with warmed IV fluids, room temperature, blankets.
- Assess for pain and provide pain relief measures.
- Change positions slowly. Patients with acute spinal cord injury are maintained in a flat position to avoid tension or flexing of the spinal cord. Patients are on bed rest for extended periods of time and may have a mechanical bed that will auto-rotate them at set intervals. The patient who does not have one of these beds needs to be repositioned every 2 hours. Upon recovery and when the physician has ordered it, the patient may be able to get up in the chair or even ambulate if spinal cord function is returning. These patients are extremely debilitated and weak from prolonged bed rest and need significant assistance with mob
- The treatment of neurogenic shock consists of correction of the patient's hypotension and hypoperfusion states through IV fluid administration, vasopressors, supplemental oxygen, and respiratory support if needed.
- The patient's neurogenic shock state may last up to 6 weeks, and thus long-term support may be needed. The lack of sympathetic nerve conduction makes assessment of the patient's status and response to treatment difficult because the patient will not exhibit hypotension-related tachycardia nor fluid-overload–related tachycardia if the patient is overhydrated as a result of treatment.

- Intravenous fluid administration is a first-line treatment option but the patient must be closely monitored for signs and symptoms of fluid overload because the heart rate response to volume depletion or excess will not be present.
- Symptoms of fluid deficit are worsened hypotension and hypoxemia, decreased skin turgor, and decreased urinary output.
- Symptoms of fluid volume excess include elevated respiratory rate, worsening hypoxemia, crackles or rhonchi on lung exam, generalized edema, and distended neck veins. The physician may choose to administer either crystalloid fluids (lactated Ringer's solution, NS, etc.) or colloidal fluids (Hespan, human albumin). Colloidal fluids will often correct the patient's hypotension faster but carry a higher risk for fluid overload.
- No specific dietary restrictions are needed for the patient with neurogenic shock. The diet depends on the patient's level of consciousness. If fully alert and not mechanically ventilated she may be able to tolerate a regular diet. Patients who are critically ill and also mechanically ventilated receive either TPN or tube feedings. The dietitian is consulted to determine caloric needs for the patient. Preventing constipation due to immobility is a priority, and diet should include adequate fiber.
- The use of vasopressor medications is another first-line treatment. These include dopamine hydrochloride (Dopamine), dobutamine hydrochloride (Dobutrex), and norepinephrine bitartrate (Levophed). The physician orders these IV medications to be titrated to maintain the patient's systolic blood pressure above 90 mm Hg and the mean arterial pressure above 80 to 90 to improve spinal cord perfusion

Complications of Shock

The two most common complications of shock are acute respiratory distress syndrome (ARDS) and disseminated intravascular coagulation (DIC). Both disorders usually develop once the patient has entered the progressive stage of shock.

ARDS ARDS is characterized by acute respiratory failure due to damage to the alveoli. When alveolar capillaries become more permeable, fluid and proteins leak into the alveoli, causing a type of pulmonary edema. The patient with ARDS may require mechanical ventilation.

DIC DIC is an acute condition characterized by simultaneous bleeding and clotting throughout the body. Tissue damage triggers an abnormal activation of the body's clotting mechanisms. There is widespread, continuous clot formation, which consumes all of the clotting factors, resulting in generalized bleeding. Clots are deposited in the capillaries, reducing blood flow to the skin and causing mottling (discoloration). Initially, the patient bleeds from puncture sites and incisions. Treatment is aimed at replacing the platelets and clotting factors while protecting the patient from injury.

4.0 Tutor-Marked Assignment.

1. Which of the following findings is common with anaphylactic shock?

A. Wheezing

B. Hypotension

C Tachycardia

D. Oliguria

3. Which of the following conditions causes the decreased level of consciousness commonly found in patients experiencing shock?

A. Cerebral hypoxia

B. Endotoxins

C. Cerebral edema

D. Severe pain

4. Which of the following nursing diagnoses is most appropriate to include in planning care for a patient experiencing shock?

A. Fatigue

B. Ineffective tissue perfusion

C. Ineffective health maintenance

D. Hopelessness

5. Which of the following treatments for shock would the nurse anticipate would be ordered first for a patient found lying in a pool of blood from a leg incision that has opened is restless and confused?

A. IV fluids

B. Oxygen

C. Vasopressor medications

D. Antibiotics

Answer

1. A

2. D

3. B

4. B

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Section 4: Pain and Sleep

CONTENT

1.0 Introduction

Pain is the most common reason patients seek medical advice. However, despite the widespread nature of the problem, pain is often untreated or undertreated. The care of patients with pain is challenging and requires a systematic approach to assessment and treatment.

2.0 Learning outcomes

At the end of reading this section, the students should be able to:

- Pain and its classification
- Identify factors affecting pain perception
- Discuss the management of pain
- Explain the concept of sleep
- Identify the stages of sleep
- Discuss sleep disorder

3.0 Main Content

3.1 Pain

Pain is an unpleasant sensation felt due to injury or illness.

Characteristics of pain

Pain is characterized by its intensity, timing, location, quality, personal meaning, aggravating and alleviating factors and behaviors.

- **Intensity:** pain intensity ranges from none to mild discomfort to excruciating. There is no correlation between reported intensity and stimulus that produced it. The pain threshold and pain tolerance influences reported intensity of pain.
- **Timing:** When time aspect of the pain is known, the etiology of the pain can be determined most times. When assess the patients, the nurse ask about the onset, duration, relationship between time and intensity and whether there are changes in rhythmic patterns. Sudden pain that rapidly reaches the peak could be suggestive of tissue damage, and with that, immediate intervention is required. The pain caused by ischemia occur gradually and increase overtime.
- **Location:** The location of pain is best determined by having the patient point to the area of the body involved.
- **Quality:** this is assessed by asking the patient to express how they feel the pain in their words, without giving them a clue on how to express it. It is vital to document the quality of patient expressed by the patient in their own words, so as not to give it another meaning.
- **Personal Meaning:** People express pain in different ways. Pain means different thing to different people. Pain interpreted to be debilitating could disable some people, while others who perceive the pain as normal could go on with their everyday activities while feeling pain.
- **Aggravating and Alleviating factors:** The pain is asked if there anything that worsen the pain or what relieve the pain. These factors help the nurse to ascertain the stimulating or relieving factors and help in management plan.
- **Pain Behaviors:** When experiencing pain, people express it differently. some people use non-verbal and behavioral expressions to indicate the quality or intensity of the pain. Some of these are cry, rub the affected area, guard the affected area, grimace, moan, grunt or sigh.

Categorization of Pain by Duration

Acute Pain Usually of recent onset and commonly associated with a specific injury, acute pain indicates that damage or injury has occurred. Pain is significant in that it draws attention to its existence and teaches people to avoid similar potentially painful situations. If no lasting damage occurs and no systemic disease exists, acute pain usually decreases as healing occurs. For definitional purposes, acute pain can last from seconds to 6 months. However, the traditional 6-month time frame is controversial because many acute injuries heal within a few weeks and most heal by 6 weeks. In a situation in which healing is expected within 3 weeks and a patient continues to be in pain, the pain should be considered chronic, and appropriate treatment should be used.

Chronic Pain Chronic pain is constant or intermittent pain that persists beyond the expected healing time and that can seldom be attributed to a specific cause or injury. It may have a poorly defined onset, and it is often difficult to treat because the cause or origin may be unclear. Although acute pain may be a useful signal that something is wrong, chronic pain usually becomes a problem

in its own right. Chronic pain is pain that lasts for 6 months or longer, although 6 months is an arbitrary period for differentiating between acute and chronic pain, as previously noted. An episode of pain may assume the characteristics of chronic pain before 6 months have elapsed, or some types of pain may remain primarily acute in nature for longer than 6 months. Nevertheless, after 6 months, most pain experiences are accompanied by problems related to the pain itself. Chronic pain serves no useful purpose. If it continues, it may become a patient's primary disorder.

- **Chronic Cancer Pain** Many patients with cancer report pain at the time of diagnosis, which increases in advanced stages of the disease. Most cancer pain can be successfully managed by giving adequate amounts of oral opioids around the clock, yet patients with cancer are often inadequately treated for what can be persistent, excruciating pain and suffering. Most cancer pain is the result of tumor growth, including nerve compression, invasion of tissue, and/or bone metastasis, an extremely painful condition. Cancer treatments also can cause acute pain (e.g., from repetitive blood draws and other procedures, surgery, and toxicities from chemotherapy and radiation therapy). Patients with cancer pain generally have pain in two or more areas of the body but usually talk about only the primary area. Be sure to perform a complete pain assessment to ensure an effective plan of care.
- **Chronic Non-Cancer Pain** Chronic non-cancer pain is a global health problem, occurring most often in people older than 65 years. This type of pain was formerly called chronic nonmalignant pain. However, most experts, and certainly patients who suffer daily, believe that all pain is malignant. There are many sources and types of chronic non-cancer pain. Among the most common are neck, shoulder, and low back pain following injury. Chronic conditions, such as diabetes, rheumatoid arthritis, Crohn's disease, and interstitial cystitis, often are associated with chronic pain. People who have had a stroke or are paralyzed may report persistent pain as a result of central nervous system (CNS) damage. Sometimes the exact cause of the pain is unclear as with fibromyalgia.

Categorization of Pain by Underlying Mechanisms

Pain is more commonly categorized as either nociceptive (normal pain processing) or neuropathic (abnormal pain processing). The duration of nociceptive and neuropathic pain can be either acute (shortlived) or chronic (persistent), and a person can have both types.

Pain pathway: The pain pathway can be split into three components

1. Peripheral tissue nociceptors detect the stimulus and transmit the nociceptive signal via primary afferent nerve fibers to the spinal cord or cranial nerve nuclei.

2. Processing occurs in the spinal cord or brainstem before transmission to supra-spinal structures.

After further processing at supra-spinal sites, the signal induces the conscious perception of pain.

The appreciation of pain is not just a moment-by-moment analysis of afferent noxious input relayed by a hard-wired transmission system. Instead, it is a dynamic process that is influenced by past experiences.

Factors affecting the pain experience

The patient is the only authority on the existence and nature of his or her pain. Age, previous experience with pain, drug abuse, and cultural norms account for the differences in a patients' individual responses to pain.

Age Age can greatly influence a patient's perception of pain. Individuals may continue pain behaviors learned as children and may be reluctant to admit pain or seek medical care because they fear the unknown or fear how treatment may impact their lifestyle. Older adults may ignore their pain, believing it is a consequence of aging. Family and health care members may thoughtlessly support this idea and be less responsive to an older patient's complaints of pain.

Previous Pain Experiences Previous experience with pain often influences patients' reactions. Past coping mechanisms may affect patients' judgments about how pain will affect their lives and which measures they can use to successfully manage the pain on their own. Teaching patients about pain expectations and management methods can often allay their fears and lead to successful pain management.

Drug Abuse A drug abuser is likely to be less tolerant of pain than someone who does not use drugs. Drug abuse may cause changes in the central nervous system, resulting in an exaggerated neurophysiological response to painful stimuli. To keep a drug abuser comfortable, withdrawal must be prevented.

Cultural Norms Cultural differences in pain responses can lead to pain management problems. Studies on people from various cultures found no significant difference among the groups in the intensity level at which pain becomes perceptible. The same studies showed that the intensity level or duration of pain the patient was willing to endure differed significantly. Cultural values guide the expression of pain. Some cultures tolerate pain and "suffering in silence," whereas others fully express pain, including physical and emotional responses. Be careful not to equate the level of pain expression with the level of actual pain experienced but consider cultural and other influences that affect the expression of pain.

Acute Pain Management

Acute pain is often the result of surgical procedures, trauma, or burns. Acute pain problems are the most common reason why patients seek medical assistance, and nurses spend a significant

portion of their time at the bedside providing pain-relieving treatments and medications. The plan for pain management provides for organized and rational treatment appropriate to all phases of recovery including the critical or emergent phase, subsequent healing and recovery, and finally rehabilitation. Management of acute pain is focused on

- reducing the sympathetic stress response
- safely optimizing comfort during treatment and recovery
- facilitating participation in recovery and rehabilitation activities,
- improving patient outcomes.

Nurses educate patients and family members with the goal of improving their understanding of

- the importance of pain management in the patient's recovery,
- the role of medications and non-medication treatment, and
- the differences between physical dependence, tolerance, and addiction to opioid medications.

Establishing comfort and function goals encourages the patient and healthcare team to work toward meeting a defined pain intensity score and a specific functional goal rather than an elusive or poorly defined therapeutic goal.

Chronic Pain Management

The long-term, persistent nature of chronic pain increases the likelihood that psychosocial and environmental factors will contribute to the emotional distress and physical disability that is frequently seen with pain that has limited ongoing pathology. Management of chronic pain is focused on

- reducing the focus on pain;
- safely optimizing comfort through appropriate use of analgesic treatments and complementary or alternative strategies
- increasing active participation in ADLs, work, and relationships;
- restoration of joy and a sense of purpose despite persistent pain

Nurses educate patients and family members with the goal of improving understanding of

- the role anxiety, depression, and anger can have in escalation of pain;
- the role of medications and complementary or alternative treatments in improving function;
- the differences between physical dependence, tolerance, and addiction to opioid medications.

When encouraging the patient with chronic pain to establish comfort and function goals, the process is the same as with acute pain, but the scores and functional goals are likely to be very

different. Patients who experience moderate to severe pain on a daily basis may consider even a very small reduction in pain intensity as a success. Often functional goals are focused around achieving or maintaining independence in activity of daily living (ADL), work, or relationships and leisure activities. It may be necessary to encourage the patient to identify realistically achievable goals as an intermediate step to his ultimate goals to avoid discouragement.

Physiological and Pathological Consequences of Unrelieved Pain

Undertreated pain can produce serious adverse physiological, psychological, and immunological effects.

- Inadequate pain control can stimulate a stress response that involves the cardiovascular, pulmonary, gastrointestinal, metabolic, and neuroendocrine systems
- Pain causes catabolism, which leads to poor wound healing, weakness, and muscle breakdown.
- Increased heart rate and blood pressure increases the risk of thromboembolic events due to stress hormone effects and decreased mobility.
- Effective respiratory effort is impaired, increasing the risk of infection and hypoxemia.
- Pain increases salt and water retention, resulting in fluid overload and hypokalemia.
- Pain also causes decreased gastrointestinal motility and increased blood pressure.
- Anxiety, depression, and sleep deprivation are commonly associated with pain.
- Immunologically, pain is associated with reduced natural killer cell counts indicating impaired immune response. Increasing evidence suggests

Pharmacologic Management of Pain

Safe and effective use of analgesics requires the development of an individualized treatment plan based on a comprehensive assessment. This plan includes clarifying the desired outcomes of treatment and discussing options and preferences with the patient and family. Desired outcomes are periodically re-evaluated and changes made depending on patient response and, in some cases, disease progression.

Around-the-Clock Dosing

Two basic principles of providing effective management are (1) preventing pain and (2) maintaining a level of pain control that allows the patient to function and have an acceptable quality of life. Accomplishment of these desired outcomes may require the mainstay analgesic to be administered on a scheduled around-the-clock (ATC) basis, rather than PRN (“as needed”), to maintain stable analgesic levels. ATC dosing regimens are designed to control pain for patients who report it being present 12 hours or more during a 24-hour period, such as that associated with most chronic syndromes and pain during the first 24 to 48 hours after surgery or other tissue injury.

PRN dosing of analgesics is appropriate for intermittent pain, such as before painful procedures and breakthrough pain (additional pain that "breaks through" the pain being managed by the mainstay analgesic), for which supplemental doses of analgesic are provided.

Patient-Controlled Analgesia

Patient-controlled analgesia (PCA) is an interactive method of management that allows patients to treat their pain by self-administering doses of analgesics. It is used to manage all types of pain and given by multiple routes of administration, including IV, subcutaneous, epidural, and perineural. A PCA infusion device ("pump") is used when PCA is delivered by invasive routes of administration and is programmed so that the patient can press a button ("pendant") to self-administer a set dose of analgesic ("PCA dose") at a set time interval ("demand" or "lockout") as needed. Patients who use PCA must be able to understand the relationships between pain, pressing the PCA button and taking the analgesic, and pain relief. They must also be cognitively and physically able to use any equipment that is used to administer the therapy.

The Three Analgesic Groups Analgesics are categorized into three main groups: (1) non-opioid analgesics, which include acetaminophen and the NSAIDs; (2) opioid analgesics, such as morphine, hydromorphone, fentanyl, and oxycodone; and (3) adjuvant analgesics (sometimes referred to as co-analgesics), which make up the largest group and include a variety of agents with unique and widely differing mechanisms of action. Examples are local anesthetics and some anticonvulsants and antidepressants.

- **Non-opioid Analgesics.** Acetaminophen and NSAIDs make up the non-opioid analgesic group. Acetaminophen is thought to relieve pain by underlying mechanisms in the CNS. It has analgesic and antipyretic properties but is not effective to treat inflammation. In contrast, NSAIDs have analgesic, antipyretic, and anti-inflammatory properties. These drugs produce pain relief by blocking prostaglandins through inhibition of the enzyme cyclooxygenase (COX) in the peripheral nervous system. Acetaminophen and an NSAID may be given together, and there is no need for staggered doses. Unless contraindicated, all surgical patients should routinely be given acetaminophen and an NSAID in scheduled doses as the foundation of the pain treatment plan throughout the postoperative course, preferably initiated preoperatively. The non-opioids are often combined in a single tablet with opioids, such as oxycodone (Percocet) or hydrocodone (Vicodin, Lortab, Vicoprofen), and are very popular for the treatment of mild to moderate acute pain. Many people with persistent pain also take a combination non-opioid/opioid analgesic. However, it is important to remember that these combination drugs are not appropriate for severe pain of any type because the maximum daily dose of the non-opioid limits the escalation of the opioid dose.
- **Opioid Analgesics.** Opioid analgesics are the mainstay in the management of moderate to severe nociceptive types of pain, such as postoperative, surgical, trauma, and burn pain. Although it is often used, the term "narcotic" is considered obsolete and inaccurate when

discussing the use of opioids for pain management. “Narcotic” is used loosely by law enforcement and the media to refer to a variety of substances of potential abuse. Legally, controlled substances classified as narcotics include opioids, cocaine, and others. The preferred term is “opioid analgesics” when discussing these agents in the context of pain management. Some patients prefer the term “pain medications” or “pain medicine. Opioids produce their effects by interacting with opioid receptor sites located throughout the body, including in the peripheral tissues, in the GI system, and in the spinal cord and brain. When an opioid binds to the opioid receptor sites, it produces analgesia as well as unwanted effects, such as constipation, nausea, sedation, and respiratory depression.

- **Adjuvant Analgesics.** Adjuvant analgesics (sometimes called co-analgesics) are drugs that have a primary indication other than pain but are analgesic for some painful conditions. For example, the primary indication for antidepressants is depression, but some antidepressants help relieve some types of pain. The adjuvant analgesics are the largest and most diverse of the three analgesic groups. Drug selection and dosing are based on both experience and evidence-based practice guidelines.

Local Anesthetics.

Local anesthetics relieve pain by blocking the generation and conduction of the nerve impulses necessary to transmit pain. The local anesthetic effect is dose-related. A high enough dose of local anesthetic can produce complete anesthesia, and a low enough dose (subanesthetic) can produce analgesia. Local anesthetics have a long history of safe and effective use for the treatment of all types of pain. Allergy to local anesthetics is rare, and side effects are dose-related. CNS signs of systemic toxicity include ringing in the ears, metallic taste, irritability, and seizures. Signs of cardiotoxicity include circumoral tingling and numbness, bradycardia, cardiac dysrhythmias, and CV collapse. The lidocaine patch 5% (Lidoderm) is 10 cm by 14 cm and contains 700 mg of lidocaine. The patch is placed directly over or adjacent to the painful area for absorption into the tissues directly below. A major benefit of the drug is that it produces minimal systemic absorption and side effects. The patch is left in place for 12 hours and then removed for 12 hours (12-hours-on, 12-hours-off regimen). This application process is repeated as needed for continuous analgesia.

Use of Placebos

A placebo is defined as any medication or procedure, including surgery, which produces an effect in a patient because of its implicit or explicit intent, not because of its specific physical or chemical properties. A saline injection is one example of a placebo. Administration of a medication at a known subtherapeutic dose (e.g., 0.05 mg of morphine in an adult) is also considered a placebo. Placebos are appropriately used as controls in research evaluating the effects of a new medication. Patients or volunteers who participate in placebo-controlled research must be able to give informed consent or have a guardian who can provide informed consent. Unfortunately, occasionally placebos are used clinically in a deceitful manner and without informed consent. This is often done when the clinician does not accept the patient's report of pain. Pain relief resulting from a placebo,

should it occur, is mistakenly believed to invalidate a patient's report of pain. This typically results in the patient being deprived of pain-relief measures despite research showing that many patients who have obvious physical stimuli for pain (e.g., abdominal surgery) report pain relief after placebo administration. The use of placebos has both ethical and legal implications, violates the nurse-patient relationship, and deprives patients of more appropriate methods of assessment or treatment.

Nonpharmacologic Management of Pain / Strategies to cope with pain

1. Activities to Promote Comfort

Analgesic medication is the most powerful tool for pain relief that is available, but it is not the only one. Nonpharmacologic nursing activities can assist in pain relief, usually with low risk to the patient. Although such measures are not a substitute for medication, they may be appropriate to relieve episodes of pain lasting only seconds or minutes. In instances of severe pain that lasts for hours or days, combining nonpharmacologic interventions with medications may be the most effective way to relieve pain.

2. Massage

The gate control theory of pain proposes that stimulation of fibers that transmit non-painful sensations can block or decrease the transmission of pain impulses. Several nonpharmacologic pain relief strategies, including rubbing the skin and using heat and cold, are based on this theory. Massage, which is generalized cutaneous stimulation of the body, often concentrates on the back and shoulders. A massage does not specifically stimulate the nonpain receptors in the same receptor field as the pain receptors, but it may have an impact through the descending control system. Massage also promotes comfort because it produces muscle relaxation.

3. Thermal Therapies

Ice and heat therapies may be effective pain relief strategies in some circumstances; however, their effectiveness and mechanisms of action need further study. Proponents believe that ice and heat stimulate the nonpain receptors in the same receptor field as the injury. For greatest effect, ice should be placed on the injury site immediately after injury or surgery. Ice therapy after joint surgery can significantly reduce the amount of analgesic medication required. Ice therapy may also relieve pain if applied later.

Care must be taken to assess the skin before treatment and to protect the skin from direct application of the ice. Ice should be applied to an area for no longer than 15 to 20 minutes at a time and should be avoided in patients with compromised circulation. Long applications of ice may result in frostbite or nerve injury. Application of heat increases blood flow to an area and contributes to pain reduction by speeding healing.

Both dry and moist heat may provide some analgesia, but their mechanisms of action are not well understood. Both ice and heat therapy must be applied carefully and monitored closely to avoid injuring the skin. Neither therapy should be applied to areas with impaired circulation or used in patients with impaired sensation.

4. Transcutaneous Electrical Nerve Stimulation

Transcutaneous electrical nerve stimulation (TENS) uses a battery-operated unit with electrodes applied to the skin to produce a tingling, vibrating, or buzzing sensation in the area of pain. It has been used in both acute and chronic pain relief and is thought to decrease pain by stimulating the nonpain receptors in the same area as the fibers that transmit the pain. This mechanism is consistent with the gate control theory of pain and explains the effectiveness of cutaneous stimulation when applied in the same area as an injury. For example, when TENS is used in a postoperative patient, the electrodes are placed around the surgical wound,

5. Distraction

Distraction helps relieve both acute and chronic pain. Distraction, which involves focusing the patient's attention on something other than the pain, may be the mechanism responsible for other effective cognitive techniques. Distraction is thought to reduce the perception of pain by stimulating the descending control system, resulting in fewer painful stimuli being transmitted to the brain. The effectiveness of distraction depends on the patient's ability to receive and create sensory input other than pain. Distraction techniques may range from simple activities, such as watching TV or listening to music, to highly complex physical and mental exercises. Pain relief generally increases in direct proportion to the patient's active participation, the number of sensory modalities used, and interest in the stimuli. Therefore, the stimulation of sight, sound, and touch is likely to be more effective in reducing pain than is the stimulation of a single sense.

Relaxation Techniques Skeletal muscle relaxation is believed to reduce pain by relaxing tense muscles that contribute to the pain. Research findings support the use of relaxation in relieving postoperative pain. A simple relaxation technique consists of abdominal breathing at a slow, rhythmic rate. The patient may close both eyes and breathe slowly and comfortably. A constant rhythm can be maintained by counting silently and slowly with each inhalation ("in, two, three") and exhalation ("out, two, three").

When teaching this technique, the nurse may count out loud with the patient at first. Slow, rhythmic breathing may also be used as a distraction technique. Relaxation techniques, as well as other noninvasive pain relief measures, may require practice before the patient becomes skilled in using them. Patients who already know a relaxation technique may need to be reminded to use it to reduce or prevent increased pain. Almost all people with chronic pain benefit from some method of relaxation. Regular relaxation periods may help combat the fatigue and muscle tension that occur with and increase chronic pain.

6. Music Therapy Music therapy is an inexpensive and effective therapy for the reduction of pain and anxiety. Research among elderly Korean and American women who had gynecologic surgery demonstrated decreased pain among those patients who received a music therapy intervention

3.2 Sleep

Sleep is the period of reduced mental and physical activity, characterized by altered consciousness and impaired sensory activity. Sleep is an important part of an individual's daily routine. Quality of sleep is getting enough of the right amount of sleep at the right times. Sleep is a fundament needs of man, just like water and food is needed for survival. Without sleep, one cannot form or maintain the pathways in the brain that let one learn and create new ideas, memories and concentrate better. Sleep is seen to be an important brain function, including how nerve cells communicate with each other. In fact, the brain and the body stay active while one sleep. Sleep is a complex and dynamic process that affects how you function.

Stages of Sleep

There are two basic sleep; rapid eye movement and non-rapid eye movement. The cycle through all stages of non-rapid and rapid eye movement occur several times during a typical night, with increasingly longer, deeper, rapid eye movement periods occurring more towards morning.

Stage 1 non-rapid eye movement sleep is the changeover from the wakefulness to sleep. During this short period of relatively light sleep, the heartbeat, breathing and eye movements slow, while the muscle relax with occasional twitches. The brain waves begin to slow from their daytime wakefulness patterns.

Stage 2 non-rapid eye movement sleep is a period of light sleep before one enter deeper sleep. It characterized with slow heartbeat and breathing patterns, body temperature drops, eye movement stops. There is slow down in the brain activities which is marked by brief bursts of electrical activity.

Stage 3 non-rapid eye movement sleep is the period of deep sleep that you need to feel refreshed in the morning. It occurs in longer periods during the first half of the night, During this stage, there is slow heartbeat and breathing in their slowest level during the sleep. The muscle is relaxed and it may be difficult to awaken the individual.

Rapid eye movement sleep first occur about 90 minutes after falling asleep. The eyes move rapidly from side to side behind closed eyelids. Mixed frequency brain wave activity becomes closer to that seen in wakefulness. The breathing becomes faster, irregular, while blood pressure increase to near waking level. As one age, one sleeps less of the rapid eyes movement time.

Sleep Mechanisms

Two internal biological mechanism exist;

1. Circadian Rhythms direct a wide variety of functions from daily fluctuations in wakefulness to body temperature, metabolism and increased hormones. They control the timing of sleep and cause a sleepy eyes at night and the tendency to wake in the morning without an alarm. The body's biological clock. Circadian rhythms synchronize with environmental cues about the actual time of day, but they continue even in the absence of clues

2. Sleep-wake homeostasis keeps track of the need for sleep. The homeostatic sleep drive reminds the body to sleep after a certain time and regulates sleep intensity. The sleep drive gets stronger every hour one is awake and cause the eyes to sleep longer and more deeply after a period of sleep and deprivations.

Some factors that influence sleep-wake needs are

1. medication
2. medical condition
3. stress
4. sleep environment
5. food and drink
6. exposure to light
7. night-shift workers

Management of sleep disorders

Getting sufficient can be achieved through the following ways

- set an alarm
- exercise 20 to 30 minutes a day but no longer that a few hours before going to bed
- avoid caffeine and nicotine late in the day and alcoholic drinks before bed.
- relax before bed
- create a room for sleep by avoiding light and tight clothing.
- Do not lie in bed awake. If you cannot sleep, get other thing to do.
- If insomnia become a problem, consult the doctors.
- take prescribed drugs as ordered, especially a sedative.

4.0 Tutor-Marked Assignment

1. The pain caused by ischemia occur gradually and increase overtime. **True or False**

2. Circadian rhythms does not play its part in sleep pattern. **True or False**

3. In rapid eye movement, mixed frequency brain wave activity becomes closer to that seen in wakefulness. **True or False**

4. Which of the following allow stimulation of fibers that transmit non-painful sensations can block or decrease the transmission of pain impulses.

A. Distraction

B. Massage

C. Cold compress

D. Heat compress

Answer

1. True

2. False

3. True

4. B

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Section 5: Skin Care and Wound management

CONTENT

1.0 Introduction

The skin is one of the largest organs of the body. It serves as a protector to the entire body. Invasion of microbes or break in the skin can result in wound. Poor wound care can lead to infection. This section will explain the functions of the skin, wound types and wound infection.

2.0 Learning Outcomes

At the end of this section, the student should be able to:

- list the functions of the skin
- identify the types of wound
- explain wound infection and management

3.0 Main Concept

3.1 Functions of the Skin

The skin is the largest external organ, and in adults weighs between 2.7 and 3.6 kg. It covers the whole of the body and its thickness varies around the body, with areas of greatest friction, such as the soles of the feet, being thickest and areas of low friction, like eyelids, being the thinnest. It also receives one-third of the body's circulating blood volume – an oversupply compared to its metabolic needs.

The skin has five primary functions:

1. **Protection**
    - Bacteria and viruses
    - Heat and cold

- Dehydration
- Some chemical substances
- Mechanical damage

2. **Sensation**
   - Largest sensory organ
   - Contains nerve endings – most concentrated in fingertips and lips
   - Sensitive to touch, pain, heat, cold, vibration and pressure
   - Skin hairs are also sensitive to touch, reducing risk of injury to the skin
3. **Thermoregulation**
   With the control of the hypothalamus, the skin surface loss or retain heat in the body through the mechanism of conduction, convection and radiation from the skin surface.
4. **Vitamin D synthesis**
   Vitamin D is synthesized from ultraviolet light falling on the skin.
   Vitamin D is necessary for calcium absorption.
   Vitamin D can also be synthesized from dietary intake
5. **Excretion and reserve**
   Some gaseous exchange takes place through skin. Sodium and urea are excreted via sweat. The skin provides a water reserve which is drawn into the circulating blood volume in cases of sudden fluid loss, such as haemorrhage or chronic dehydration. The fat layer can also be converted into energy

3.2 Wound and Wound Healing

Wound occur due to injuries that break the skin. The body then response through certain pattern to repair the injured skin. The process is call wound healing. Wound healing can be complex and is affected by the mechanism of injury and the general health of the patient.

Types of Wound

- Lacerated wound: This result due to blunt force such as a direct blow to the skin, leading to tearing or splitting of the skin. It is characterized by an irregular break of the skin.
- Incision wound: It is caused by sharp cut, usually done by a knife, broken bottle or a metal edge. The wound is appear straight and clean.
- Puncture wound: it is caused by an object penetrating the skin and deep underlying structures. The cut might not ;look wide enough, but it is deep to affect the underlying structures. So, Care is taken to explore the extent of the injury.
- Contusion: It is caused by blunt trauma. The underlying vessels might be involve.

The closure of traumatic wounds can be categorized into three types:

- **Closure by first intention–** where edges of wounds are brought together preferably within the first 6 hours after injury
- **Closure by second intention** – performed 4–5 days after injury provided there is no evidence of infection
- **Closure by third intention** – where the wound heals by granulation and epithelialization. Purposeful delay allows an intervention, such as the use of antibiotics, before the wound is closed. This may happen following debridement of the wound edges.

Stages of Wound Healing

The wound healing process occurs from the time of injury and may last days to years. The phases can be divided into haemostasis, inflammatory stage, the proliferative or maturation stage and the remodeling stage.

Haemostasis

The body's initial response to a cut in the skin is bleeding. This extravasation initiates platelet activity and coagulation of blood. It also results in vasoconstriction and release of histamines and ATP, which also attract leucocytes. Platelets begin to aggregate and the coagulation cascade results in the development of a fibrin mesh and clot, or beginnings of a scab, which temporarily seals the wound. Once the clot is formed, fibrinolysis commences as part of the body's defence mechanism. This ensures the clot does not extend and allows better migration of cells into the wound bed.

Inflammatory stage

The body responds to the tissue trauma by releasing prostaglandins, bradykinins and histamine to activated proteins which initiate vasodilation in the area. This has two main functions:

- it increases blood supply to the area
- it increases capillary permeability.

This is to enable plasma to leak into tissues around the area of injury. This creates wound exudate. Neutrophils are the first leucocytes that usually arrive within 6–12 hours at the injury site, leak into the area of the wound and offer initial protection from infection by engulfing and digesting bacteria. Neutrophils have a short life span, and so are replaced by monocytes that are capable of phagocytosis. These promote new tissue formation and angiogenesis, and continue to engulf and destroy bacteria and debris from the wound, including old neutrophils.

The signs of an inflammatory response are often confused with infection, so it is important to establish a clear history of the duration since injury. Inflammatory responses usually occur before infection has had time to develop.

The signs of the inflammatory response include:

- redness – because of local vasodilatation
- heat – because of increased blood supply and metabolic activity
- edema – because increased capillary permeability allows fluid to leak into the extracellular space

- pain – due to pressure of fluid in tissues and chemical irritation from enzymes such as prostaglandin. This inflammation is vital to the natural healing. If it is suppressed by drugs or illness, healing will be delayed. Macrophages are essential for transition into the proliferation stage of healing, as they begin to produce transforming growth factor (TGF), which promotes angiogenesis and the formation of new tissues. Macrophages also produce fibroblast growth factor (FGF), which stimulates fibroblast production.

Proliferation stage

This starts 3–5 days post-injury and can last up to three weeks. As its name suggests, this part of the healing process is about growth and reproduction of tissue to replace that lost in injury. By day five, the wound surface will only be 7 % of its pre-injury tensile strength. In order to produce new tissue, the wound needs a good oxygen supply and essential nutrients such as vitamin C, protein and zinc. As angiogenesis occurs in response to wound hypoxia and TGF, new capillary loops develop and the wound is oxygenated. Three distinct processes occur during the proliferation phase.

Maturation or remodeling stage

This begins around three weeks after injury, and is a process of returning the area to its usual functional structure. The process is twofold.

Firstly, collagen is remodelled, sometimes over a period of years. The aim of this is to gradually replace newly formed type III collagen, laid down in the proliferation phase, with stronger, more organized collagen fibres. The amount of collagen does not change; its bundles become thicker and shorter and hold the wound together more tightly. Although the skin and wound scar become stronger, the area only usually regains about 80 % of the pre-injury tensile strength. This takes a long time; at three months post-injury 50 % of tensile strength is considered good healing.

The second part of the process is the rationalization of blood vessels bringing extra nutrients to the area. This process occurs gradually, and its progression can be monitored by the gradual fading of the scar. It will become paler and flatter as blood vessels diminish. Once maturation is achieved the scar will appear white; it is avascular, has no sebaceous glands and no hairs.

Factors affecting wound healing

Although patients with sudden traumatic wounds do not have the same physiological and educational preparation as patients undergoing surgery, many of the influences on wound healing can be optimized by effective education and empowerment during their initial visit for wound management.

Age

With age, all metabolic processes slow down and collagen production is lower; therefore wounds heal more slowly and have less tensile strength

Tissue perfusion

Many diseases cause hypoxia and reduced tissue perfusion. Those with a significant effect on wound healing include:

- Anaemia
- Peripheral vascular disease
- Respiratory disease
- Arteriosclerosis
- Dehydration
- The result of this is reduced fibroblast activity and collagen synthesis, reduced epithelial regeneration and greater susceptibility to infection because of decreased leucocyte activity

Systemic diseases

These include diabetes, immune disorders and cancer, because of dampened inflammatory response and susceptibility to infection. Also, inflammatory conditions, liver failure and uraemia

Psychological factors and body image

Stress and anxiety suppress the immune system and are linked with sleep disturbance. This has been shown to delay healing. Anabolic healing is enhanced by sleep. Altered body image can occur from seemingly minor wounds and this can adversely affect healing in terms of stress and compliance with wound care strategies

Poor wound care

Inadequate wound cleansing or inappropriate wound dressing is an avoidable factor in healing

Nutrition

Protein, vitamins and trace elements are vital for prompt, adequate wound healing. These include: Iron, Copper, Zinc, Vitamin A, Vitamin C, Vitamins B, E and K also influence healing, and adequate protein and calorie intake is also necessary

Hydration

To maintain metabolism, between 2 and 2.5 L of fluid in 24 hours is needed. Less than this will result in fluid being drawn from interstitial spaces. Patients who are already clinically dehydrated will have delayed healing

Smoking

Both carbon monoxide and nicotine, as end-products of smoking, have an adverse effect on peripheral tissue perfusion, therefore increasing hypoxia risk. There is also an increased risk of thrombus formation in smokers

Medication

Anti-inflammatory agents, immunosuppressive drugs, cytotoxic agents and corticosteroids all impinge on the healing process.

How to optimize wound dressing

- High humidity between wound surface and dressing
- Allows gaseous exchange
- Provides thermal insulation
- Impermeable to bacteria
- Removes excess exudate
- Free of particles and toxic wound contaminants
- Can be removed without causing further tissue trauma

3.3 Wound infection

Most traumatic wounds occur in unsterile conditions, and therefore all carry a risk of infection. But just because contaminants can get in does not mean that all wounds become infected. A number of factors affect the infection potential, such as mechanism of injury, degree of tissue loss, age of the wound prior to cleansing and anatomical location. It is important to recognize infection and differentiate it from the normal inflammatory response. Accurate historytaking and the duration of the injury are important factors in differentiation.

Signs of infection include: redness, swelling, increased pain, skin warm to touch, purulent discharge, odour, breakdown of the wound, systemic symptoms, pyrexia, tachycardia and tachypnoea. Patients with a suspected wound infection may need a wound swab taken for culture and sensitivity prior to considering antibiotic therapy. Antibiotics are generally only considered for those infections that are not responding to local dressing techniques or the patient demonstrates local or systemic inflammatory markers such as cellulitis, fever, tachycardia, etc.

Wound care and nursing documentation

- ensure bed rest and the affected area.
- ensure aseptic procedure is used for wound dressing
- Advise and ensure adequate nutrition
- educate the patient on the need for personal and environmental hygiene
- monitor vital signs, especially pulse and temperature.
- ensure adequate ventilation
- give prescribed drugs as ordered.
- Give analgesics for pain
- ensure peoper hydration
- encourage the consumption of fruits and vegetables

4.0 Tutor-Marked Assignment

1. Inflammatory response is the first stage in wound healing. **True or False**

2. Age of the patient can affect wound healing. **True or False**

3. Rest is needed for good wound healing. **True or False**

4. The mechanism of injury, degree of tissue loss and anatomical location of the wound could predispose to wound infection. **True or False**

Answer

1. False

2. True

3. True

4. True

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Self Assessment Question

1. Discuss the nursing care for the patient with malnutrition?

2. Explain how you would manage a patient with dehydration?

3. Mr John was involved in road traffic accident and was assessed to have lost about 3litres of blood. He was diagnosis with hypovolaemic shock. How would you mange him as a nurse?

4. Mrs Jane, a cancer patient as assessed with mild pain. Explain non pharmacological management you would give to her?

5. Explain the mechanism of wound healing?

Module 3- Caring for Patients with Special Needs

Section 1: Care of the Patient Having Surgery

Section 2: Care of Patients Experiencing Trauma and Unconscious Patients

Section 3: Care of Patients Receiving Palliative Care

Section 4: Care of Patients with Burns and cancer

Section 5: Loss, Grief and End of Life Care

Section 1: Care of the Patient Having Surgery

CONTENT

1.0 Introduction

Surgical procedures are categorized in a variety of ways, and any given procedure will fall into several of the categories. Each of the categorizations provides a small piece of information about the patient who is having surgery. For example, knowing the specific procedure to be performed allows the nurse to begin formulating plans for preoperative teaching. Knowing that a procedure needs to be done emergently gives information about patient acuity.

2.0 Learning Outcome

After studying this section, the student will be able to:

- Describe the categories of surgery

- Identify critical preoperative assessment findings that require further intervention
- Discuss the elements of preoperative preparation.
- Prioritize nursing interventions for the preoperative patient.
- Develop a teaching plan for the preoperative patient.
- Identify and discuss the preoperative, intraoperative and postoperative care for patient undergoing surgery.

3.0 Main Content

3.1 Category of Surgery

Surgery may also be performed for diagnostic, curative, reconstructive, palliative, or cosmetic purposes.

Diagnostic procedures are those that are performed for the purpose of making or confirming a medical diagnosis. These procedures frequently require the removal of tissue or cells for analysis. Examples of diagnostic surgeries include procedures such as breast biopsy, arthroscopy, and laparotomy. In some cases, diagnostic surgery is referred to as **exploratory surgery** because the surgeon examines or explores the tissues and structures in order to decide what further procedures or treatments needs to be done.

Curative procedures are those that are done for the purpose of affecting a cure, for example, the successful treatment of a disease or condition. Many surgeries are done for this purpose including cholecystectomy, hernia repair, open reduction of a fracture, and mammoplasty.

Reconstructive surgery is done for the purpose of rebuilding tissues or body structures to achieve a more normal function and appearance. Examples include skin grafting and breast reconstruction following mastectomy.

Palliative procedures are those that are done for the purpose of alleviating symptoms caused by disease or a condition. Palliative surgery does not affect a cure, but it frequently improves quality of life. Examples include tumor debulking, performing a laminectomy to reduce spinal cord compression in a patient with metastatic cancer, and creation of a colostomy in a patient with severe inflammatory bowel disease.

Cosmetic surgery is performed for the primary purpose of improving physical appearance. Examples include liposuction, rhinoplasty, and breast augmentation. Surgeries are also classified according to the urgency with which the procedure needs to be performed.

Elective procedures are those that are scheduled in advance for a non-acute condition. Performing a procedure electively is always preferred because the patient will be in better health than he would be during an acute illness, and it allows optimum physiological and psychological preparation of the patient. There also is a technical advantage to elective procedures because the tissues are not distorted by inflammation or infection.

Urgent procedures are those that require prompt attention, within the next 24 to 48 hours, but they describe situations where the patient's condition is not currently life threatening. An appendectomy performed for a ruptured appendix is an example of an urgent procedure.

An emergent (or emergency) surgery is a procedure that must be performed immediately to prevent serious consequences. Failure to perform emergency surgery in a timely manner can result in a patient's death or disability. A fasciotomy performed to treat compartment syndrome in a fractured leg is an example of an emergent procedure.

Surgery-Specific Classification

High-Risk Surgical Procedures

- Emergent operations, particularly in elderly
- Aortic and other major vascular surgery
- Peripheral vascular surgery
- Prolonged surgical procedures, usually longer than 2 hours, associated with large fluid shifts and/or blood loss (e.g. major spinal surgery, pancreas resection)
- Cardiac procedures

Intermediate-Risk Surgical Procedures

- Carotid endarterectomy
- Head and neck surgery
- Intraperitoneal and intrathoracic surgery
- Orthopedic surgery
- Prostate surgery

Low-Risk Surgical Procedures Endoscopic procedures

- Superficial procedures
- Cataract surgery
- Breast surgery
- Cosmetic surgery

Common Surgical Suffixes

There is no standardization for the naming of surgical procedures. Consequently, any given surgical procedure may have several names that are used interchangeably. Knowing the meaning of common surgical suffixes, however, provides some help in understanding what type of surgery is to be performed:

- ectomy—removal of, surgical excision to remove (e.g., colectomy)
- ostomy—surgical creation of permanent opening (e.g., colostomy)
- otomy—surgical incision ofor cutting into (e.g.,thoracotomy)
- plasty—surgicalrepairorreconstructionof(e.g.,rhinoplasty)
- orraphy—surgical repair or suture of (e.g.,herniorrhaphy)
- scopy—use of a scope to view an area, looking into (e.g., laparoscopy).

3.2 Perioperative Nursing

The term perioperative encompasses the entire surgical experience: preoperative, intraoperative, and postoperative. The nurse's role in a perioperative setting includes preparing the patient for surgery, assisting and observing the patient during the operation, preventing and treating postoperative complications, and preparing the patient for discharge. Practice standards and practice guidelines are the basis for providing consistent, high-level care for the patient who is undergoing surgery. Practice standards developed by professional organizations set the expectations and responsibilities of professional nursing performance.

A successful surgical experience includes all members of the health care team. The surgeon and anesthesia care providers assess the patient prior to surgery. Consults from specialty areas such as cardiology, endocrinology, or neurology may be required depending on the patient's past or current medical condition. Some surgeries, such as organ transplantation or the creation of an ostomy, will require the patient to learn a whole new set of health maintenance skills. In these situations, the health care team may include a nurse who works directly with the surgeon and specializes in health care teaching for those surgeries.

A preoperative health evaluation is done within 30 days of a planned operation and must be documented in the patient's chart. .An internist, surgeon, or anesthesia provider performs the evaluation, and it frequently is done as an outpatient examination. This evaluation is performed specifically to clear the patient for the planned surgical procedure. It provides data for confirming the overall appropriateness of performing the planned surgery (by answering questions such as "Is the patient healthy enough to have surgery?"), and confirms the plan to perform the surgery either as an outpatient ,as a same-day admission, or as an inpatient. If abnormal findings are identified during this evaluation, further tests may be required prior to having the surgery.

Preoperative Evaluation

The preoperative evaluation includes

- a medical history;
- a focused review of issues pertinent to the planned anesthesia and surgical procedure;

- an abbreviated physical exam including height, weight, vital signs, cardiac and pulmonary systems;
- an assessment of the patient's overall functional ability.
  The preoperative health evaluation and any recommendations from the evaluation must be sent to the site where the surgery will be conducted.

The anesthesia provider also conducts a preoperative history and physical exam. This preprocedure assessment includes a review of systems with a focus on issues that affect the choice and administration of anesthesia. The patient is asked about any family history of anesthetic problems and any history of motion sickness or anesthesia-related nausea and vomiting. The latter two are risk factors for postoperative nausea and vomiting. The anesthesia assessment includes an examination of the patient's airway, neck(for range of motion),and teeth.

Preoperative assessment by Nurses

Preoperative assessment includes a patient history with physical examination and functional assessment. Patient history includes:

- Age
- Allergies
- Current health problem
- Type of surgery planned
- Plans for autologous blood donation
- Family history
- Past medical history
- Past surgical history and experiences with anesthesia
- Current medications
- Current herbal medications and nutritional supplements
- Alcohol, cigarette, social drug use.

Physical and Functional Assessment

An important part of the preoperative assessment is the physical examination and functional assessment. During this assessment the nurse documents the patient's baseline physical findings such

as vital signs and mental status as well as his baseline functional ability. The components of the assessment remain the same regardless of the type of surgery being performed, but the level of detail provided in certain categories may change by type of surgery. Patients admitted for neurosurgery will have a more thorough reporting of their neurological exam, whereas patients admitted for gastrointestinal surgery will need a more detailed abdominal and nutritional

assessment. The patient's past medical history will also direct the nurse's attention toward specific categories of assessment.

- **Neurological Assessment** The neurological examination includes a baseline mental status examination as well as an assessment of motor and sensory function. An evaluation of mental status includes level of consciousness, judgment, ability to follow commands, appropriateness of behavior, speech, and the ability to express oneself and to understand what is being said.
- **Cardiovascular Assessment** Baseline vital signs are established for the preoperative patient. It is helpful to know baseline pulse and blood pressure because postoperative problems such as anxiety, pain, hypoxia, and dehydration can manifest via a change in vital signs. The nurse assesses heart rate and rhythm, blood pressure, and peripheral pulses in addition to observing the extremities for color, sensation, capillary refill, and the presence of edema. The physician is made aware of any cardiac specific abnormalities present on exam such as hypertension, chest pain, dyspnea, pedal edema, or heart rhythm irregularities.
- **Respiratory Assessment** Baseline findings of respiratory rate and depth, quality of respiratory effort, lung sounds, and oxygen saturation level with room air and with oxygen, if the patient requires oxygen, are established. The nurse also asks the patient about any problems breathing, whether or not shortness of breath interferes with ADLs, and about the use of inhalers, oxygen, or continuous positive airway pressure (CPAP) devices at home. Baseline information is important because postoperative atelectasis is a common problem and because the nurse is usually responsible for weaning patients off oxygen in the postoperative period.
- **Gastrointestinal Assessment** Physical exam includes palpation of the abdomen and auscultation of bowel sounds. Patients are asked about the usual pattern and consistency of bowel movements, the date of the last bowel movement, and what, if any, medications they take for their bowels. Abdominal distention and constipation can occur postoperatively as a result of factors such as anesthesia, limited physical mobility, and the use of narcotics for pain. A patient who has an ostomy is asked about any ostomy-specific issues such as skin care and regularity and about the required supplies during the hospitalization.
- **Genitourinary Assessment** Patients are asked about their usual pattern of urinary elimination as well as urinary issues such as any difficulty starting a stream, controlling continence of urine, completely emptying the bladder, and dysuria. Patients with chronic renal failure are asked if they are anuric (no urine production) and their usual schedule for dialysis. If a patient is on dialysis, then the arteriovenous (AV) fistula or graft, if present, is documented and checked for patency. The AV fistula or graft is palpated for the presence of a thrill and auscultated for a bruit. Baseline data are important for interpreting postoperative findings and anticipating potential problems. Postoperatively, fluid balance is monitored using urinary output. Urinary retention is a postoperative problem that is associated with certain surgeries, such as gynecologic and genitourinary procedures.

- **Musculoskeletal Assessment** Musculoskeletal assessment is concerned with patients' ability to move themselves and their extremities. The nurse notes any problems with range of motion, arthritic joints, or mobility restrictions. These data are important to the proper positioning of the patient intraoperatively as well as postoperatively. If a patient uses a prosthetic device, electrocautery grounding pads, which are used in surgery, should be placed away from the site of prosthesis to prevent potential injury to the tissue. Assistive devices (e.g., prostheses, crutches, a walker, a wheelchair) that the patient requires for mobilization need to be available to the patient postoperatively to facilitate early mobilization.
- **Endocrine Assessment** Patients with diabetes are asked about the frequency of glucose testing and use of oral hypoglycemic agents and insulin. Surgery and anesthesia can affect the regulation of glucose. The physiological and psychological stress of surgery and illness tend to elevate serum glucose levels, whereas factors such as preoperative restriction of food and fluids tend to lower glucose levels. The patient with diabetes should be scheduled for surgery early in the day to limit prolonged fasting. The patient will need frequent monitoring of serum glucose with insulin coverage using a sliding scale. Patients who ordinarily take oral hypoglycemic agents may need the temporary coverage of insulin during periods of stress and illness.
- **Nutritional Assessment** The nutritional assessment includes a baseline height and weight. The nurse asks specific questions about the patient's appetite, usual diet, food preferences, recent weight loss or gain, and any problems with chewing or swallowing. The nurse notes signs of poor nutrition including brittle nails and dry, flaky, skin. The patient's nutritional status has a profound effect on surgical outcomes. Surgery increases basal metabolic rate and the need for proteins, vitamins, and calories. Patient's who are malnourished with a negative nitrogen balance and deficits of vitamins A, C, and B complex are at risk for experiencing problems with their wound including infection, delayed healing, and dehiscence. A low serum albumin (less than 3.5 mg/dL) or a low or declining prealbumin are markers of poor nutrition and are associated with a higher risk of postoperative pulmonary complications. Prealbumin or a transthyretin test is considered a more sensitive marker of nutrition than albumin and correlates with patient outcomes. Postoperatively, a dropping prealbumin alerts the caregiver to a declining nutritional status.

  Integumentary Assessment The nurse asks about skin sensitivities and problems, and observes the condition of the skin for moisture, turgor, and color. Any area of injury or breakdown is noted. Many hospitals adopt the use of a tool or scale to measure the risk or likelihood of pressure ulcer development. Maintaining skin integrity is a priority of care in the operating room. Surgical cleansing materials, surgical tape, electrodes, and other materials have the potential to cause allergic skin reactions. The grounding pad used with electrocautery can cause a burn if improperly placed. Pressure ulcers can develop within 2 to 3 hours of unrelieved pressure**.** Preoperative risk factors for development of skin break

down include older age; the presence of comorbidities such as diabetes, hypertension, and vascular disorders; poor nutritional status; and low hemoglobin and hematocrit level.

Psychosocial Assessment

Surgery is a stressful life event for patients and their significant others. Among the reported sources of anxiety are fears—of the unknown, of death, of mutilation, of disability and loss of independence, of loss of sexuality, of waking up during the surgery, of pain, of separation from family, and of the financial impact. The nurse asks open-ended questions to illicit the patient's concerns about surgery and anesthesia. The nurse also assesses for physiological indicators of stress and anxiety including crying, restlessness, tachycardia, tachypnea, diaphoresis, complaints of inability to sleep, stomach upset, nausea, and diarrhea. Numeric rating scales of anxiety, similar to those used to rate pain, are an effective, easy, and valid way to measure anxiety.

Patients' level of stress will influence their ability to listen and absorb perioperative instruction. It can also affect their response to anesthesia and pain medication and their ability to comply with postoperative care. Patients who are highly anxious about surgery may benefit from receiving premedication with an antianxiety agent.

The nurse asks about patients' support systems including family (traditional and nontraditional), friends, and other sources of support such as neighbors and religious affiliations. Patients are also asked if there are spiritual or cultural rituals or traditions that they would like to maintain during their hospitalization.

Preoperative teaching and support

Preoperative teaching and support can be categorized into five dimensions:

- Situational and procedural information refers to teaching about the surgery and anesthesia.
- Sensation and discomfort information refers to teaching about what the patient can expect to see, hear, or feel.
- Patient role information refers to teaching patients how to participate in their own care.
- Skills training information refers to teaching about specific skills to be used postoperatively such as how to get out of bed with less pain or how to use the incentive spirometer.
- Psychosocial support refers to interactions aimed at alleviating fears and anxieties.

Preoperative Teaching to Prevent Postoperative Complications

Patients who are scheduled for major surgery that reduces mobility and requires inpatient recovery should be taught breathing exercises, how to splint the incision, coughing (to help clear airways), leg exercises, and the importance of postoperative ambulation.

Breathing Exercises

Deep breathing is taught as an intervention to decrease the risk of the postoperative pulmonary complications of hypoxemia, atelectasis, and pneumonia. To perform deep breathing, the patient breathes out normally then takes a deep breath through the nose or mouth, holds inspiration to the count of three or longer, and slowly releases the breath.

Postoperatively, the patient is asked to take 5 to 10 deep breaths every hour. Deep breathing slows the respiratory rate and produces a sustained maximal inspiration. It is thought that deep breathing increases lung volumes by increasing tidal volume and minute ventilation. It also generates higher flow rates, and stimulates surfactant to help keep alveoli open.

Splinting the Incision

Patients with thoracic or abdominal incisions can be taught preoperatively how to splint the incision to prevent painful stress on the area. The patient can use a small, flat pillow or a small, folded blanket, sometimes referred to as a "cough pillow," to apply gentle, firm pressure over the incision when performing activities that tend to pull the incision such as when getting out of bed, getting up from a chair, or coughing. Splinting the incision is helpful in reducing pain.

Coughing Postoperative

patients have an increase in mucous production and a decreased ability to clear mucus from the airways as a result of anesthesia. Retained mucus places patients at risk for the development of atelectasis and pneumonia. Coughing can help to clear mucus from the airways and facilitate full expansion of the lungs because it requires an increase in intra-thoracic pressure and a rapid expiratory flow. Coughing can be quite painful for some patients because of the stress it places on the suture line. Splinting the incision will help protect it and reduce some of the pain that occurs with movement of the incision area. Coughing may be contraindicated after some surgeries because of the stress it puts on the incision (e.g. hernia) or because it increases intracranial pressure (e.g. craniotomy).Generally a health care provider's order will be written to avoid coughing for surgical procedures where it is contraindicated.

Leg Exercises

Guidelines on prevention of venous thromboembolism recommend that a risk assessment be performed on all surgical patients. Most patients receive some form of prophylaxis against the development of DVT (i.e., venous blood clot in the leg) postoperatively. Leg exercises are a simple

way of stimulating venous return in the patient with limited mobility. They are used in addition to other devices to prevent venous stasis.

Ambulation and Mobility

Early ambulation is beneficial to the postoperative patient for a number of reasons. Ambulation increases heart rate and cardiac output and stimulates circulation to all body systems. The increase in circulation helps to rid the body of the effects of anesthesia. Ambulation increases respiratory rate and minute ventilation, and it helps to mobilize respiratory secretions. Increased circulation to the intestinal tract helps to stimulate peristalsis, and increased blood flow through the kidneys stimulates the production of urine. Blood flow to skin and muscles brings nutrients needed for wound healing. Ambulation stimulates calf muscles and increases venous return. Frequent ambulation, a minimum of three times per day, may help prevent some of the complications associated with immobility. Patients need to understand the importance and emphasis that is placed on walking after an operation and be shown effective ways of getting out of bed postoperatively.

Informed Consent

The patient must sign an informed consent form prior to surgery. The informed consent protects all parties involved: the patient, the surgeon, and the hospital. In order for the consent to be valid, there must be full disclosure of the treatment to be performed, the patient must sufficiently understand the information provided (i.e., must be competent), and the patient must voluntarily consent to the treatment. Full disclosure includes a description of the condition requiring surgery, the surgical procedure, the possible risks and benefits, alternative treatments, and prognosis. The surgeon is responsible for discussing the procedure with the patient and securing an informed consent. If a patient is unable to sign, an “X” is an acceptable substitute provided there are two witnesses. Consent is voluntary and can be withdrawn at any time. The surgical consent form may include additional consents such as consent for a blood transfusion and for the disposal of body tissues. The nurse’s role in the process is to clarify information for the patient and advocate for the patient as needed.

3.3 Intraoperative Nursing Management

The verification process consists of information gathering and verification, which begins with the determination to do the procedure and continues through all settings and interventions involved in the preoperative preparation of the patient, up to and including the time-out just before the start of the procedure.

The nurse asks the patient to confirm the procedure to be completed, the surgical site, and the surgeon. The nurse verifies this information with the surgical consent form, a site verification form

per organization policy, and the operating room schedule. In some cases, especially when there is a left or right side involved in the procedure, the correct area for surgery is marked on the patient.

Patient positioning in the OR is chosen to accommodate surgical access, staff ergonomics, and surgical view while maintaining the patient's skin integrity. It is for this reason that OR tables are narrow (ergonomic for surgeon) and firm (limits movement and allows for CPR). OR tables and accessories are designed to accommodate a wide range of positions in order to allow for the use of gravity to displace organs in order to provide additional working space, surgical access, enhanced ergonomics for professionals, and prevent patient complications.

Surgical counts are the responsibility of perioperative nurses and are performed in order to prevent patient injury due to the high risk of retained foreign body, which can include gauzes, needles, or instruments. Retained foreign objects in patients have resulted in major injuries such as sepsis, bowel perforation, and death.

The patient is monitored throughout the operation for blood loss. The calculation of blood loss is referred to as the estimation of blood loss (EBL). Blood in suction containers, wound drains, chest tubes, and nasogastric tubes is measured directly at frequent intervals during the surgery. If irrigating fluid is used, it is subtracted from the total amount of drainage to determine the amount of actual blood loss.

Postanesthesia Care Unit / Recovery Room

Once the surgery is completed, the anesthetist and the nurse will accompany the patient to the postanesthesia care unit (PACU) for further monitoring. Concerns along this route will focus on safety, infection control, medication, communication, positioning, and equipment. The PACU is where the patient will recover from the anaesthetic he has received. This is an unrestricted area where the patient will no longer need to wear a head cover and the nurses will wear regular uniforms. Visitors may be allowed in certain parts of the PACU under certain circumstances. Poor communication is one of the top contributing factors to medical errors. Therefore, nurses must strive to provide effective and consistent information during patient handoff to a transition unit such as the PACU or Intensive Care Unit (ICU). It is important to give any pertinent information to the unit members where the transfer of responsibility for the surgical patient is occurring and provide an interactive communication that is free of interruptions and includes a systematic process of verification.

3.4 Postoperative Nursing Management

Nursing assessment and intervention immediately following surgery focus on patient safety, hemodynamic stability, and the recognition and prevention of postoperative complications. Care

in the PACU is organized around postanesthesia phases I and II. Phase I begins with the arrival of the patient and focuses on the recovery of physiological homeostasis and protective mechanisms. During this phase, the patient requires intensive nursing observation and care.

Phase II begins when the patient becomes more alert and functional. The patient requires less intensive nursing and the focus of interventions is on preparing the patient and significant others for the patient's discharge home. As such, phase II refers most specifically to ambulatory surgery. The term fast-tracking describes a situation in which the patient is transferred from the operating room to PACU phase II by passing PACU phase I. Fast-tracking is possible when surgical techniques are minimally invasive and anesthesia is of a short duration.

Assessment The PACU nurse ensures patient safety during the transition from the operating room to home or to the clinical unit. The PACU nurse is an intensive care nurse who is prepared to identify and prevent the acute problems and complications associated with surgery and anesthesia. The nurse is skilled in the management of situations where the patient's physiological condition is rapidly changing and the nurse is especially attentive to surveillance (the systematic and continuous assessment of the patient) and to the recognition and management of potentially catastrophic events. A complete system assessment of the patient is conducted immediately on arrival to the PACU. The nurse uses the ABCs (i.e., airway–breathing–circulation) to prioritize the initial assessment of the surgical patient starting with observation of the airway for patency. Unless contraindicated, recovering patients are placed in a lateral position to reduce the risk ofaspiration. An artificial airway (oral or nasal) prevents the tongue from falling backward and occluding the airway. It may be used until the patient is able to support her airway unassisted. Humidified oxygen is placed via face mask and titrated to keep oxygenation saturation levels above 93% or at a level determined by the health care provider. For the first 2 hours after surgery, the patient may be placed on high levels of oxygen (e.g. ,FI O2 greater than 80%) because evidence suggests that this will destroy pathogens and reduce the risk of surgical-site infections.

The following areas are assessed during the head-to-toe examination.

Level of consciousness (LOC)—Is the patient unconscious, arousable, fully awake? LOC is documented every 15 minutes for the first hour, then hourly thereafter. Describe pupil size and response. If awake, is the patient oriented to person, place, and time? Is the patient's speech clear? Intracranial pressure will be measured following selected cranial surgeries.

Cardiovascular—Record the patient's vital signs and cardiac rhythm. If applicable, measure and record cardiac output, pulmonary artery pressures, and central venous pressure. Examine the extremities for color, sensation, motion, and pulses.

Respiratory—Describe patient's airway and need for artificial airway, respiratory rate, depth, breath sounds, oxygen saturation, cough, secretions, arterial blood gases, chest tubes, and need for suctioning, if applicable.

Pain management—Describe the location, quality, and rating of pain. If a spinal or epidural was used, describe the sensory level of numbness and the motor ability of the extremities.

Gastrointestinal—Describe abdominal assessment (Is the abdomen flat and soft or firm and distended? Are bowel sounds present?).If the patient is nauseated, describe whether the nausea is mild, moderate, or severe. Is the patient vomiting?

Genitourinary—Does the patient have a urinary catheter? Describe the amount and color of urine output. If no catheter, is the bladder distended? Has the patient voided? Note when the patient is due to void. If a gynecologic procedure was performed, describe vaginal bleeding.

Skin integrity—Describe skin color, temperature, areas of bruising, redness, or ulceration.

Temperature—Record core body temperature

Incision—Describe location and condition of incision. Describe any bleeding, wound drainage, or the presence of a hematoma. If the suture line is not visible, describe the condition of the dressing. Describe the type and drainage from any wound drains.

Activity/movement—Is the patient able to hold his head up? Is the patient able to move all extremities? Are movements voluntary or on command? Describe strength of extremities; is it equal on both sides? Does the patient have compression stockings, pneumatic compression boots, or another type of deep venous thrombosis (DVT) prophylaxis device in place?

Psychosocial—If the patient is awake, describe the level of psychosocial comfort. Is the patient calm, relaxed, and sleeping or anxious and distressed?

Intravenous fluids—Describe the location of intravenous catheters, the type of catheter, and the type and rate of intravenous fluid.

Drains and other tubes—Describe the type, location, and drainage of any tubes.

Other medical devices—Describe any other devices the patient may have such as an arterial line, pulmonary artery catheter, or traction.

Preventing Postoperative Complications

A significant role of the nurse on a surgical unit is to prevent postoperative complications when possible. Common problems that occur after surgery include atelectasis, pneumonia, abdominal distention, constipation, urinary retention, wound infection and venous stasis among others.

1. Atelectasis and Pneumonia

Atelectasis refers to the collapse of alveoli and the surrounding airways. When alveoli collapse, lung volume is reduced, and mucus accumulates, causing localized airway obstructions from mucous plugs. If atelectasis remains untreated, it leads to fever and hypoxia. Although it is not entirely clear, some theorize that the retention of secretions associated with atelectasis increases the risk of developing pneumonia. Pneumonia is the inflammation of lung parenchyma caused by a virus, bacteria, or other organism. The invasion of lung tissue by an organism causes an inflammatory response and the alveoli fill with inflammatory exudates. These changes are seen on chest x-ray as new infiltrates. Signs of pneumonia include fever, dyspnea, crackles in the lung fields, purulent sputum, congested cough, hypoxia, and an elevation in the white blood cell count. The incidence of postoperative atelectasis varies according to the surgery performed, but it is estimated to be as high as 84%.

- The nurse assesses the patient's respiratory rate, depth, lung sounds, and oxygen saturation at frequent intervals. Postoperative atelectasis most often occurs in the lower lobes of the lungs. Lung sounds may be diminished as a result of shallow respirations or crackles, which are most noticeable on inspiration and may be heard as collapsed alveoli are forced open. Crackles also occur with pneumonia as air is forced through mucus and fluid in the alveoli. The crackles with pneumonia may be present throughout the respiratory cycle. Atelectasis can clear with repeated deep breathing, so the nurse assesses lung sounds before and after use of incentive spirometry or deep breathing. Fever can be present with either atelectasis or pneumonia and is caused by inflammatory mediators. A number of interventions are designed to decrease postoperative pulmonary complications. Unless contraindicated, the patient is placed in semi-Fowler's, Fowler's, or high-Fowler's position.
- Elevating the head of the bed 30 to 90 degrees lowers the diaphragm, thus facilitating chest expansion.
- The patient is encouraged to use lung expansion therapies, deep breathing, or incentive spirometry. Deep breathing reverses alveolar collapse by forcing and holding maximal inspiration. Deep breathing is most effective when maximal inspiration is held for 3 seconds or longer and when the exercises are performed frequently. Patients are encouraged to take 5 to 10 deep breaths every hour, but more is better.
- Nasal continuous positive air way pressure, a specially designed face mask and pump that forces air into the nasal passages at pressures high enough to keep the air way open, maybe helpful to patients who are unable to perform deep breathing.
- Forced coughing is used postoperatively to clear secretions. To have an effective cough, the patient must take a deep breath, increase intra thoracic pressure, and produce a high expiratory flow rate.
- Interventions to loosen and remove secretions such as percussion and postural drainage are recommended in specific situations but they are not employed universally after surgery.
- Ambulation is an important intervention to prevent postoperative pulmonary complications. Ambulation increases respiratory rate, minute ventilation, tidal volume, and

inspiratory flow rates. Pain control is absolutely essential to getting patients to participate in pulmonary exercises and ambulation.

2. Urinary Retention

Many patients will have a urinary catheter for the first 12 to 24 hours after surgery. Urine output is observed frequently in patients with a Foley catheter. If urine output falls below 30mL or .5 mL/kg per hour, the health care provider is notified. The catheter will be removed as soon as possible to avoid the possibility of a urinary tract infection (UTI). Once the catheter is removed, the patient is at risk for development of urinary retention. Urinary retention is common and occurs as a result of general anesthesia from relaxation of the detrusor muscle, spinal anesthesia from blocking parasympathetic fibers in the sacral region of the spine controlling micturition, certain preoperative medications, and narcotics. Urinary retention is also more likely tooccurinsurgeriesofthelowerabdomen,pelvis,andgenitourinarytractwheremanipulationoftissuesmaycauseswellingofor around the urethra.

3. Wound Infection

Wound healing begins immediately after tissue injury.

Stages of Wound Healing

In the first stage (days 1 to 4), the inflammatory process is triggered bringing blood, lymph, and fibrin to the area. Fibrin strands form along the area of injury, creating a blood clot that holds the wound edges together. Increased blood flow to the site brings white blood cells (WBCs) that remove damaged tissue and fight off microorganisms.

In the second stage (days 5 to 14 or longer), epithelial cells migrate to the area and proliferate, forming a protective barrier at the wound site. While the process of epithelialization is occurring, collagen synthesis is taking place, filling in tissue gaps and giving the wound added strength. Collagen synthesis helps contract the wound, making it smaller than its original size.

The last stage of healing begins 2 to 3 weeks after injury and lasts a year or longer as the wound is reshaped. As collagen breaks down and is replaced, the new fibers become more closely packed shrinking the scar and making it less bulky. Until the wound is completely healed, infection is a concern.

Traditionally, the surgeon performs the first dressing change. Until then, the nurse monitors the surgical site for evidence of bleeding or drainage. Some amount of drainage is normal after surgery. Small to moderate amounts of drainage are circled with a pen directly on the dressing. This allows the nurse to watch for an increase in the amount of drainage. The dressing can also be reinforced. Excessive amounts of bleeding or drainage are reported to the surgeon. After the first dressing change, the wound may be left open to air or covered with a dry sterile dressing according to healthcare provider preference.

Dressing changes are usually performed once or twice a shift using sterile technique. During the dressing change, the nurse notes the condition of the incision. It should be well approximated, slightly pink, and free of purulent drainage. Crusting along the incision is a normal finding. The nurse reports signs of wound infection including pain and tenderness at the site, swelling, redness, purulent drainage, odor, or evidence of dehiscence to the surgeon. Systemic indicators of infection include fever (38°C or higher), elevated WBC count, and elevated serum glucose. Studies confirm that fever is a non-specific and insensitive measure of infection.

4. Wound Dehiscence and Evisceration

Two potential problems of the wound site are wound dehiscence and wound evisceration. Wound dehiscence is a partial or complete separation of the wound layers with an opening of the wound. Evisceration is a complete separation of the wound layers and the protrusion of internal organs or viscera. Any wound can dehisce, but it occurs most frequently with abdominal incisions and it occurs most often 5 to 10 days postoperatively. Wound disruption can occur because of poor surgical closure, poor wound healing, or increased stress on the surgical incision.

.Wound dehiscence and wound evisceration are emergencies. The nurse calls for help and assists the patient back to bed. The patient is positioned supine with knees bent, and the nurse covers the wound and internal organs with sterile towels or gauze soaked in normal saline. The nurse keeps the wound moist and does not attempt to replace the organs. The surgeon is called and the patient's vital signs are taken every 5 minutes. Wound dehiscence may be treated medically with dressings or surgically with wound closure. Evisceration is treated with surgical closure.

5. Venous Thromboembolism

Deep venous thrombosisis the formation of a venous blood clot in a deep vein, usually in the lower leg or pelvis, and it is a serious postoperative problem. Once the clot forms, there is a danger of detachment and the possibility of a pulmonary embolus (PE),a serious condition in which the clot obstructs an artery in the lungs. Venous thromboembolism (VTE) is the collective term for DVT and PE. It describes the process of blood clot formation and travel through the veins. DVT occurs as a result of vascular stasis (injury to the intimal layer of the vein) and hypercoagulability. The postoperative patient is at risk for DVT because anesthesia vasodilates vessels, leading to stasis and decreased venous return. Longer surgeries cause prolonged immobilization of the patient during the procedure and are associated with a higher risk of blood clot formation. Reduced mobility after surgery contributes to vascular stasis and DVT. Major orthopedic surgery, multiple trauma, and pelvic surgeries are associated with a higher risk of DVT than other procedure.

- Prevention of venous thromboembolism is a goal for all postoperative patients and the nurse should discuss prophylaxis with the healthcare provider if a postoperative patient arrives on the clinical unit without such orders.
- Antithrombotic drug therapy is frequently used to prevent DVT. Low-dose unfractionated heparin (LDUH) or low-molecular weight heparin (LMWH) is given subcutaneously in

large enough doses to prevent clot formation but the dose is not large enough to produce systemic anticoagulation.

- Other ways to decrease the risk of DVT include intermittent pneumatic compression devices (IPCs) or graduated compression stockings (GCSs).

4.0 Tutor-Marked Assignment

Outline the vital postoperative care given to a surgical patient?

Answer

Maintenance of airway clearance

Fluid and electrolyte balance

Vital sign monitoring

Management of pain

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Section 2: Care of Patients Experiencing Trauma and Unconscious Patient

CONTENT

1.0 Introduction

Trauma is the fifth leading cause of death in the world. Victims of major trauma may receive injury to an isolated vital organ or to multiple body systems, with several complications. This section will discuss trauma, classification of trauma care of traumatic patient and unconsciousness.

2.0 Learning Outcome

At the end of reading this section, the student will be able to:

- Explain the mechanism of injury and trauma
- Discuss the different classification of trauma
- Explain he nursing management for a trauma case
- Say who the unconscious patient is
- Explain the nursing care for the unconscious patient

3.0 Main Content

3.1 Mechanism of Injury and Trauma

When assessing a victim of major trauma, it is important to determine the mechanism of injury. Injuries are classified as either penetrating or blunt. Penetrating, or open, injuries may be caused

by any sharp object, such as broken glass or a knife, or by projectiles traveling at high speed, such as bullets or fragments from an explosion. In blunt, or closed, injuries the skin surface is intact. The injury from blunt trauma usually extends beyond the point of impact to surrounding and underlying structures. For example, a blow to the chest may cause a fracture of several ribs that in turn may cause blunt trauma (such as a laceration or hematoma) to the spleen. Damage caused by a gunshot wound and the trajectory of the bullet depends on the projectile mass, the type of tissue struck, the striking velocity, and the range. Entrance wounds are round or oval and may be surrounded by an abrasion rim. Powder burns are visible if the fire arm was discharged at close range. Documentation of these wounds should include a clear description of their appearance but should not include the words entry or exit. Patients with gunshot wounds near the level of the diaphragm should be evaluated for both abdominal and thoracic injuries.

Surface Trauma

Surface trauma includes any injury that does not break the skin (closed wound) and any open wound in which the skin surface is broken.

Types of closed wounds

- contusions (bruising)
- hematomas (collection of blood under the skin).

Types of open wounds

These include abrasions, lacerations, avulsions, amputations, punctures.

- **Abrasions** are a scratching of the epidermal and dermal layers of the skin. They bleed very little but can be extremely painful because of inflamed nerve endings. Dirt may be ground into abrasions and can increase the risk of infection when large areas of skin are involved.
- **Puncture wounds** result from sharp, narrow objects such as knives, nails, or high-velocity bullets. They can often be deceptive because the entrance wound may be small with little or no bleeding. It is difficult to estimate the extent of damage to underlying organs as a result. Puncture wounds usually do not bleed profusely unless they are located in the chest or abdomen.
- **Lacerations** are open wounds resulting from snagging or tearing of tissue. Skin tissue may be partly or completely torn away. They vary in depth and may be irregular in shape. Lacerations can cause significant bleeding if blood vessels or arteries are involved.
- **Avulsions** involve a full-thickness skin loss in which wound edges cannot be approximated. This type of injury is often seen in machine operators, or in lawn mower and power tool accidents.

- **An amputation** is a partial or complete severing of a body part. In cases of complete amputation, the arteries usually spasm and retract into the tissue, resulting in less bleeding than does a partial amputation, in which the lacerated arteries continue to bleed. If the patient has sustained an amputation, bleeding is controlled with direct pressure and elevation. A tourniquet is applied only as a last resort. If a tourniquet is necessary, it should be made of wide material such as a blood pressure cuff, which is less damaging to nerves and blood vessels. A dressing is applied to the amputated extremity, which is referred to as the stump. The stump is covered with sterile saline–moistened gauze followed by dry gauze, which is held in place with an elastic bandage for pressure. Amputated parts are taken to the hospital with the patient for possible reattachment. At the hospital, the amputated part is rinsed with saline solution, wrapped in sterile gauze, and placed in a sealed plastic bag, which is then placed in a mixture of ice and ice water.
- For a patient with an injury caused by an impaled object, it is imperative that the object not be removed unless it is obstructing the airway. Removing an impaled object may cause additional trauma and uncontrollable internal bleeding. Impaled objects are never cut off, broken off, or shortened unless transportation to the emergency department is otherwise impossible. A bulky dressing is applied around the object to stabilize it and reduce motion.

Tetanus

Tetanus is a disease caused by the bacillus Clostridium tetani, which enters the body through an open wound. Tetanus causes seizures, muscle spasms, stiffness of the jaw, coma, and death. Tetanus vaccinations should begin at 2 months of age and be followed by a series of pediatric immunizations until age 15. Thereafter, booster vaccinations are recommended every 10 years in the absence of an open wound.

3.2 Classification of Trauma

Head Trauma

Sharp blows to the head can cause shifting of intracranial contents and lead to brain tissue contusion. The pathophysiology of head trauma can be divided into two phases. The first phase is the initial injury that occurs at the time of the accident and cannot be reversed. The second phase involves intracerebral bleeding and edema from the initial injury, which causes increased intracranial pressure (ICP). Management of head trauma is directed at the second phase and involves decreasing ICP.

Signs and Symptoms of Increased Intracranial Pressure

- Early Signs and Symptoms of Increased ICP
- Headache
- Nausea and vomiting
- Amnesia
- Altered level of consciousness
- Changes in speech
- Drowsiness

Late Signs and Symptoms of Increased ICP

- Dilated nonreactive pupils
- Unresponsiveness
- Abnormal posturing
- Widening pulse pressure
- Decreased pulse rate
- Changes in respiratory pattern

Spinal Trauma

Spinal cord injury most often results from motor vehicle crashes, sports injuries, falls, and assaults, with most cases occurring in men ages 16 to 30. The cervical spine is especially vulnerable to traumatic injury. Patients who have sustained severe multiple injuries should be suspected of having a spinal cord injury, especially when they have signs of head trauma. All trauma patients should be treated as though they have a spinal cord injury until proven otherwise. Moving a patient with a vertebral injury may cause displacement of the injured bones and may increase damage to the spinal cord. Patients should be moved only by qualified people. Stabilization of the neck and back with a cervical collar and backboard is essential until spinal cord injury is ruled out.

Chest Trauma

Chest trauma can damage the heart and lungs and cause life threatening injuries, including pericardial tamponade, hemothorax, tension pneumothorax, and flail chest. Potentially life-threatening injuries include pulmonary and myocardial contusion, aortic and tracheobronchial disruption, and diaphragmatic rupture. Chest trauma can result in laceration of lung tissue and cause a change in the negative intrapleural pressure. Air or blood leaking into the intrapleural space collapses the lung, resulting in a pneumothorax (air) or hemothorax (blood) and ineffective ventilation. In a tension pneumothorax, air is trapped in the pleural space during exhalation, resulting in increased pressure on the unaffected lung. The heart, great vessels, and trachea shift toward the unaffected side of the chest. As a result, blood flow to and from the heart is greatly reduced, causing a decrease in cardiac output. An uncorrected tension pneumothorax is fatal. Chest trauma can also injure the heart and great vessels and reduce the amount of circulating blood

volume. The heart may be bruised (myocardial contusion) or may sustain direct trauma. Cardiac tamponade occurs when blood accumulates in the pericardial sac and increases pressure around the heart. The increased pericardial pressure prevents the heart chambers from filling and contracting effectively. A patient with cardiac tamponade exhibits hypotension, tachycardia, and neck vein distention and requires immediate intervention to reduce the pressure in the pericardial sac and restore normal filling and contraction of the heart chambers.

Abdominal Trauma

The organs of the abdomen are vulnerable to injury because there is limited bony protection. Injury to organs such as the spleen and liver, which have a rich blood supply, can result in rapid loss of blood volume and hypovolemic shock. Abdominal organs may be injured as a result of severe blunt or penetrating trauma. If hypotension is present, intraabdominal hemorrhage may exist. If the urinary bladder ruptures, urine leaks into the abdomen and blood may be detected at the urinary meatus or perineum. Penetrating trauma can cause lacerations to abdominal organs, resulting in rapid blood loss and hypovolemic shock.

Orthopedic Trauma

Fractured bones can result in blood loss, compromised circulation, infection, and immobility. Unstable pelvic fractures can cause injury to the genitourinary system or disrupt the veins in the pelvis. Fractures of large bones such as the femur and tibia can cause significant blood loss. For example, a fractured femur can cause up to 1500 mL of blood loss and a fractured tibia or humerus can cause up to 750 mL of blood loss. Joint dislocations can cause neurovascular compromise by applying pressure to the nerves and blood vessels. Delayed fracture reduction (realignment or setting) can cause avascular necrosis, which leads to death of the affected tissue and bone.

Assessment/Data Collection

1. The mechanism of injury is determined to identify the extent of injury. Loss of consciousness immediately after the injury indicates that a concussion has occurred. The Glasgow Coma Scale (GCS) is used to rate a patient's level of consciousness. The highest score is 15, indicating that the patient is alert and needs only observation. Scores lower than 13 may indicate the need for immediate treatment. Morbidity and mortality are highest for patients with GCS scores of 8 or lower. Pupil size and reaction are monitored and recorded.
2. Dilated or nonreactive pupils indicate increased ICP and a need for immediate intervention. Spinal nerves are located in the spinal cord and transmit motor and sensory impulses to the body. The higher a traumatic lesion is on the spinal column, the more extensive will be the loss of muscle and sensory function.
3. The patient's muscle functions correlate with the level of spinal injury. A spinal cord injury at the level of C5 or above interferes with diaphragmatic function and affects respiratory effort, which must be carefully assessed.

4. The patient's level of muscle control and ability to feel each extremity is noted and recorded. Patients with major chest injuries can have dramatic symptoms. They may exhibit classic signs of shock with cyanosis, dyspnea, and restlessness.
5. The patient's breathing pattern and effectiveness of respirations are assessed. The rise and fall of the chest is observed, as well as symmetrical chest movement. Any bruising on the chest or upper abdomen is noted. Seat belts and restraint systems can cause significant bruising in high-impact crashes.
6. Vital signs are taken to detect tachycardia and hypotension from shock. The shape of the abdomen is observed to detect distention from intra-abdominal hemorrhage. Skin color, bruising, open wounds, and penetrating trauma are noted. The abdomen is auscultated for bowel sounds. The perineum is inspected for blood from the urethra.
7. Vital signs and pain level are assessed to detect orthopedic abnormalities. A respiratory assessment is done to detect a pulmonary embolism as a result of a long bone fracture. The injured extremity is inspected and skin color and capillary refill are noted. Skin integrity, protruding bone, or deformity is noted. Pulses distal to the injury are palpated to assess circulation to the area. Motor function and sensation are assessed to determine the extent of nerve injury.

3.3 Nursing Management for a trauma case

Pain

- Apply ice, elevate, and immobilize the affected area to decrease swelling and relieve pain.
- Provide analgesics as ordered to relieve pain.

Skin Integrity

- Apply direct pressure to open wounds to control bleeding.
- Irrigate open wounds with sterile saline solution to thoroughly remove dirt and debris and clean exposed tissue to prevent infection.

Tissue Perfusion

- Give oxygen as ordered to maintain adequate oxygenation of brain tissues and prevent cellular damage from hypoxia at the cerebral level.
- If the patient has an altered level of consciousness or deteriorating respiratory effort, anticipate and assist with endotracheal intubation as needed to provide respiratory support to patient.
- Elevate the head of the patient's bed 15 to 30 degrees, if possible, to reduce ICP.
- Maintain the patient's head position at midline to ensure unobstructed venous drainage to help reduce ICP.

- Maintain intravenous access for fluids to maintain hemodynamic stability and access for medications.
- Monitor mannitol IV, an osmotic diuretic, as ordered to decrease cerebral edema.
- If the patient is agitated, calm the patient as agitation increases ICP.

Breathing Pattern and airway clearance

- If the cervical spinal cord has been traumatized, the effectiveness of breathing may be altered. If signs of respiratory distress are present, use the jaw thrust or chin lift maneuver, along with suction and airway adjuncts as needed to maintain patency of the airway.
- Maintain cervical collar and backboard to prevent further injury.
- Give oxygen as ordered to improve tissue oxygenation. Advanced adjunct airway equipment, including an endotracheal tube, must be readily available.
- Administer supplemental oxygen as ordered to promote tissue oxygenation.
- Maintain chest tube drainage system if inserted to help expand lung.
- Suction the oropharynx and nasopharynx to clear secretions and prevent aspiration of secretions into the airway.
- If the patient vomits, log roll the patient onto side to prevent aspiration of emesis. Use suction as needed

Fluid Balance

- Monitor for signs of shock to detect hypovolemic shock.
- Maintain IV fluids as ordered per 18- or 16-gauge IV cannulas to restore circulating volume.
- Assist with peritoneal lavage if performed to detect intra-abdominal hemorrhage.
- Maintain nasogastric tube if ordered to decompress the stomach.
- Cover abdominal wounds with a sterile dressing to prevent infection.
- If abdominal organs are exposed, cover with sterile saline-soaked dressings to prevent tissue necrosis.
- Assist with blood and blood products administration as ordered per agency policy to maintain circulating volume and improve tissue oxygenation.

Prevention of complications of bone injury

- Remove all jewelry before applying a splint as the extremity may swell after injury.
- Maintain extremity in splint in the position found unless the distal circulation is severely compromised and keep immobilized if there is severe pain or deformity. Splinting promotes comfort and prevents further damage to surrounding tissue by preventing movement of broken bone ends.
- Immobilize the joints above and below the affected area using a folded towel or a pillow until the patient is evaluated by a physician.

- Monitor skin color, temperature, distal pulses, capillary refill, movement, and sensation of the extremity after splint application to detect abnormalities.
- Maintain neck immobility during initial treatment of a patient with head or neck trauma to prevent serious injury until trauma damage is identified.

3.4 The Unconscious Patient

The unconscious patients are those who have temporary or permanent impairment of either the reticular activating system in the brainstem, both cerebral hemishperes or bilateral thalami. It could be caused by either structural pathology localized at the brain or due to systemic pathology. Therefore, unconsciousness is a state in which an individual is unresponsive to stimuli and appears to be sleeping.

Types of unconsciousness

- Acute state of unconsciousness
- Chronic state of unconsciousness

In an acute state of unconsciousness, the condition is potentially reversible. But, the chronic state is irreversible. The acuter state is caused by metabolic upsets, like hypoglycaemia, drug toxicity, which can temporarily impair the brain function, leading cloudiness in consciousness.

Assessment of the level of consciousness

Different tools have been developed over time to assess the level of consciousness. The Glasgow Coma Scale (GCS) is the most commonly used. This is because it is quick, objective and easily interpreted mode of neurological assessment. The accuracy of the GCS assessment is dependent of the competency of the assessor.

3.5 Nursing management for the Unconscious Patient

- The nurse should give care to relief the effect of immobility. Immobility can give rise to many complications in the unconscious patients. Hence there is need to apply range of motion exercises and frequent positional change.

- For respiratory functions, maintain a patent airway and ensure god ventilation. Suction excess secretions, remove dentures and properly fix the oropharyngeal airways. Inability to maintain a proper airway might lead to complications such as chest infections. If there are gastric secretions, nasogastric tube can be inserted to prevent aspirations.
- Proper positioning to allow for postural drainage. To maintain a patent airway, lateral recumbent position is advised.
- Monitor vital signs, especially the oxygen saturation. Administer oxygen therapy via a humidifier to prevent drying of secretions. Check the pulse and blood pressure. A low blood pressure with tachycardia is suggestive of hypovolaemia. Monitor neurological assessment.
- Wear patient antiembolic stockings to increase flow of blood, enhancing venous return.
- Ensure proper nutrition and hydration. Enteral can be achieved. Nasogastric feeding or total parenteral feeding can be indicated. Accurate fluid balance must be ensured to maintain body function and prevent potential imbalances.
- Monitor strict input and output chart.
- Immobility alters glucose-insulin intolerance. Hence, intravenous insulin can be given regimentally to maintain blood glucose level. Close monitoring of blood glucose level is essential to ensure that normal level is maintained.
- Soft diet with high fiber should be given to ease digestion and promote elimination. Constipation and fecal impaction are common with immobility. Regular laxatives can be given to assist elimination.
- Proper mouth care and general body hygiene should be ensured.
- Skin care should be a priority. Skin hygiene, correct positioning and regular turning should be ensured to prevent pressure ulcers.

4.0 Tutor-Marked Assignment

1 A close wound could be …… and ……..……

2. The following are examples of open wound except

A. Contusion

B. lacerations

C. amputations

D. punctures.

3. Unconsciousness can either be caused by …….

4.. The total most commonly used to assess level of unconsciousness is ……

Answer

1. contusion and hematomas

2. A

3. structural pathology localized at the brain or due to systemic pathology

4. Glasgow Coma Scale

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Section 3: Care of Patients Receiving Palliative Care

CONTENT

1.0 Introduction

Palliative care is care focused on improving quality of life by relieving physical, mental, and spiritual distress for individuals who are dying, and providing support for patients' families. It primarily is planned and implemented to alleviate manifestations such as pain, nausea, dyspnea, confusion, anxiety, and depression. Although palliative care may be provided by a single person, it (like hospice) usually involves the combined efforts of an interdisciplinary team. Care is provided in the patient's home, long-term care facility, senior living facility, hospice home, or hospital. The expected outcomes of care are directed by interventions to manage current manifestations of the illness and to prevent new manifestations from occurring.

2.0 Learning Outcome

At the end of reading this section, the student will be able to:

- Define palliative care
- State the purpose of palliative care
- Explain palliative sedation
- Discuss the role of palliative sedation care

3.0 Main Content

3.1 Palliative Care

Terminally ill patients are often given palliative care, or care that relieves symptoms, such as pain, but does not alter the course of disease. Palliative care is an approach that focuses on the seriously ill patient and family and is most often provided in the home, hospital setting, or long-term care facilities. In palliative care, the goal is to ensure the highest possible quality of life for the patient and family. A primary aim is to help the patient feel comfortable, safe, and secure. The nurse can do much to increase the patient's feelings of safety by being available when needed. Holding the patient's hand and listening are therapeutic measures. Care delivered by an interdisciplinary team emphasizes the management of psychological, social, and spiritual problems experienced by patients and families during end of life. The nurse addresses pain control and the management of other physical problems. The patient needs to know that he has the nurse's support as an advocate for his care and well-being.

3.2 Purpose of Palliative Care

Palliative care improves the quality of life the patients and that of their theirs families who are facing challenges associated with life-threatening illness, whether physical, social, spiritual or psychological.

It prevents and relieves suffering through the bearly identification, correct assessment and treatment of pain and other problems, whether physical, social, spiritual or psychological.

It uses a team approach to support patients and their caregivers. The team include physicians, nursing, support workers, physiotherapists, pharmacists, patients and their family.

In palliative care, the tea2m help to address practical needs and providing bereavement counseling.

They provide system support that help patients live as actively as possible until death.

3.3 Palliative Sedation

Effective control of the clinical manifestation of the patients' conditions, such as pain, can be achieved under most conditions, but some patients may experience distressing, intractible manifestations. Palliative sedation is offered in some settings to patients who are close to death, have their presenting manifestations of their conditions are not responding to conventional pharmacologic and non-pharmacologic interventions and as a result are experiencing unrelieved suffering.

Before the palliative sedation is commenced, the care team assess the patient for the underling conditions and the need for the therapy. Then the patient and family are made to sign consent for the commencement of the therapy. Palliative sedation is accomplished through infusion of barbiturate in doses adequate to induce sleep and enhance comfort.

3.4 Role of the Nurse in Palliative Sedation Care

The nurse collaborate with the other health team members to provide emotional comfort and support for patient and family.

The help to clarify values and preferences of patient and their family

The nurse provide individualized and holistic care to the patients to relief symptoms

The nurse monitors the physcological effects of the therapy

The nurse ensures communication within the care team and between the care team and patient family.

The nurse supports the family through the period of the patient's end of care life.

3. 5 Pain Management in Palliative Care

Pain is a significant source of anxiety and distress, and most especially, debilitating symptom that is most feared by patients receiving end of life care. Nurses need to have expert knowledge in an advance form to provide treatment and symptoms management in the patients receiving palliative care. Since pain is the most common symptom of the end of life patient, inadequate pain management can be problematic and distressing for the patients. Therefore, timely pain management with adequate access to medications is the goal. Though different classifications of analgesics exist, opioids are mainly used in palliative patients.

The first step in pain management is pain assessment. The nurses assess the level of pain and match intervention with the appropriate analgesics ordered by the physician. The three principles for pain management for palliative care and other conditions are:

- pain should be treated right away
- if medicine are prescribed rightly according to the need and under supervision, addiction is rare.
- Pain are well managed using the World Health Organization guideline in step-care approach.

World Health Organization Guideline for pain management include

Step 1- Non-opioid analgesics (NASIDs)

Step 2 - if pain persist, give weak opioids

Step 3- if pain continues and get worse give strong opioids, methadone, oral administration and Trans-dermal patch

Step 4- for cancer pain, give Nerve block, Epidurals PCA pump, Neurolytic biock therapy, or Spinal stimulators

For better understanding of the pain management, refer to the pain section in module two.

4.0 Tutor-Marked Assignment

1. Care rendered to a dying patient receiving end of life care is called?

2. Pain management level is determined by the ……..

3. Pain management can either be by medications or ……..

Answer

1. Palliative care

2. Patient's perceived level of pain

3. Non-medications

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Section 4: Care of Patients with Burns and cancer

CONTENT

1.0 Introduction

This section will discuss care for patient with burns and cancer.

2.0 learning outcomes

At the end of reading this section, the student will be able to:

- Define burns
- Explain the classification of burns
- Explain the body's response to burns
- Discuss the management given to burns patient
- Explain the treatment for patient under cancer care

3.0 Main content

3.1 Burns

Burns are injury to the skin. Burns are caused by a transfer of energy from a heat source transferred to the body. It can be as a result of heat, radiation, or chemical. When it occur, there is tissue destruction from the coagulation, protein denaturation or the ionization of cellular contents. The main site of this tissue damage is the skin and the mucosa of the upper respiratory airway. When the tissues are destroyed, there is resultant fluid loss, infection, hypothermia, scarring,

compromised immunity and changes in function, appearance and body image. The extent of the tissue damage on the skin layer is dependent on the nature of the burning agent and the duration of the event.

3.2 Classification of Burns

1. According to tissue depth

Burns are classified according to the depth of the tissue damage.

- **Superficial Partial-thickness burn**:

In this type, the epidermis is destroyed, with or without a part of the dermis. The injury may be painful, red dry or present with formation of blister.

- **Deep Partial-thickness burn:**

In this case, there is destruction of the epidermis, and the upper part of the dermis is affected. The injury is painful, accompanied with redness and exudes formation. The capillary refill follows tissue blanching. The hair follicles remain intact and it takes longer time to heal with formation of hypertrophic scars.

- **Full-thickness burn:**

This involves the total destruction of the epidermis and dermis, with the underlying tissues. Due to absent of nerve endings in the dermis, this injury is usually painless, nut the hair follicles and sweat glands are destroyed.

Factors that affect the extent of the depth of burns injury

1. Temperature of the burning agent
2. how the injury occurred
3. Timing of the injury
4. The duration of exposure to the burning agent
5. The nature of the burning agent
6. Thinkness of the skin affected.

2. According to extent of the body surface injured

Different tools are used to measure the extent of the body surface affected. These include:

- **Rule of Nines**

Rule of nines is used to estimate the total surface of the body involved in burn to calculate the extent of injury. The system uses percentages in multiples of nine to the major body surfaces. The head and face is 9%, the upper limbs are 9% each, anterior truck and abdomen are 18%, posterior part of the body (the full back) is 18%, lower limbs are both 18% each and the perineum is 1%. This gives rise to a total if 100%.

- **Palm Method**

This is used for patient with scattered burns. In this case, the palm is used to estimate the burns extent. The size of the patient's palm is estimated to be 1% of the total body surface area.

- **Lund and Browder Method**

This method uses the percentage of the anatomical parts involved, especially the head and limbs. Since it divides the body to smaller part for estimation, it is tend to be more accurate for estimating the total body surface area injured.

3.3 Body response to Burns

Burns that do not exceed 25% would produce local response, whereas, those that exceeds 25% will produce system response. The systemic response will stimulate the release of cytokines and other mediators into the systemic circulation but in local response, there is changes in the flow of blood causing edema.

Circulatory response

Due to the loss of body fluid in the affected site, there could be hypovolaemia leading to reduced tissue perfusion and transport of oxygen. As the blood loss continue, there is further resultant decrease in cardiac output, which might initial burn shock. In response, the sympathetic nervous system releases catacholamines to increase peripheral resistance, causing vasoconstriction, and increase in pulse rate. However, if the blood loss continues, it can affect the myocardial contractibility may be suppressed due to the release of inflammatory cytokine necrosis factor. Therefore, prompt fluid therapy is recommended to maintain blood pressure and renal function.

Respiratory Response

Inhalation injury is common when urns occur. This is the main cause of death in burn incident. The injury from chemical irritation of the respiratory tissue at the alveolar level, can impede gaseous exchange. Inhalation injury below the glottis can cause loss of ciliary action, hyper-secretion, severe mucosa edema and bronchospasm. Due to the injury, there is reduction in the production of respiratory surfactant is reduced, resulting in atelectasis (collapse of alveoli).

Inhalation of smoke can cause tissue hypoxia. When edema occur, airway obstruction occur resulting in reduced lung compliance, decreased arterial oxygen level and respiratory acidosis.

Other Systemic Response

Renal function may be altered as a result of the reduced volume of blood. The resultant effect of the destruction of red blood cells at the injury site lead to free hemoglobin in the urine. In the presence of muscle damage, myoglobin is release from the muscle cells and excreted by the kidney. Fluid replacement is needed for adequate renal blood flow to prevent renal failure.

Loss of skin lead to inability of the body to regulate temperature. Burns patient may present with low body temperature in the early phase of the incident. Patient become hyperthermic as hypermetabolism result.

There is gastrointestinal complication such as paralytic ileus and curlings ulcer. Due to the physiological changes associated with burns, there is gastric bleeding, which may be evidence in stool as occult blood, vomiting of blood, or regurgitation of coffee ground material from the stomach.

There is immunological response. serious burns reduces resistance to infection. Sepsis may occur leading cause of death in thermally injured patients. The loss of the abnormal inflammatory factors, alter levels of immunoglobulins and serum complement, impaired neutropil functions, and reduction in lymphocytes.

3.4 Management of the Patient with a Burn Injury

Burn care must be planned according to the burn and depth and local response, and the extent of the injury, and the presence of a systemic response.

The care for a burn patient proceeds via 3 phase:

resuscitative phase: This phase begins from the time of the incident, from onset of injury to the when resucitation is completed. Priorities include

- give first aid
- prevention of shock
- prevention of respiratory distress
- detection and treatment of concomitant injuries
- wound assessment and initial care,

intermediate phase: This range from the time of the beginning of diuresis to near completion of wound closure. During this time, priorities in care include wound care, treatment and prevention of complications, and nutritional support.

rehabilitation phase: This is the period of major wound closure and the individual adjusts back to normalcy, with physical and psychological adjustment. This period of featured with prevention of scars and contractures, functional and cosmetic repair, psychological counseling, and rehabilitation.

Treatment of burns

1. Extinguish the fire: If the source of the fire is known, remove the victim from the source or the source from the victims. To put out fire, place the victim on the ground and roll, with anything time available, like blanket, rug or coat may be used to put out the flames. Standing still will make the victim breath the smoke, running will ignite the flame.

2. Cool the burn: After the fire has been put out, soak the affected part with water. Any adherent clothing is soaked with water. But, if sticky to the wound, leave it. Soaking with water help to give some relief from pain and discomfort.

3. Cover the wound to prevent exposure and infection.

4. If the burns is due to chemical irritation, remove the chemical agent, remove the clothes and rinse the affected area.

5. Assessment of airway, breathing and circulation is done quickly. the apical pulse is quickly assessed, the head to toe examination is done, alongside with neurological status. If breathing and circulation is established, the victim is transported to the nearest emergency unit. However, in the absence of breath and circulation, cardiopulmonary resuscitation is commenced. This involve 30 chest compressions to 2 rescue breaths. Then, help is sorted for to transport the victim to the nearest emergency centre.

6. Adequate respiratory and circulatory status should be maintained at all times. an indwelling urinary catheter is inserted to enable the monitoring of urine output. This is to monitor renal functioning.

7. Prophylaxis tetanus can be given to prevent wound contamination.

8. Patient and family are reassured throughout, because burrn can produce psychological and emotional responses.

9. Adequate pain relief is ensured.

10. Monitor regular vital signs and ensure patent airway.

11. Use aseptic wound care.

12. Position patient to ensure comfort.

3.5 Cancer Care

Review of Normal Anatomy and Physiology of Cells

Cells are the smallest living structural and functional subunits of the body. Although human cells vary in size, shape, and certain metabolic activities, they have many characteristics in common. **Cell Structure** Human cells have a cell membrane, cytosol, cell organelles, and, with the exception of mature red blood cells, a nucleus. In the mature red blood cell, the nucleus has been lost. Each cell structure has a specific and vital function. The cell membrane forms the outer boundary of the cell and is made up of phospholipids, proteins, and cholesterol. Proteins serve four different

purposes: (1) Some are channels or transporters to permit movement of materials, (2) some are enzymes catalyzing reactions, (3) some are receptor sites for hormones to trigger a cell's activity, and (4) some are antigens to identify the cell as belonging in the body. A cell membrane is selectively permeable, meaning that not all substances pass through equally. The lipids in the membrane permit the diffusion of lipid-soluble materials into or out of the cell. Materials may enter or leave a cell in a variety of ways, such as diffusion, osmosis, active transport, pinocytosis, and phagocytosis.

Genetic Code and Protein Synthesis

The genetic code of DNA is the code for the amino acid sequences needed to synthesize a cell's proteins. A complementary copy of the DNA's gene is made by a molecule called messenger RNA (mRNA). The mRNA then moves to the cytoplasm of the cell and attaches to the ribosomes. Transfer RNA (tRNA) molecules bring the necessary amino acids to the proper places on the mRNA molecule, and enzymes of the ribosomes catalyze the formation of peptide bonds to link the amino acids into the primary structure of a protein.

As with any complex process, mistakes are possible. Should there be a mistake in the DNA code, the process of protein synthesis may go on anyway, but the resulting protein will not function normally; this is the basis for genetic diseases. DNA mistakes acquired during life are called mutations. A mutation is any change in the DNA code. Ultraviolet rays or exposure to certain chemicals may cause structural changes in the DNA code. These changes may kill the affected cells or may irreversibly alter their function. Such altered cells may become malignant, being unable to function normally but very active; this is the basis of some forms of cancer.

Mitosis

Mitosis is the process by which a cell reproduces itself. One cell, after its 46 chromosomes have duplicated themselves, divides into two cells, each with a membrane, cytoplasm, and organelles from the original cell and a complete set of chromosomes. Mitosis is necessary for the growth of the body and the replacement of dead or damaged cells. Some cells are capable of mitosis and others are not. Cells of the epidermis of the skin undergo mitosis continuously to replace the superficial cells that are constantly worn off the skin surface. The same is true of cells that line the stomach and intestines. Cells in the red bone marrow also divide frequently; red blood cells have a fixed life span (about 120 days) and must be replaced. Some cells seem to be capable of only a limited number of divisions, and when that limit has been reached, the cells die and are not replaced. Other cells do not undergo mitosis to any great extent after birth. Nerve cells (neurons) are unable to divide (except for in the hippocampus), and muscle cells have very limited mitotic capability. When such cells are lost through injury or disease, the loss of their function in the individual is usually permanent.

Concept of Cancer

Oncology is the branch of medicine dealing with tumors. Oncology nursing is also called cancer nursing; it is an important component of medical-surgical nursing care.

- **Benign Tumors**

Cells that reproduce abnormally result in neoplasms, or tumors. Neoplasm is a term that combines the Greek word neo, meaning "new," and plasia, meaning "growth," to suggest new tissue growth. The new growth results in enlargement of tissue and the formation of an abnormal mass. Not all neoplasms contain cancer cells; however, a neoplastic cell is responsible for producing a tumor and shows a lively growing cell. A neoplastic growth is very difficult to detect until it contains about 500 cells and is approximately 1 cm. A benign tumor is defined as a cluster of cells that is not normal to the body but is noncancerous. Benign tumors grow more slowly and have cells that are the same as the original tissue. An organ containing a benign tumor usually continues to function normally.

- **Cancer (malignant tumors)**

Cancer is a group of cells that grows out of control, taking over the function of the affected organ. Cancer cells are described as poorly constructed, loosely formed, and without organization. An organ with a cancerous tumor eventually ceases to function. A simplistic definition is "confused cell." Malignant, a term often used as a synonym for cancer, is defined as a growth that resists treatment and tends to worsen and threaten death.

Pathophysiology

Cancer is not one disease, but many diseases with different causes, manifestations, treatments, and prognoses. There are more than 100 different types of cancer caused by mutation of cellular genes. Cancer takes on the characteristics of the cell it mutates and then takes on characteristics of the mutation. Growth-regulating signals in the cell's surrounding environment are ignored as the abnormal cell growth increases. Normal cells are limited to about 50 to 60 divisions before they die. Cancer cells do not have a division limit and are considered immortal.

The progression from a normal cell to a malignant cell follows a pattern of mutation, defective division and abnormal growth cycles, and defective cell communication. Cell mutation occurs when a sudden change affects the chromosomes, causing the new cell to differ from the parent. The malignant cell's enzymes destroy the gluelike substance found between normal cells, which disrupts the transfer of information used for normal cell structure. Cancer cells also lack contact inhibition. This is a property of normal cells in which contact by the cell with another cell or tissue signals cells to stop dividing. Since cancer cells do not possess contact inhibition, they continue to divide and invade surrounding tissues.

Cancer cell growth and reproduction involves a two-step process. The first step in cancer growth is called initiation. Initiation causes an alteration in the genetic structure of the cell (DNA). Cell alteration is associated with exposure to a carcinogen. The cellular change primes the cell to become cancerous. Promotion is the second type of cancer cell growth. It occurs after repeated exposure to carcinogens causes the initiated cells to mutate. During the promotion step, a tumor forms from mutated cell reproduction.

A healthy immune system can often destroy cancer cells before they replicate and become a tumor. It is important to remember that any substance that weakens or alters the immune system puts the individual at risk for cell mutation.

Risk Factors

- viruses
- exposure to radiation, chemicals, and irritants
- genetics
- diet
- general body immunity level
- certain racial and ethnic groups

Diagnostic Evaluation for Cancer

A diagnosis of cancer can be a very frightening experience. Often people try to mask symptoms because they are so frightened of the disease. A careful and thorough assessment of the patient's present and past medical and surgical histories and pertinent family history should be obtained. A complete physical examination provides both objective and subjective data. The most conclusive information about the health of tissue is acquired by examining cell activity through biopsy.

Laboratory Evaluations. Blood, serum, and urine tests are important in establishing baseline values and general health status. Laboratory values are used with other assessment findings. An elevated white blood cell (WBC) count is expected if the patient has evidence of infection; however, an increase in WBCs without infection raises suspicion of leukemia. Fifty percent of patients with liver cancer have increased levels of bilirubin, alkaline phosphatase, and glutamic-oxaloacetic transaminase. Bone marrow aspiration is done to learn the number, size, and shape of red and white blood cells and platelets. Bone marrow aspiration is a major tool for diagnosis of leukemia.

Cytological Study: Cytology is the study of the formation, structure, and function of cells. Cytological diagnosis of cancer is obtained primarily through Pap smears of cells shed from a mucous membrane (e.g., cervical or oral smear). Test results are based on the degree of cell abnormality. Normal results reflect no cellular changes. Slight cellular changes are considered normal, with a possible link to abnormal cells seen in infection. Significant cellular changes reflect a higher probability of precancerous or cancerous activity. Infection causes cellular changes and contributes to an increase in abnormal cells detected.

Radiology: X-ray examination is a valuable diagnostic tool in detecting cancer of the bones and hollow organs. Routine chest x-ray examination is one diagnostic test used in detecting lung cancer. Mammography is a reliable and noninvasive low-radiation x-ray procedure for detecting breast masses. Breast tissue is compressed to allow better visualization of the soft tissue. You must alert patients that soft tissue compression causes a degree of discomfort, but the compression is necessary to obtain an accurate picture. Assure the patient that the discomfort is brief.

Ultrasonography: Ultrasonography uses high-frequency sound waves to provide images of deep soft tissue structures in the body. The procedure is noninvasive and does not use x-rays. Echoes from high-frequency sound waves outline tissue density and masses. This technology helps detect tumors of the pelvis and breast. Ultrasound may also be used to distinguish between benign and malignant breast tumors.

Magnetic Resonance Imaging: Magnetic resonance imaging (MRI) creates sectional images of the body. MRI can be done with or without contrast dye and does not use radiation. The patient is placed in a cylinder-shaped magnetic field. The magnetic field aligns the nuclei of body cells in one direction. The magnetized cells are then excited by radiofrequency pulses. Images are made as cell nuclei change their alignment. MRI is valuable in the detection, localization, and staging of malignant tumors in the central nervous system, spine, head, and musculoskeletal system. MRI cannot be used in patients with pacemakers, implanted pumps, surgical clips, metal knees or hips, or in some cases tattooed eyeliner because metals are attracted by the magnet.

Endoscopic Procedures An endoscopic examination allows the direct visualization of a body cavity or opening. The procedure involves the insertion of a flexible endoscope containing fiberoptic glass bundles that transmit light and can produce an image. Endoscopy enables the surgeon to biopsy abnormal tissue and is used to detect lesions of the throat, esophagus, stomach, colon, and lungs. Oral endoscopic procedures require patient preparation to reduce the risk of aspirating stomach secretions. The patient is given nothing to eat or drink before and immediately after the examination. A local anesthetic is used during the examination to anesthetize the throat. Following the procedure, oral food and fluids are withheld until the gag reflex returns to prevent aspiration. The gag reflex is assessed by touching a cotton-tipped swab to the back of the throat to stimulate the reflex after the procedure.

Staging and Grading

Tumor staging is used to determine the stage of solid-tumor masses, providing valuable information to guide treatment plans. Tumor staging is important in the development of an international system that can compare statistics among cancer centers. The most common system used for staging tumors is the tumor, node, metastasis (TNM) system. This staging system classifies solid tumors by size and tissue involvement. TNM stages are T0 (no tumor), Tis (tumor in situ), and T1 through T4 (progressive increase in tumor size or involvement). Extent of lymph node involvement ranges from N0, no nodes, to N4, a large amount of lymph node involvement. Metastasis is described as M0, no metastasis, to M1, metastasis to some area.

There is also a rating or grading system to define the cell types of tumors. Tumors are classified according to the percentage of cells that are differentiated (mature). If the tissue of a neoplastic tumor closely resembles normal tissue, it is called well differentiated. A poorly differentiated tumor is a malignant neoplasm that contains some normal cells, but most of the cells are abnormal. The better defined or differentiated the tumor, the easier it is to treat.

3.5 Treatment for Cancer

There are three main types of treatment for cancer: surgery, radiation therapy, and chemotherapy.

Surgery

Surgery can be curative when it is possible to remove the entire tumor. Skin cancers and well-defined tumors without metastasis can be removed without any additional intervention. Other tumors may be removed as much as possible, with follow-up chemotherapy or radiation to treat the remaining tumor cells.

Prophylactic surgery is used to remove moles or lesions that have the potential to become malignant. Colon polyps are often removed to prevent malignancies from developing, especially if the polyps are considered premalignant. An extreme example of prophylactic surgery is a woman who elects to have a mastectomy (surgical removal of the breast) because of a high incidence of breast cancer in her family. Surgery may also be done for palliation(symptom control).

Surgical removal of tissue to reduce the size of the tumor mass is helpful, especially if the tumor is compressing nerves or blocking the passage of body fluids. The goals of palliative surgery are to increase comfort and quality of life.

Reconstructive surgery can be done for cosmetic enhancement or for return of function of a body part. Facial reconstruction is important for a patient's self-image after removal of head or neck tumors. Women can elect to have breast reconstruction after mastectomy. Nursing care include:

- Therapies such as deep relaxation, imagery, and hypnosis can be used with traditional pain control measures.
- It is important to encourage patients to express and discuss their fears. Patients with a limited understanding of cancer may fear that tissues will not heal postoperatively. Provide information about wound care, including dressing changes and drainage tubes, to increase the patient's knowledge base and sense of control.
- Visual aids concerning tumor site and surgical procedures are valuable teaching tools.
- Patients who are undernourished are poor surgical candidates and require intervention such as enteral or parenteral nutrition before and after surgery.
- Patients with cancer are also at increased risk for postoperative deep vein thrombosis (DVT). Preoperative teaching includes the importance of leg movement, early ambulation, wearing antiembolism stockings, and recognizing symptoms of DVT, such as calf pain or a cramping sensation in the calf muscle when the foot is dorsiflexed

Radiation

Radiation is used commonly in the treatment of cancer for control or palliation, or it can be curative if the disease is localized. The decision to use radiation is commonly based on cancer site and size. Radiation destroys cancer cells by affecting cell structure and the cell environment. It is used in fractionated (divided) doses to prevent destructive side effects; however, side effects can occur in the area being treated because of damage to normal cells. The size of a large tumor can be decreased with radiation before surgery, making surgical intervention more effective and less

dangerous. Palliative radiation is used to reduce the size of a large cancerous lesion and consequently reduce pressure and pain. Radioisotopes inserted into cancerous tissue during surgery help destroy the cancerous cells without removing the organ. Nursing care of the patient receiving radiation include

- **Fatigue:** Encourage the patient to nap frequently and prioritize activities. Reassure the patient that the feeling will go away when the treatments are completed.
- **Nausea, vomiting, and anorexia:** Encourage the patient to take prescribed medication for nausea and vomiting. Anorexia can be eased by giving small amounts of high-carbohydrate, high-protein foods and avoiding foods high in fiber.
- **Mucositis** (inflammation of the mucous membranes, especially of the mouth and throat). Encourage the patient to avoid irritants such as smoking, alcohol, acidic food or drinks, extremely hot or cold foods and drinks, and commercial mouthwash. Advise the patient to perform mouth care before meals and every 3 to 4 hours. A neutral mouthwash is appropriate and can be made by using 1 ounce of diphenhydramine hydrochloride.
- **Dry mouth:** Encourage frequent mouth care. Saliva substitute is available over-the counter and is helpful, especially at night when patients complain of a choking sensation from extreme dryness.
- **Skin reactions:** These can vary from mild redness to moist desquamation similar to a second-degree burn. Skin surfaces that are especially warm and moist, such as the groin, perineum, and axillae, have poor tolerance to radiation. Prophylactic skin care includes keeping skin dry; keeping it free from irritants, such as powder, lotions, deodorants, and restrictive clothing; and protecting it against exposure to direct sunlight. Irradiated skin can be fragile during treatment. It is important to wash these areas gently with mild soap and water, rinse well, and pat dry. The skin may have markings and tattoos to delineate the treatment field. Take care not to wash off the markings.
- **Bone marrow depression:** This reaction occurs with both radiation and chemotherapy. Weekly blood cell counts are done to detect low levels of WBCs, red blood cells, and platelets. Transfusions of whole blood, platelets, or other blood components may be necessary.

Chemotherapy

Chemotherapy is chemical therapy that uses cytotoxic drugs to treat cancer. Cytotoxic drugs can be used for cure, control, or palliation of cancerous tumors and are described according to how they affect cell activity. For example, alkylating agents bind with DNA to stop the production of RNA; antimetabolites substitute for nutrients or enzymes in the cell life cycle; mitotic inhibitors interfere with cell division; antibiotics inhibit DNA and RNA synthesis; and hormonal agents alter the hormonal structure of the body.

Chemotherapy is usually more effective when multiple drugs are given in multiple doses. The effects of chemotherapy are systemic unless used topically for skin lesions. Chemotherapy is used preoperatively to shrink tumors and postoperatively to treat residual tumors.

Factors influencing the effectiveness of chemotherapy are

- tumor type
- available chemotherapeutic drugs
- genetics.

Nursing Intervention for Patient with Cancer

Ineffective protection related to thrombocytopenia associated with chemotherapy and radiation.

- Monitor platelet counts. Platelet count of 50,000 indicates potential for bleeding
- Avoid giving intramuscular, subcutaneous, or rectal medications. Medications given via invasive routes can cause bleeding.
- Apply pressure for at least 5 minutes to venipuncture or injection sites. Pressure for a longer time is needed at sites of invasive procedures to stop bleeding
- Avoid trauma to rectal tissue by avoiding rectal temperatures and enemas. Teach importance of avoiding anal intercourse. Trauma to rectal tissue can cause bleeding to occur.
- Instruct the patient not to take any salicylates or non-steroidal anti-inflammatory medications because they can interfere with platelet functions and cause bleeding in the GI tract.
- Observe for bruising, petechiae, bleeding gums, tarry stools, and black emesis. These are signs of bleeding.
- Advise the patient to use an electric razor to decrease trauma that could result in bleeding.
- Teach the patient to avoid blowing his or her nose or inserting objects into the nose to reduce trauma to nasal mucosa to prevent spontaneous bleeding.

Nutrition, imbalanced: less than body requirements related to anorexia, nausea, or vomiting associated with disease, pain, and treatment

- Monitor food and fluid intake and output every 8 hours. This will provide objective data for the amount of nutrients and fluids taken in.
- Weigh the patient daily. Weight is an objective measurement to determine if intake is adequate enough to maintain weight.
- Consult a dietitian for dietary supplements. Dietitians can calculate the calories needed for adequate nutrition and make recommendations for supplements.
- Consult with the physician for medications to control nausea, vomiting, and diarrhea. If these symptoms are controlled, then the patient is better able to eat.
- Keep the environment free of strong odors, such as disinfectants, perfumes, deodorizers, and body wastes. Strong odors can induce nausea.

- Provide room-temperature or cold foods and clear liquids. These foods have fewer odors and may be more comfortable for the patient to eat.
- Offer sour foods such as hard candy and lemon. These may help control nausea.
- Encourage listening to music or doing relaxation exercises. These may provide distraction from pain and nausea.
- Provide mouth care before meals. Oral care allows for a better taste in the mouth, and saliva is necessary for digestion of food.
- Provide small, high-calorie meals. Smaller, more frequent meals prevent the patient from feeling full and wanting to vomit. Administer pain medication before meals to help reduce the impact of pain on the appetite.
- Instruct the patient to avoid fluids with meals to prevent premature feelings of fullness.
- Teach the patient to avoid exercise before meals. If the patient is fatigued, he or she will not have the energy to eat and digest food.
- Teach the patient about options available for when he or she is no longer able to care for his or her own needs. Support from other sources will help the patient conserve energy. Planning ahead can help reduce anxiety
- Identify and include the patient's strengths in self care activities to help increase the patient's independence
- Teach self-administration of epoetin alfa as ordered. Epoetin alfa stimulates production of red cells and can help fatigue related to anemia.
- Instruct family members in how to assist in daily care. Allowing family to assist in the daily care will promote their role as caregiver.

Anticipatory grieving related to potential disease outcome

- Use therapeutic communication techniques to ask open-ended questions like, "What are your thoughts and fears?" This can assist the patient to identify concerns, and also help the nurse to individualize nursing care.
- Actively listen to the patient's grief. Being present for the patient and just listening helps the patient communicate needs and fears.
- Encourage family members to spend time with the patient to make end-of-life decisions. More people would rather rely on family and friends than physicians to make end-of-life decisions.
- Ask the patient about end-of-life decisions. Provide information as needed. Knowing what a dying patient wants will help the nurse to develop the end of-life care plan.
- Contact the patient's minister or clergy if the patient agrees. Religious beliefs can influence the patient's and/or family's grieving process.
- Help the patient build memories by assisting to write letters, plan his or her funeral, or write an obituary. These are ways to nurture the patient's relationship with family and to leave a memento behind.

Disturbed body image related to cancer and its treatment (e.g., surgical procedures such as an ostomy or loss of hair associated with chemotherapy)

- Allow the patient to discuss feelings of anger or depression and confirm that these feelings are normal when adjusting to body changes. A patient may be better able to cope with body changes if he or she can talk about feelings and understand that the feelings are normal.
- Encourage the patient to select a wig prior to hair loss. Selecting a wig before the hair loss occurs allows the patient to find one resembling his or her own hair color and style.
- Encourage the patient to provide own care to ostomy site or surgical wound when ready. Encouragement and education about self-care will promote independence.
- Provide information about community assistance/financial aid for programs or services. Social workers can assist with community resources that can provide equipment or supplies for the patient.

4.0 Tutor-Marked Assignment

1. In burns assessment, …… is used, using the percentage of the anatomical parts involved.

2. The two main priorities in burns management are to……

3. When lesion or cancerous cells are detected, they are surgically removed to prevent malignancy. This surgery is called……

3. ……can be used for cure, control, or palliation of cancerous tumors.

Answer

1. Lund and Browder Method

2. Ensure patient is well hydrated and prevention of infection is ensured.

3. Prophylactic surgery

4. Cytotoxic drugs

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Section 5: Loss, Grief and End of Life Care

CONTENT

1.0 Introduction

Loss, grief are reaction to losing what seem valuable to someone. For a dying patient, end of life care is given. The thought of dying could stir sense of loss and grief in the patient undergoing end of life care and their family. This section will explain loss, grief and end of life care in detail.

2.0 learning outcomes

The end of reading this section, the student will be able to:

- Explain the concept of loss
- Explain the grief and stages of grief
- Discuss end of life care and management

3.0 Main content

3.1 Loss

Loss occurs when a valued person, object, or situation is changed or becomes inaccessible such that its value is diminished or removed. There are several types of loss, all of which everyone may experience at some time. Actual loss can be recognized by others as well as by the person sustaining the loss, for example, loss of a limb, a child, a valued object such as money, and a job. Perceived loss, such as loss of youth, financial independence, and a valued environment, is experienced by the person but is intangible to others. Directly related to actual and perceived loss are physical and psychological loss. A person who loses an arm in an automobile crash suffers from both the physical loss of the arm and the psychological loss that may be caused by an altered

self-image and the inability to return to one's occupation or other activities. These losses are simultaneously physical, psychological, and actual. A person who is scarred but does not lose a limb may suffer a perceived and psychological loss of self-image.

Other types of loss are maturational loss, situational loss, and anticipatory loss. Maturational loss is experienced as a result of natural developmental processes. As examples, a first child may experience a loss of status when a sibling is born, and the parent of a single child may experience a sense of loss when the child begins school. Situational loss is experienced as a result of an unpredictable event, including traumatic injury, disease, death, or national disaster. Anticipatory loss occurs when a person displays loss and grief behaviors for a loss that has yet to take place. Anticipatory loss is often seen in the families of patients with serious and life-threatening illnesses and may lessen the effect of the actual loss of a family member.

3.2 Grief

Grief is an internal emotional reaction to loss. It occurs with loss caused by separation or by death. For example, many people who divorce experience grief. Loss of a body part, job, house, or pet may also cause grief. Normal expressions of grief may be physical (crying, headaches, difficulty sleeping, fatigue), emotional (feelings of sadness and yearning), social (feeling detached from others and isolating oneself from social contact), and spiritual (questioning the reason for your loss, the purpose of pain and suffering, the purpose of life and the meaning of death). Mourning is the actions and expressions of that grief, including the symbols and ceremonies (e.g., a funeral or final celebration of life) that make up the outward expressions of grief. People who are bereaved are in a state of grieving from loss of a loved one.

Grief Reactions

Reactions to grief and dying are similar. The stages of these reactions overlap and vary among people. One person may skip a reaction stage, whereas another may repeat an earlier stage. Each person is different, and patients and family members may be at different reaction stages. Several theories explain the stages of reactions to grief and death. Two discussed here are by Engel and Kübler-Ross. More important than the actual stages of any given grief reaction is the idea that grief is a process that varies from person to person. Engel (1964) was among the first to define stages of grief. Engel's six stages are 1) shock and disbelief, 2) developing awareness, 3) restitution, 4) resolving the loss, 5) idealization, and 6) outcome. Shock and disbelief are usually defined

as refusal to accept the fact of loss, followed by a stunned or numb response: "No, not me." Developing awareness is characterized by physical and emotional responses such as anger, feeling empty, and crying: "Why me?" Restitution involves the rituals surrounding loss—with death, it includes religious, cultural, or social expressions of mourning, such as funeral services. Resolving the loss involves dealing with the void left by the loss. Idealization is the exaggeration of the good

qualities that the person or object had, followed by acceptance of the loss and a lessened need to focus on it. Outcome, the final resolution of the grief process, includes dealing with loss as a common life occurrence.

Dysfunctional Grief

Dysfunctional grief is abnormal or distorted; it may be either unresolved or inhibited. In unresolved grief, a person may have trouble expressing feelings of loss or may deny them; unresolved grief also describes a state of bereavement that extends over a lengthy period. With inhibited grief, a person suppresses feelings of grief and may instead manifest somatic (body) symptoms, such as abdominal pain or heart palpitations.

Stages of Grief

Denial A person may react with shock and disbelief after receiving word of an actual or potential loss. People may make such statements as "This can't be happening to me" or "This can't be true." This initial stage of denial serves as a buffer. During denial, the person or family mobilizes defenses to cope with the situation.

Anger In the anger stage, the person resists the loss. The anger, described as "acting out," is often directed toward family and healthcare providers.

Bargaining The bargaining stage serves as an attempt to delay the reality of the loss. The person makes a secret bargain with God, expressing a willingness to do anything to postpone the loss or change the prognosis. This is the individual's plea for an extension of life or the chance to "make everything right" with a dying family member or friend.

Depression Upon realizing the full effect of the actual or perceived loss, the person enters a stage of depression and prepares for the impending loss by working through the struggle of separation. While grieving over "what cannot be," the person may either talk freely about the loss or withdraw from others.

Acceptance Some people who are dying reach a stage of acceptance in which they may appear to have no emotions. The struggle is past, and the emotional pain is gone. If the person has experienced the loss of a loved one or other valued object, he or she begins to come to terms with the loss and resumes activities with an air of hopefulness for the future.

Family and Other Support Systems

Grieving is painful and lonely. Reactions to loss are affected by how much social support people feel they have. Lack of a support system has been identified as one factor that may delay grief work. Even if the patient is reacting to the loss in an expected manner, feelings of isolation and withdrawal behaviors are often observed. Patients need encouragement to reestablish contact with significant others in their lives so they may share their grief. If the patient is not making progress

in grief work, the nurse may need to explain the benefit of sharing grief with significant others. Some losses may lead to social isolation, placing patients at high risk for dysfunctional grief reactions. For example, survivors of people with AIDS often report feeling excluded by the deceased person's family and by healthcare providers.

Factors that can interfere with successful grieving

- Perceived inability to share the loss.
- Lack of social recognition of the loss.
- Ambivalent relationships before the loss.
- Traumatic circumstances of the loss.

A well-functioning family usually rallies after the initial shock and disbelief, and the family members provide support for each other during all phases of the grieving process. After a loss, the well-functioning family is able to shift roles, levels of responsibility, and ways of communicating. The nurse needs to be alert for the negative as well as positive effects the family may have on the grieving patient. For example, the dying patient may ask someone the family perceives as an outsider to be near, and the family may respond with anger to this "intrusion." Similarly, certain family members may have hurt feelings or be angry if the patient is unresponsive to them. Well-meaning family members also may try to shield the patient from the pain of grieving. Because no two people grieve alike, the nurse must assess the individual family members' reactions to the loss. The family and the patient rarely experience anger, denial, and acceptance in unison.

3.3 End-of-Life Care

People are considered to be dying when they have an illness or injury that is expected to end in death and for which there is no treatment (such as severe heart disease or advanced cancer). Dying patients may also be those who choose to have no further treatment to prolong life (such as those with end-stage kidney disease). Nurses care for dying patients in intensive care units, emergency rooms, hospital units, long-term care facilities, and the home. Regardless of the cause of death or the setting, the patient's wishes about death should be respected. End-of-life nursing care that ensures a peaceful death was mandated by the International Council of Nurses' (ICN) definition of nursing's inclusion of the statement "Nursing includes the promotion of health, prevention of illness, and the care of ill, disabled, and dying people. The quality of care during the end stage of life greatly contributes to peaceful and dignified death and provides support to family members in dealing with their loss and grieving process."

Physiologic Changes in End of Life Care

Weakness and fatigue. Weakness and fatigue cause discomfort, especially in joints, and contribute to an increased risk for pressure ulcers

Anorexia and decreased food intake. Although anorexia and a decrease in food intake are normal in the dying patient, the family often views this as "giving up." Anorexia may be a protective mechanism; the breakdown of body fats results in ketosis, which leads to a sense of well-being and helps decrease pain. Parenteral or enteral feedings do not improve symptoms or prolong life and may actually cause discomfort. As weakness and difficulty in swallowing progress, the gag reflex is decreased and patients are at increased risk for aspiration if oral foods are given.

Fluid and electrolyte imbalances. Decreased oral fluid intake is normal at the end of life and does not cause distress. Parenteral fluids are sometimes given to decrease delirium, but they may cause increased edema, breathlessness, cough, and respiratory secretions. If the patient has edema or ascites (a collection of fluid in the abdominal cavity), excess body water is present, so dehydration is not a problem.

Hypotension and renal failure. As cardiac output decreases, so does intravascular blood volume. As a result, renal perfusion decreases and the kidneys cease to function. Urinary output is concentrated and scanty. The patient will have tachycardia, hypotension, cool extremities, and cyanosis with skin mottling.

Neurologic dysfunction. Neurologic dysfunction results from any or all of the following: decreased cerebral perfusion, hypoxemia, metabolic acidosis, sepsis, an accumulation of toxins from liver and renal failure, the effects of medications, and disease-related factors. These changes may result in a decreased level of consciousness or agitated delirium. Patients with terminal delirium may be confused, restless, or agitated. Moaning, groaning, and grimacing may accompany the agitation and are often misinterpreted as pain. Level of consciousness may decrease to the point where the patient cannot be aroused. Although decreased consciousness and agitation are both normal states at the end of life, they are very distressing to the patient's family.

Respiratory changes. Respiratory changes are normal at this time. The patient may have dyspnea, apnea (periods of not breathing), or Cheyne–Stokes respirations, and may use accessory muscles to breathe. Fluids accumulated in the lungs and oropharynx may lead to what is sometimes called "the death rattle" (although nurses should not use this term when talking to family members). Oxygen may not relieve these manifestations.

Bowel and bladder incontinence. Loss of sphincter control may lead to incontinence of feces, urine, or both.

Pain. Pain is a common problem for patients at the end of life and is what people often say they fear the most. It is of utmost importance to keep the patient comfortable through general comfort measures and by administering ordered medications for pain and anxiety.

Support for the Patient and Family

- As the patient's condition deteriorates, the nurse's knowledge of the patient and family guides the care provided. It may be necessary to provide opportunities for patients to express personal preferences about where they want to die
- If the family feels that this is morbid, the nurse explains that it helps patients to keep a sense of control as they approach death. The patient needs the opportunity to say goodbye to others.
- The nurse encourages and supports the patient and family as they terminate relationships as a necessary part of the grief process. The nurse acknowledges that termination is painful and, if the patient or family desires, stays with them during this time. Family members are often afraid to be present at the moment of death, yet dying alone is the greatest fear expressed by patients.
- Use open-ended questions to encourage the person to share concerns and the possible effect on the family unit. Grief resolution cannot occur until the patient acknowledges the loss.
- Promote a trusting nurse– patient relationship by:
    - Allowing enough time for communications.
    - Speaking clearly, simply, and to the point.
    - Listening.
    - Being honest in responses to questions, and not giving unrealistic hope.
    - Offering support.
    - Demonstrating respect for the person's age, culture, religion, race, and values.
- Care as of palliative care above is rendered to the patient by the care team to ensure a peaceful death.

4.0 Tutor-Marked Assignment

1. The grief process may range from discomforting to debilitating, and it may last a day or a lifetime, depending on:

A. whether the loss is temporary or permanent.

B. what the loss means to the person experiencing it.

C. the religion of the person experiencing the loss.

D. the educational level of the person experiencing the loss.

2. A patient has been diagnosed with terminal cancer and is reacting with hostility and abruptness to her family and the hospital staff. She tells them to leave her alone. The patient is most likely in the stage of:

A. denial.

B. anger.

C. bargaining.

D. acceptance.

3 Factors that affect an individual's understanding of and reaction to loss include:

A. age and availability of a support system.

B. income level and age.

C. self-esteem and self-confidence.

D. mental stability and employment status.

4 To provide holistic end-of-life care, it is necessary for the nurse to:

A. control his or her own emotions about death

B. maintain a sense of detachment.

C. agree with the patient's values and beliefs.

D. provide comfort and symptom-management interventions.

Answer

1.B

2. B.

3. A

4. D.

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Self Assessment Questions

1. Discuss the pre-operative nursing for a patient going for appendectomy?

2. Explain the nursing management you would render to Margaret who was admitted unconscious in her room early hours of this morning?

3. Mrs Ojo is admitted for an end of life care in the oncology ward. Explain the term palliative sedation?

4. Johnson, a 14 years old secondary school boy was involved in hot water burns. After assessment, it was observed that he has 78% burns. Explain the nursing management for Johnson?

5. Discuss the stages of grief?

Module 4- Immune System and Care of Patients with Infectious Diseases

Section 1: Caring for Patients with Altered Immune Status

Section 2: Caring for Patients with Inflammation

Section 3: Caring for Patients with Infectious Diseases

Section 1: Caring for Patients with Altered Immune Status

CONTENT

1.0 Introduction

The immune system comprises of the components needed by the body to fight infection and remain healthy. When the body immune system is compromised, infection set in. This section will discuss the immune system and care for patient with infectious diseases.

2.0 learning outcomes

At the end if reading this section, the student will be able to:

- Discuss the components of the immune system
- Explain the physiology of the immune system
- Explain what an impaired immune system is
- Discuss the various immune system disorders

- Explain the nursing care for a patient with immuo-deficiencies

3.0 Main content

3.1 Components of the Immune System

The major components of the immune system include the bone marrow, the lymphatic system including lymph nodes and lymphatic circulation, and the spleen. These organs and tissues are located throughout the body in order to provide systemic immune response.

Bone Marrow

Knowledge of the functions of bone marrow is important In understanding the development of the immune system. Stem cells have the capacity to produce any type of cell that they are chemically directed to make. For example, stem cells differentiate into white blood cells such as granulocytes, lymphocytes, and monocytes. Granulocytes become neutrophils, eosinophils, and basophils. Lymphocyte precursors in bone marrow become B- and T-cells lines. Monocytes differentiate from white blood cell precursors. Monocytes circulate in the blood and mature into macrophages. Bone marrow stem cells also differentiate into red blood cells (erythrocytes) and platelets (thrombocytes).

Lymphatic System

The lymphatic system is comprised of the vessels, lymph nodes, and lymph tissue. This system of vessels drains lymph fluid, referred to as chyle, through the entire body and returns it to venous circulation in the chest. The vessels drain chyle (a milky fluid comprised of serous fluid, white cells, and fatty acids) into the thoracic and lymphatic ducts in the mediastinum. The lymph vessels follow the same route as veins and arteries and run parallel to veins. Chyle then drains from the mediastinum into the heart through the superior vena cava. Lymph nodes and lymph tissue filter debris from the breakdown of cells, bacteria, virus, and fungal antigens.

Lymphocytes such as T and B cells are found in lymph nodes. Lymph nodes and tissue contain or house macrophages that ingest cells, bacteria, and debris. Two-thirds of fixed lymph tissue is located in the abdomen surrounding the intestinal tissue, and is referred to as Peyer's patches. This is important because the vessels that deliver blood to the intestines facilitate the entry of large molecules of digested materials into the circulatory system. Vessels able to absorb large food particles may also allow the entry of viral and bacterial particles. Hence, immune protection by Peyer's patches is vital. A high concentration of lymph tissue also is located in the lungs. Alveolar macrophages function with lymph tissue to protect the lungs from bacteria, virus, and debris from the outside environment.

Lymph nodes are consolidated groups of lymph tissue and are found throughout the body. Lymph nodes located in the neck, axilla, and groin may be palpated. Like lymph tissue, they contain macrophages and lymphocytes, and are able to filter and remove dead cells, bacteria, and other debris from the system as well as assist in mounting the immune response. During infection, inflammation, or injury, lymph nodes in the area of injury will become swollen. An example of this is the swelling of lymph nodes in the axilla and neck during pneumonia.

Tonsils and Adenoids

Tonsils and adenoids are consolidated lymph tissue located in the throat. They function to remove and filter debris, bacteria, and viruses from the upper airways and mouth. Like all consolidated lymph tissue, they contain B and T cells as well as macrophages.

Spleen

The spleen plays a significant role in immune function as part of the lymphatic system. It is comprised of white and red pulp and is involved in hematologic filtration, sequestering of red and white cells, and immune response. The white pulp of the spleen is rich in lymphocytes that can be activated in an immune response. The red pulp is responsible for filtering out old or damaged red blood cells.

The spleen may also sequester red and white blood cells and platelets, and thereby decrease these levels in the circulating blood volume. The spleen may become enlarged in acute inflammatory or infectious disease processes because of the stimulation of the immune response. An enlarged spleen (splenomegaly) can be involved in a plethora of disease processes such as trauma, cancer, infection, portal hypertension, thrombosis, cysts, and mononucleosis, and this assessment finding warrants further investigation. To assess the spleen, place the patient on the right side, and percuss down the midaxillary line from an area of resonance over the lung to dullness over the spleen. The spleen is normally not detected on palpation. If detected, the spleen should not be percussed more than 6 to 8 cm (about 2 to 3 in.) above the left costal margin. An enlarged spleen is diagnosed if there is a greater than 8-cm finding above the costal margin.

3.2 Physiology of the Immune System

The physiology of the immune system includes the function of the lymphatic tissues, cells, and chemicals that provide protection from infectious agents, antigens, and mutated cells and enable the body to differentiate self from non-self. The immune response includes both natural and acquired immunity.

1. Natural Immunity

Natural immunity is the responsibility of a group of body organs, cells, and chemicals that are present at birth or shortly after. These include the cells and chemicals of the inflammatory response, barriers such as skin, and chemicals such as complement. Natural immunity is defined as the organs, cells, and secretions of the body that provide protection from foreign proteins, chemicals, and other non-self particles. Natural immunity includes the integumentary system, the lymphatic system, and secretions such as lysozymes, immunoglobulins, and sub-cellular receptors such as toll-like receptors. The white blood cells and chemicals of the inflammatory response are an important part of natural immunity. All of these components of natural immune function are present at birth.

2. Acquired Immunity

Acquired immunity occurs after birth and includes antibodies, immuno-competent T cells and B cells, and cytokines that act to remove antigens that are considered non-self. Acquired immunity also includes immunizations received as a child or an adult. Acquired immunity can be described as the ability of the immune cells to correctly produce antibodies, regulate the immune response, and respond only to non-self antigens. Active acquired immunity involves the production of antibodies by the immune system in response to specific foreign antigens, such as bacteria. This immunity is considered acquired because the body develops the ability to regulate the immune system and produce antibodies after birth and after exposure to antigens in the environment. Active immunity is acquired by either contracting the disease or through a vaccination.

Acquired immunity involves lymphocyte cells and chemicals that can confer long-term permanent protection against the disease for which the antibodies have been produced. Lymphocytes include T cell and B cells. T lymphocytes are involved in the cellular immune response and are responsible for stimulating and regulating the immune response. The B lymphocytes are involved in the humoral immune response and are responsible for the creation and release of antibodies and development of long-term immune protection.

3.3 Impaired Immune System

This result from a loss of regulation of some aspect of the immune system

Signs and symptoms include:

Respiratory System

- Changes in respiratory rate
- Cough (dry or productive)
- Abnormal lung sounds (wheezing, crackles, rhonchi)
- Rhinitis
- Hyperventilation

- Bronchospasm

Cardiovascular System

- Hypotension
- Tachycardia
- Dysrhythmia
- Vasculitis
- Anemia

Gastrointestinal System

- Hepatosplenomegaly
- Colitis
- Vomiting
- Diarrhea

Genitourinary System

- Frequency and burning on urination
- Hematuria
- Discharge

Musculoskeletal System

- Joint mobility
- edema
- pain

Skin

- Rashes
- Lesions
- Dermatitis
- Hematomas or purpura
- Edema or urticaria
- Inflammation
- Discharge

Neurosensory System :

- Cognitive dysfunction
- Hearing loss

- Visual changes
- Headaches and migraines
- Ataxia
- Tetany

3.4 Immune Disorders

Immune disorders fall into two general categories: immune hypersensitivities and immune deficiencies.

Immune hypersensitivity

This occurs when the immune system over responds to an antigen, either from the environment, from the individual himself, or from another individual. **Hypersensitivity disorders** fall into three broad categories based on the type of triggering antigen, and include allergic, autoimmune, and alloimmune reactions. **An allergic** response occurs when the antigen is from the external environment, as opposed to an **autoimmune response,** which is triggered by a self-antigen. **An alloimmune response** occurs when the antigen is from another human. Within each of these categories are four specific mechanisms by which the immune system over responds, referred to as type-specific hypersensitivity reactions..

Immuno-deficiencies

Immune deficiencies occur when the immune system experiences abnormalities in function that result in a decreased or compromised ability to appropriately respond and protect the host from an antigenic attack. **Primary immune deficiencies** are the result of genetic abnormalities in the embryonic development of the immune system. Symptoms of primary deficiencies usually appear shortly after birth. **Secondary immuno-deficienc**y occurs when the immune system is damaged and unable to mount an appropriate immune response due to a variety of factors that range from normal aging to infections that eliminate immune cells and severely impair function as in HIV. The immunodeficiency section will briefly review the abnormalities related to primary immune deficiency and related disorders. The focus of this section will be on secondary immuno-deficiencies and specifically the pathophysiology, clinical manifestations, and treatment of HIV.

Primary Immune Deficiencies

Primary immune deficiencies are categorized according to the type of immune cell that is genetically malformed or dysfunctional. These categories include phagocytic cell dysfunction, B cell (humoral) deficiencies, T-cell (cell-mediated) deficiencies, and combined B-cell and T-cell deficiencies.

Phagocytic Dysfunction

Several primary immune deficiencies have been identified related to abnormal function of phagocytic cells, most commonly neutrophils. For genetic reasons, neutrophils may not develop in adequate numbers or they may be dysfunctional. If an individual is unable to make an appropriate number of neutrophils, then she is unable to mount an adequate immune response. If the neutrophil DNA is dysfunctional, adequate numbers of neutrophils are unable to migrate and travel to the site of injury or infection and appropriately protect the host from foreign antigens.

Medical Management

Patients with neutropenia continue to be at increased risk for development of severe infections despite substantial advances in supportive care. Epidemiologic shifts occur periodically and need to be detected early because they influence prophylactic, empiric, and specific strategies for medical management. Attention to infection control practices is important, especially with the emergence of multidrug-resistant organisms. Although it is effective in preventing some bacterial and some fungal infections, prophylactic drug treatment must be used with caution, because it has been implicated in the emergence of resistant organisms. The choices for empiric therapy include combination regimens and monotherapy. Specific choices depend on local factors (epidemiology, susceptibility/ resistance patterns, availability, cost). Home and inpatient settings are also available and the selection of setting depends on the patient's risk category. Early diagnosis and appropriate treatment of many fungal and viral infections remains suboptimal in many cases.

While granulocyte transfusions are used as a medical treatment, they are seldom successful because of the short halflife of these cells. Treatment with granulocyte-macrophage colony-stimulating factor (GM-CSF) or granulocyte colony-stimulating factor (G-CSF) may prove successful, because these proteins draw nonlymphoid stem cells from the bone marrow and hasten their maturation. Cell therapy, which refers to the provision of living cells to patients for the prevention of human disease, may be effective. (The infusion of blood and blood products is the best established and most widely practiced form of cell therapy.) Hematopoietic stem cell transplantation (HSCT), another form of cell therapy, has proven to be a successful curative modality. The stem cells may be from embryos or adults. However, toxicity and reduced efficacy are frequent limitations of HSCT. Another emerging therapy involves the use of cells as vehicles for the delivery of genes or gene products. However, gene therapy has many side effects and needs further improvement.

B Cell (Humoral) Deficiencies

There are two different kinds of B-cell deficiencies. In the first group of disorders, B-cell precursors are unable to differentiate into plasma cells. This deficiency results in inadequate immunoglobulin levels (IgG, IgA, IgM, IgD, IgE) and recurrent infection. The second type of B-cell disorder is the more serious one. In this disease, also known as Brutton's disease, the B cells are unable to differentiate into mature B cells. As a result no plasma cells can be found in

circulation, and no immunoglobulins are produced causing major immune deficits including lack of immunologic memory.

Medical Management

Patients with primary phagocytic disorders may be treated with intravenous immunoglobulin (IVIG). Its administration is an essential part of the prevention and treatment of complications of CVID. Antibody replacement therapy is recommended for severe, recurrent infections. Other interventions aimed at overcoming the immunologic defects in CVID, such as interleukin-2 therapy, are being studied.

T-Cell (Cell-Mediated) Deficiencies

The function of T cells is to regulate the immune response. T-cell deficiencies most commonly result in opportunistic infections. Therefore, these abnormalities do not commonly manifest themselves immediately after birth. This type of deficiency is suspected when an infant has repeated opportunistic infections such as candidiasis of the oral, vaginal, or rectal mucosa. There are a wide variety of T-cell-mediated deficiencies, which are differentiated by the type of T cells affected. One extreme example of T-cell-mediated dysfunction is the rare disorder called DiGeorge syndrome. In this disease the thymus does not develop properly and, therefore, T cells are unable to mature and appropriately stimulate an immune response to a foreign antigen. The result is susceptibility to opportunistic infections, symptoms of which begin to appear shortly after birth.

Medical Management

Patients with T-cell deficiency should receive prophylaxis for PCP. General care includes management of hypocalcemia and correction of cardiac abnormalities. Hypocalcemia is controlled by oral calcium supplementation in conjunction with administration of vitamin D or parathyroid hormone. Congenital heart disease frequently results in heart failure, and these patients may require immediate surgical intervention in a tertiary care centre. Transplantation of fetal thymus, postnatal thymus, or human leukocyte antigen (HLA)-matched bone marrow has been used for permanent reconstitution of T-cell immunity. In patients with DiGeorge syndrome, attention must be given to cardiac, nutritional, and developmental needs. IVIG may be used if an antibody deficiency exists. This therapy may also be used to control recurrent infections. T-cell function improves with age and often is normal by 5 years of age. Prolonged survival has been reported after spontaneous remission of immunodeficiency, which occurs in some patients.

Combined B-Cell and T-Cell Deficiencies

Several variations of combined immunodeficiency syndrome have been identified and involve a mutation in one or more of the many genes that involve lymphocyte development and response. This results in low or absent levels of B lymphocytes and T lymphocytes in serum, as well as low or absent levels of IgG and IgA. Subsequently, the diseases that result from these deficiencies range from moderate to fatal in severity. The most severe form of congenital B-and T-cell

deficiencies is severe combined immunodeficiency (SCID). This deficiency results from multiple genetic abnormalities that cause all white blood cell lines to fail to develop normally from a stem cell, leading to absence of all immune function. Infants with this genetic defect have failure to thrive, chronic diarrhea and multiple opportunistic infections that usually result in death before 2 years of age. More recently, bone marrow transplant has been used with success to treat infants identified with SCIDS at birth or within the first 3 months of life.

Medical Management

Treatment of ataxia-telangiectasia includes early management of infections with antimicrobial therapy, management of chronic lung disease with postural drainage and physical therapy, and management of other presenting symptoms. Other treatments include transplantation of fetal thymus tissue and IVIG administration. Treatment options for SCID include stem cell and bone marrow transplantation. The ideal donor is an HLA-identical sibling. Improvements continue in the use of HSCT to treat patients with SCID as well as other primary immunodeficiencies. Evidence demonstrates that transplantation of allogeneic hematopoietic stem cells can cause an enhanced improvement over time. Other treatment regimens include administration of IVIG or thymus-derived factors and thymus gland transplantation. Gene therapy has been used, but the results have thus far been disappointing. As treatment improves, an increased number of those who previously would have died in infancy may live to adulthood.

Nursing Management

Many patients require immunosuppression to ensure engraftment of depleted bone marrow during certain transplantation procedures. For this reason, nursing care must be meticulous, with attention to preventing the transmission of infection. The use of routine practices related to infection control is essential in caring for these patients. Additional precautions, such as protective measures, where nurses protect the patient by donning gowns, gloves, and caps, is essential. The patient's condition must be monitored at all times, as a certain number of patients experience complications that can be fatal.

Secondary Immune Deficiencies

Immunosuppressive therapy for treatment of autoimmune diseases and prevention of organ transplant rejection and also chemotherapy agents are the most prevalent medications that contribute to secondary immune deficiencies. Suppression of the immune system places these patients at a high risk for opportunistic infections (OIs), which are infections from microorganisms that are not usually considered pathogens, but cause disease if the immune system is impaired. Therefore, a primary focus of nursing care for patients who are immune suppressed is prevention of infection.

Nutrition also plays a key role in immune function. Prolonged malnutrition with low protein intake contributes to decrease in lymphatic tissue, atrophy of the thymus gland, and altered cell-mediated immune response. Without appropriate nutritional intake, general cell function is impaired and

increases the susceptibility to infection. Major injuries such as trauma and burns destroy immune tissues such as the skin and can result in shock states that damage cell function.

Medical treatment requiring surgery that removes immune organs such as the lymph nodes, the spleen, or the thymus also impairs immune response. Additionally, radiation suppresses immune function by destroying the lymph tissue directly or by causing atrophy of bone marrow function and depressing stem cell production of lymphocytes. Numerous diseases significantly impact immune function by altering immune tissue or cells and leaving the individual susceptible to secondary infections.

Medical Management

Management of secondary immunodeficiencies includes diagnosis and treatment of the underlying disease process. Interventions include eliminating the contributing factors, treating the underlying condition, and using sound principles of infection control.

3.5 Nursing Management for Patients with Immunodeficiencies

Nursing management includes assessment, patient teaching, selected interventions, and supportive care. Assessment of the patient for infection and timely initiation of treatment are essential.

1. Nursing care of patients with primary and secondary immunodeficiencies depends on the underlying cause of the immunodeficiency, the type of immunodeficiency, and its severity. Because immunodeficiencies result in a compromised immune system and pose a high risk for infection, careful assessment of the patient's immune status is essential.

2. The assessment focuses on the history of past infections, particularly the type and frequency of infection; methods of and response to past treatments; signs and symptoms of any current skin, respiratory, oral, gastrointestinal, or genitourinary infection; and measures taken by the patient to prevent infection.

The nurse assesses and monitors the patient for signs and symptoms of infection. Look out for

- Fever with or without chills
- Cough with or without sputum
- Shortness of breath
- Difficulty breathing
- Difficulty swallowing
- White patches in the oral cavity
- Swollen lymph nodes
- Nausea with or without vomiting
- Persistent diarrhea
- Frequency, urgency, or pain on urination
- Change in the character of the urine
- Lesions on the face, lips, or perianal area
- Redness, swelling, or drainage from skin lesions

- Persistent vaginal discharge with or without perianal itching
- Persistent abdominal pain

3. Because the inflammatory response may be blunted, the patient is observed for subtle and unusual signs and changes in physical status. Vital signs and the development of pain, neurologic signs, cough, and skin and oral lesions are monitored and reported immediately. Pulse rate and respiratory rate should be counted for a full minute, because subtle changes can signal deterioration in the patient's clinical status. Auscultation of the breath sounds is important to detect changes in respiratory status that signal an existing or impending infection. Any unusual response to treatment or a significant change in the patient's clinical condition must be promptly reported to the physician.

4. The nurse continuously monitors laboratory values for changes indicative of infection. Culture and sensitivity reports from wound drainage, lesions, sputum, stool, urine, and blood are monitored to identify pathogenic organisms and appropriate antimicrobial therapy. Changes

in laboratory results and subtle changes in clinical status must be reported to the physician, because the immuno-compromised patient may fail to develop typical signs and symptoms of infection.

5. Assessment also focuses on nutritional status; stress level and coping skills; use of alcohol, drugs, or tobacco; and general hygiene practices, all of which may affect immune function. Strategies the patient has used to reduce the risk of infection are identified and evaluated for their appropriateness and effectiveness

6. The patient's ability to demonstrate good hand hygiene must be assessed, and the patient is encouraged to cough and perform deep-breathing exercises at regular intervals.

7. Teaching good dental hygiene measures reduces the potential for oral lesions, as do instructions on measures to protect the integrity of the skin.

8. Attention to strict aseptic technique when performing invasive procedures, such as dressing changes, venipunctures, and bladder catheterizations, is essential.

9. Other aspects of nursing care include assisting the patient to manage stress, to incorporate lifelong patterns of physiologic safety, and to adopt behaviours that strengthen immune system function

10. A major role of the nurse is to develop and maintain a knowledge base in these evolving treatment modalities, to help the patient and family understand the treatment options and cope with the uncertainties of treatment outcomes.

4.0 Tutor-Marked Assignment

1. When there is abnormal function of the neutropils in performing it phagocytic ability, we say there is ……..

2. …… plays an important role in the immune function

3. The main function of the T cells is to …….

Answer

1. Phagocytic dysfunction

2. Nutrition

3. regulate immune response

5.0 References / Further Reading

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Section 2: Caring for Patients with Inflammation

CONTENT

1.0 Introduction

Inflammation is a natural body response to injury. This section will explain the mechanism of inflammatory response, types of inflammation and management of inflammation.

2.0 learning outcomes

At the end of reading this section, the students will be able to:

- Define inflammation
- Effective collect data for diagnosis from patient experiencing inflammatory response
- Explain the management given to a patient experiencing and inflammatory response

3.0 Main content

3.1 Inflammation

Inflammation is a "nonspecific" response to an injury, meaning the same sequence of events occurs regardless of the cause. Inflammation brings fluid, dissolved substances, and blood cells into the interstitial tissues where an injury has occurred. Its purpose is to destroy the harmful agent, limit spread to other tissues, and begin the healing process. Inflammation develops as soon as one or more harmful invaders injure the body's cells.

Inflammation, also called innate-native immunity or natural immunity, provides immediate protection against the effects of tissue injury and invading foreign proteins. Innate-native immunity is any natural protective feature of a person. It can be a barrier to prevent organisms from entering the body or can be an attacking force that eliminates organisms that have already entered the body. This type of immunity cannot be transferred from one person to another and is not an adaptive response to exposure or invasion by foreign proteins. The inflammatory responses are part of

innate immunity. Other parts of innate immunity include skin, mucosa, antimicrobial chemicals on the skin, complement, and natural killer cells.

The ability to respond with inflammation is critical to health and wellbeing. Inflammation differs from antibody-mediated immunity (AMI) and Cell mediated immunity (CMI) in two important ways:

- Inflammatory protection is immediate but short-term. It does not provide true immunity on repeated exposure to the same organisms.
- Inflammation is a nonspecific body defense to invasion or injury and can be started quickly by almost any event, regardless of where it occurs or what causes it.

So, inflammation triggered by a scald burn to the hand is the same as inflammation triggered by bacteria in the middle ear. How widespread the manifestations of inflammation are depends on the intensity, severity, and duration of exposure to the initiating event.

Inflammation starts tissue actions that cause visible and uncomfortable manifestations that are important in ridding the body of harmful organisms. However, if the inflammatory response is excessive, tissue damage may result. Inflammation also helps start both antibody mediated and cell-mediated actions to activate full immunity.

Infection A confusing issue about inflammation is that this process occurs in response to tissue injury, as well as to infection by organisms. Infection is usually accompanied by inflammation; however, inflammation can occur without infection. Examples of inflammation without infection include joint sprain injuries, myocardial infarction, and blister formation. Examples of inflammation caused by noninfectious invasion include allergic rhinitis, contact dermatitis, and other allergic reactions. Inflammations from infection include otitis media, appendicitis, and viral hepatitis, among many others. Inflammation does not always mean that an infection is present.

Cell Types Involved in Inflammation

The leukocytes (white blood cells [WBCs]) involved in inflammation are neutrophils, macrophages, eosinophils, and basophils. An additional cell type important in inflammation is the tissue mast cell. Neutrophils and macrophages destroy and eliminate foreign invaders. Basophils, eosinophils, and mast cells release chemicals that act on blood vessels to cause tissue-level responses that help neutrophil and macrophage actions.

Neutrophils

Mature neutrophils make up between 55% and 70% of the normal total WBC count. Neutrophils come from the stem cells and complete the maturation process in the bone marrow. They are also called granulocytes because of the large number of granules present inside each cell. Other names for neutrophils are based on their appearance and maturity. Mature neutrophils are also called segmented neutrophils (“segs”) or polymorphonuclear cells (“polys,” PMNs) because of their

segmented nucleus. Less mature neutrophils are called band neutrophils (“bands” or “stabs”) because of their nuclear shape.

Neutrophil function provides protection after invaders, especially bacteria, enter the body. This powerful army of small cells destroys invaders by phagocytosis and enzymatic digestion, although each cell is small and can take part in only one episode of phagocytosis. Mature neutrophils are the only stage of this cell capable of phagocytosis. Because this cell type is responsible for continuous, instant, nonspecific protection against organisms, the percentage and actual number of mature circulating neutrophils are used to measure a patient's risk for infection: the higher the numbers, the greater the resistance to infection.

Macrophages

Macrophages come from the committed myeloid stem cells in the bone marrow and form the mononuclear-phagocyte system. The stem cells first form monocytes, which are released into the blood at this stage. Until they mature, monocytes have limited activity. Most monocytes move from the blood into body tissues, where they mature into macrophages. Some macrophages become “fixed” in position within the tissues, whereas others can move within and between tissues.

Macrophage function protects the body in several ways. These cells are important in immediate inflammatory responses and also stimulate the longer-lasting immune responses of antibody-mediated immunity (AMI) and cell-mediated immunity (CMI). Macrophage functions include phagocytosis, repair, antigen presenting/processing, and secretion of cytokines for immune system control. The inflammatory function of macrophages is phagocytosis. Macrophages can easily distinguish between self and non-self, and their large size makes them very effective at trapping invading cells. They have long life spans and can take part in many phagocytic events.

Basophils

Basophils come from myeloid stem cells and make up only about 1% of the total circulating WBC count. These cells cause the manifestations of inflammation. Basophil function acts on blood vessels with basophil chemicals (vasoactive amines), which include heparin, histamine, serotonin, kinins, and leukotrienes. Basophils have sites that bind the base portion of immunoglobulin E (IgE) molecules, which binds to and is activated by allergens. When allergens bind to the IgE on the basophil, the basophil membrane opens and releases the vasoactive amines into the blood, where most of them act on smooth muscle and blood vessel walls. Heparin inhibits blood and protein clotting. Histamine constricts small veins, inhibiting blood flow and decreasing venous return. This effect causes blood to collect in capillaries and arterioles. Kinins dilate arterioles and increase capillary permeability. These actions cause blood plasma to leak into the interstitial space (vascular leak syndrome). Thus basophils stimulate both general inflammation and the inflammation of allergy and hypersensitivity reactions.

Eosinophils

Eosinophils come from the myeloid line and contain many vasoactive chemicals. Only 1% to 2% of the total WBC count normally is composed of eosinophils. Eosinophil function is very active

against infestations of parasitic larvae and also limits inflammatory reactions. The eosinophil granules contain many different substances. Some are enzymes that degrade the vasoactive chemicals released by other leukocytes. This is why the number of circulating eosinophils increases during an allergic response.

Tissue Mast Cells

Tissue mast cells look like and have functions very similar to basophils and eosinophils. Although mast cells do originate in the bone marrow, they come from a different parent cell than leukocytes and do not circulate as mature cells. Instead, they differentiate and mature in tissues, especially those near blood vessels, nerves, lung tissue, skin, and mucous membranes. Like basophils, mast cells have binding sites for the base of IgE molecules and are involved in hypersensitivity reactions. Some mast cells also respond to the inflammatory products made and released by T-lymphocytes. The tissue mast cells have important roles in maintaining and prolonging inflammatory and hypersensitivity reactions.

Pathophysiology of Inflammation

Normally, the skin and mucous membranes act as the body's first line of defense, preventing an invasion by external organisms. Mucous membranes lining the inner surfaces of the body trap microorganisms and other foreign substances. These are removed by other protective mechanisms, such as ciliary movement in the respiratory tract or the washing action of tears and urine. Many body fluids contain bactericidal substances that provide barrier protection. These include acid in the gastric fluid and lysosomes in tears, nasal secretions, and saliva. External or internal agents can destroy the body's defense mechanisms and trigger the inflammatory process.

Inflammation can be caused by the following factors:

- Mechanical injuries, such as cuts or surgical incisions
- Physical damage, such as burns
- Chemical injury from toxins or poisons
- Microorganisms, such as bacteria, viruses, or fungi
- Extremes of heat or cold
- Immunologic responses, such as hypersensitivity reactions
- Ischemic damage or trauma, such as a stroke or myocardial infarction.

The **inflammatory response** involves three steps:

1. **Vascular response**. Initially, the blood vessels around the injured area constrict briefly. Then they dilate as chemical mediators, such as histamine, bradykinin, and prostaglandins, are released. Blood flow to the injured area increases, causing redness and warmth. It also raises local hydrostatic pressure (pressure within the capillary), which causes capillaries to leak fluid into surrounding tissues. The increased permeability results in edema at the injury site and dilution of the organisms or toxins in the area. The chemical mediators and edema are responsible for pain and impaired function.

2. **Cellular response.** As blood flow increases to the injured tissues, white blood cells (WBCs) move into the area. Neutrophils, the first white blood cells to respond, usually arrive within 90 minutes. The process by which neutrophils move from inside the capillary to the injured tissue is known as diapedesis. Neutrophils and macrophages (large white blood cells that develop from monocytes) ingest harmful bacteria and dead tissue cells in a process called phagocytosis. Once neutrophils have ingested their full capacity of bacteria, they die. The accumulation of dead neutrophils, dead bacteria, and tissue debris forms pus. Bacteria such as staphylococci, streptococci, and Neisseria often cause purulent drainage.
3. **Healing and tissue repair**. After neutrophils die, macrophages clean up the site for healing. In minor injuries, the inflammatory process and healing restore normal structure and function. If the injury is more extensive, new cells are produced to replace the functional tissue. Most cells can regenerate or reproduce (except for nerve, skeletal muscle, and cardiac muscle cells). When regeneration is impossible, collagen scar tissue replaces the destroyed tissue through a process known as repair

Acute Inflammation

Inflammation may be either acute or chronic. Acute inflammation is a short-term reaction of the body to any tissue damage. It is immediate and usually lasts less than 1 to 2 weeks. Once the harmful agent is removed, the inflammation subsides. Healing and tissue repair occur, and the body returns to normal or near-normal function. Acute inflammation produces local and systemic manifestations.

Local Manifestations

- Redness
- Pain
- Warmth
- Edema
- Loss of function

Systemic Manifestations

- Fever
- Tachycardia
- Increased respiratory rate
- Loss of appetite
- Fatigue
- Enlarged lymph nodes
- WBC count 10,000/mm3

Diagnostic Evaluation Diagnostic tests can identify the source and extent of inflammation. The following diagnostic tests may be ordered:

1. WBC count with differential provides information about five leukocytes: neutrophils, eosinophils, basophils, monocytes, and lymphocytes. It measures the percentage of the total WBC made up by each type of leukocyte and provides clues about the type of inflammation (Table 1). With inflammation, leukocytosis (a WBC count of greater than 10,000/mm3) typically occurs. Leukopenia (a WBC count of less than 4,500 mm3) may indicate a viral infection.
2. Erythrocyte sedimentation rate (ESR or sed rate) is a nonspecific test that can detect generalized inflammation. Normal levels are less than 20 mm/hr; significant increases may be seen in both acute and chronic inflammation.
3. C-reactive protein (CRP) is produced by the liver and excreted into the bloodstream during the acute inflammation. A positive result indicates acute or chronic inflammation.
4. Cultures of the blood and other body fluids are also ordered to determine whether infection is the cause of inflammation

3.2 Assessment of Patients with Inflammation

Subjective Data

- General health and nutritional status.
- Any injuries; redness, warmth, swelling, or pain.
- Any drainage associated with current injury or previous procedure? Is drainage clear or purulent?
- Changes in appetite or energy level.
- Any frequent infections?
- Past or present use of anti-inflammatory medications, corticosteroids, or antibiotics.

Objective Data

- Vital signs: blood pressure, pulse, respirations, temperature.
- Observe patient for fatigue and listlessness.
- Observe ability to move injured area and indications of pain.
- Assess circulation to affected area.
- Inspect skin and surrounding area of injury for redness and warmth, purulent drainage, odor, and poor healing.
- Measure size (depth and width) of wounds.
- Palpate the skin for the presence of edema.
- Palpate for enlarged lymph nodes.
- Monitor and report abnormal results of WBC count

3.3 Management of Patient with Inflammation

The nursing care needs of the patient with an inflammatory process are related to the manifestations of inflammation and altered tissue integrity. Priority nursing diagnoses include Pain, Impaired Tissue Integrity, and Risk for Infection.

Pain management

- Give anti-inflammatory medications as prescribed. These medications can lessen the pain resulting from inflammation.
- Give mild analgesic medications as prescribed. Although most analgesics do not reduce inflammation, they may decrease pain perception.
- Remind the patient that rest is important for acutely inflamed tissue. Strenuous activity or exercising an inflamed body part may increase discomfort and cause tissue damage.
- Apply cold or heat therapy as ordered. Remove ice pack or heating pad after 10 minutes and check the patient's skin. (For cold, note bluish color or a feeling of numbness; for heat, observe for redness.) For an acute injury, cold reduces swelling and relieves pain. After the initial stage, heat increases blood flow to the affected tissue and promotes absorption of edema. It is important to monitor the patient's skin for untoward effects and to prevent injury to the skin.
- Elevate the inflamed area if possible. Elevation promotes venous return and reduces swelling

Protection of skin integrity

- Provide protective devices, such as an eye patch, over the injured area. Protective devices aid in comfort and healing.
- Clean inflamed tissue gently; use water or normal saline only. Soap and harsh cleansing agents can cause drying and further tissue damage.
- Encourage the patient to balance rest with active and passive exercises. Rest decreases metabolic demands and promotes cell growth. Activity promotes circulation.
- Encourage the patient to eat a well-balanced diet with adequate carbohydrates, protein, vitamins, and minerals. If the patient is NPO or unable to eat an adequate diet, suggest parenteral nutrition, between-meal supplements, or multivitamin supplements. A well-balanced diet promotes immune function and healing.

Protection from Infection

The inflammatory response is meant to protect the patient against microorganisms. However, when intact skin is broken (as in a healing wound), the risk for infection increases.

- Monitor the patient's temperature, pulse, and respirations at least every 4 hours. Increased vital signs usually indicate inflammation. A temperature of 101°F (38.3°C) or above indicates infection.
- Culture purulent or odorous wound drainage. Wound culture is used to determine the infectious organism and appropriate antibiotic therapy.
- Provide fluid intake of 2,500 mL per day unless otherwise contraindicated. Adequate hydration helps maintain blood flow and nutrient supply to the tissues. Fluids may be limited for the patient with heart failure.
- Use proper hand-washing techniques (including at least 15 seconds of friction). Hand washing is the fundamental tool for preventing the spread of infection to a susceptible person.
- Wear sterile gloves when providing wound care. Sterile gloves prevent further wound contamination and the spread of infection to other patients

Fluid and Diet Treatment

Inflammation and wound healing require adequate nutrition, blood supply, and oxygenation. Malnutrition makes the phagocytes ineffective so that there is a delayed inflammatory response. The macrophages cannot prepare the wound site for healing. If an infection develops, it interferes with effective wound healing. Inadequate circulation cannot deliver sufficient oxygen and nutrients or remove waste products. Without normal circulation, the injury site cannot heal properly.

The patient with an inflammation or wound requires a well-balanced diet to promote healing. When patients develop protein deficiency, their risk for poor wound healing and infection increases. Inflammation produces catabolism, a condition in which body tissues are broken down. During healing, the desired result is tissue building (anabolism). Diets low in calories and essential nutrients lead to catabolism and impaired healing. Encourage the patient to eat a diet high in carbohydrates, protein, and vitamins.

- Carbohydrates are important to meet energy demands and to support leukocyte function.
- Protein is necessary for tissue healing and the production of antibodies and WBCs. Some vitamins and minerals are also important.
- Vitamin A fosters capillary formation and tissue growth.
- B-complex vitamins promote wound healing.
- Vitamin C is necessary for collagen synthesis.
- Vitamin K is essential for blood clotting.
- Minerals, especially zinc, are important for tissue growth, skin integrity, and immune function.

- Ensure patient is well hydrated.

Medications

The medications prescribed to relieve the effects of inflammation include antibiotics, acetaminophen, anti-inflammatory agents, and corticosteroids.

- Antibiotics are used to treat infection and prevent infection from interfering with the healing process. If an infection is present, a culture and sensitivity test is done to determine the most effective antibiotic.
- Acetaminophen (Tylenol) does not have an anti-inflammatory effect. It is used by patients to reduce the pain associated with inflammation. Acetaminophen does have an antipyretic effect. It decreases fever by acting directly on the hypothalamic heat-regulating center.
- Aspirin (acetylsalicylic acid, or ASA) and NSAIDs have a similar action. They produce anti-inflammatory, antipyretic, and analgesic effects. Patients receive varying degrees of relief with aspirin and different NSAIDs. Sometimes several different drugs are tried before the patient reports any relief.
- Corticosteroid therapy is prescribed for acute hypersensitivity reactions, such as poison oak, or for inflammation unrelieved by aspirin or NSAIDs. Corticosteroids are also used to manage chronic inflammatory diseases such as arthritis, but they do not cure disease. Steroid medications cause adverse reactions. They suppress the immune and inflammatory responses as well as delay healing; therefore, they should be used cautiously.

Remember the following principles when administering corticosteroids:

1. Use the smallest effective dose.
2. An alternate-day dose schedule may decrease suppression of adrenal gland activity.
3. Never stop steroid therapy abruptly. Taper the dose gradually so that adrenal gland function can return to normal.
4. Harmful side effects increase with higher doses and prolonged therapy.

Wound Care

Minor wounds may require no more then gentle cleansing with soap and water. If wounds are more extensive, wound care may involve irrigations and debridement of necrotic tissue. To prevent additional wound damage, the nurse cleanses the site with sterile normal saline or commercially prepared nontoxic wound cleansers. Hydrogen peroxide, povidone–iodine (Betadine), and sodium hypochlorite (Dakin's solution) have a drying effect on the tissue. They can also inhibit the healing process. They should be used as a last resort. Because granulation tissue in a healing wound is fragile and bleeds easily, wound care must be performed gently.

Tutor-Marked Assignment

1. The blood cell responsive to inflammation is the ……

2. The Process by which the body destroys the invaders is ……

3. …….. cells have important roles in maintaining and prolonging inflammatory and hypersensitivity reactions

4. In the management of inflammation, non-steroidal anti-inflammatory drugs (NSAIDs) are use. One of the uses NSAIDs in combination with its anti-inflammatory and antipyretic properties is the ……

Answer

1. White blood cells

2. Phagocytosis

3. The tissue mast

4. Analgesic function

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Section 3: Caring for Patients with Infectious Diseases

CONTENT

1.0 Introduction

Infection occur when microbes invade the body and multiply. These multiplied microorganisms grow and alter the body normal functioning. This section will explain the process of infection, factors that enhance infection development, assess of a patient with infection and management of a patient with infection.

2.0 learning outcomes

At the end of reading this section, the student will be able to

- Explain the concept of infection
- Identify the causative organism for infection diseases
- Explain the assessment for a patient with infection
- Discuss the medical and nursing management for an infection case.

3.0 Main content

3.1 Infectious organism

Microorganisms invade humans in order to grow and reproduce. Contact between humans and microorganisms is often beneficial to both. For example, the normal flora of the skin, mucous

membranes, and gastrointestinal tract play an important part in the body's defense system. However, all microorganisms are capable of producing infection (growth and invasion of microorganisms that leads to disease), especially when an individual is in poor health. Infectious diseases have existed throughout history. Modern medicine, antibiotic therapy, immunizations, and public health measures that protect food and water supplies have significantly reduced the prevalence of infectious diseases in many parts of the world.

Pathogenic Organisms

Bacteria Bacteria are single-celled organisms. They have different shapes: round (cocci), rod shaped (bacilli),or spiral (spirochete). Bacteria can adapt to different environments: Aerobes require oxygen for survival; anaerobes survive without oxygen. In the laboratory, they are classified by staining properties: Gram positive bacteria stain purple and Gram-negative bacteria stain red. Common bacterial infections include Streptococcus pneumoniae, Staphylococcus aureus, and Escherichia coli.

Mycoplasma Although similar to bacteria, mycoplasma are smaller. They are more resistant to antibiotics such as penicillins and cephalosporins.

Rickettsia and Chlamydia Rickettsia and Chlamydia have some features similar to bacteria and viruses. Rickettsia infect the cells of arthropods (e.g., fleas, ticks, and lice) without causing disease. When they are transmitted from these vectors to humans, they cause diseases such as typhus. Chlamydia are transmitted by direct contact and can cause sexually transmitted infections.

Viruses Viruses are the smallest pathogens. They are incapable of reproducing outside of a living cell. They use the host's metabolic and reproductive materials to multiply. Viruses consist of a protein shell around a DNA or RNA core. Some viruses are short-lived, such as rhinovirus (the common cold).Latent viruses remain dormant in the host until they are reactivated, for example, herpes zoster (shingles) and fever blisters (cold sores).Human immunodeficiency virus (HIV) is classed as a retrovirus. Oncogenic viruses may be able to transform normal cells into cancer cells.

Fungi Fungi are prevalent throughout the world, but few are capable of causing disease in humans. They grow in two forms: yeasts and molds. Fungal infections can be mild, affecting the skin and subcutaneous tissue. Some fungi, such as Pneumocystis carinii, can cause life-threatening opportunistic infections in the immuno-compromised host.

Parasites Protozoans, helminths, and arthropods are considered parasites. Protozoans are single-celled organisms transmitted from host to host, indirectly through contaminated water, or by an arthropod vector. Helminths are wormlike parasites (e.g., roundworms, tapeworms, and flukes).They are transmitted via eggs or larvae that usually are excreted by humans in urine or feces. They enter other humans through food contaminated by urine or feces or through broken skin. Arthropod parasites, such as scabies (mites),lice, and fleas, typically infest external body

surfaces, causing localized tissue damage and inflammation. Transmission is by direct contact with the arthropod or its eggs.

Pathophysiology

Chain of Infection

For an individual to develop an infection, the chain of infection must be in place. Key elements of the chain include (1) a microorganism, (2) a reservoir, (3) a portal of exit from the reservoir, (4) a mode of transmission from the reservoir to the host, and (5) an entry point into a (6) susceptible host. Each element is presented in more detail in the following discussion.

1. Microorganisms Pathogens are microorganisms that are capable of causing disease. Common pathogens include bacteria, mycoplasma, rickettsiae, chlamydia, viruses, fungi, protozoans, helminths, and arthropods. Each organism causes a different reaction in the host. For microorganisms to result in disease, several factors are required, including virulence and invasiveness. **Virulence** is the power of a microorganism to cause infection . It is affected by the number of organisms, the host's health, and whether toxins are produced. For example, measles has a low virulence, but rabies has a high virulence. An organism's ability to invade and multiply in a host determines its **invasiveness**.

Microorganisms that produce enzymes or toxins are better able to resist the host's defenses and can easily invade the body. For example, Staphylococcus aureus releases an enzyme that increases its resistance to certain antibiotics. Bacteria may release exotoxins (from Staphylococcus, Streptococcus, or tetanus bacteria) or endotoxins (from Gramnegative bacteria). Also, diseases such as botulism and cholera release deadly bacterial exotoxins. Gram-negative organisms that produce endotoxins can cause septic shock.

2. Reservoir and Portal of Exit The reservoir is where the pathogen lives and multiplies. Humans, animals, insects, and nonliving or inanimate objects such as equipment, needles, and utensils act as reservoirs. Infectious diseases are usually transmitted from human sources that have the clinical disease. People who have the disease but do not show any clinical manifestations are called carriers. For an infection to escape its reservoir, it must have a portal of exit. Pathogens exit humans through respiratory secretions, gastrointestinal and genitourinary body fluids, skin or mucous membrane lesions, or the blood.

3, Mode of Transmission Pathogens move from their reservoir to a susceptible host by several routes: direct or indirect contact, droplet or airborne transmission, or a vector. Direct contact includes person-to-person spread or contact with infected body fluids or contaminated food or water. Indirect contact occurs when the infectious agent is carried on inanimate objects, such as dirty eating utensils. Droplet transmission involves large, moist droplets released during sneezing, talking, and coughing. Contaminated droplets can be sprayed to another person within a 2- to 3-foot radius. In airborne transmission, small respiratory particles are carried by air currents and then

inhaled by the host. For example, tuberculosis is spread by airborne transmission. Vectorsare insects and animals (such as flies, mosquitoes, or rodents) that act as intermediate hosts between the source and host. Pathogenic organisms must be able to survive their transport from the reservoir to a host. Over time, they have developed mechanisms to resist drying and unfavorable temperatures (e.g., tetanus bacteria produce spores).

4. Portal of Entry An organism needs a portal of entry to gain access into the host. Portals of entry include eyes; mouth; respiratory, gastrointestinal, and genitourinary tracts; broken skin; and blood.

5. Susceptible Host The susceptible host is the final link in the chain of infection. The concepts of normal flora, colonization, infection, and disease are important to how bacteria can affect a host. Normal flora (resident bacteria) work in harmony with the host and provide a benefit such as the normal flora in the intestinal tract. Colonization occurs when pathogenic microorganisms live in the host but do not cause injury or initiate the inflammatory response. For example, Staphylococcus aureus may colonize on the skin. Infection indicates that pathogenic bacteria have triggered the inflammatory process, such as when S. aureus enters a surgical wound, causing redness, heat, and pain. Infectious disease is the illness that results from an infection.

Factors that predispose to infection

1. age
2. poor nutrition
3. metabolic/ systemic diseases
4. immuno suppression
5. exposure to radiation

Factors that help the host resist infection

1. Physical barriers, such as the skin and mucous membranes
2. Chemical barriers created by acid stomach secretions, urine, and vaginal secretions cause a hostile environment
3. Antimicrobial factors in saliva, tears, and prostatic fluid
4. Coughing, sneezing, and the cilia in the respiratory tract
5. Neutrophils and macrophage

3.2 Stages of the Infection Process

Infectious disease usually follows a predictable course through five stages as it develops in the host

1. The initial stage is the incubation period. The pathogen actively reproduces but does not cause symptoms. Some diseases have short incubation periods (such as food poisoning due to Salmonella). On the other hand, HIV infection has an incubation period of months to years.
2. In the prodromal stage, symptoms begin to appear, although they are often vague and nonspecific. The patient will report general malaise, fever, muscle aches and pains, headache, and fatigue.
3. During the acute stage, the pathogen continues reproducing and disperses rapidly. Manifestations become obvious and reflect the specific organism and site. Usually, the patient develops a fever, chills, tachycardia, and tachypnea. Infections of an internal organ cause an inflammatory response. The patient may have tenderness over the site or show signs of altered function, such as hematuria in kidney infections. If the infectious process continues over an extended period, patients show signs of increased catabolism and malnutrition. They lose weight and their muscles become weak. Sometimes products of the immune process, formed in other sites than the primary infection, cause an inflammatory reaction. For example, a sore throat caused by a streptococcal infection may result in glomerulonephritis.
4. In the convalescent stage, the infection is contained and the pathogen is continually destroyed. At this point, affected tissues are repaired and symptoms disappear.
5. During the last stage, resolution, the infection is totally eliminated from the body without residual manifestations. Patients with chronic infections never reach the convalescent and resolution stages.

3.3 Diagnostic Evaluation

Diagnostic tests assess the patient's response to infection, identify the infecting organism, and monitor progress of the medical intervention. The following laboratory tests may be ordered:

- WBC count provides clues about the infecting organism and the body's immune response to it
- Cultures of the wound, blood, or other infected body fluids may be obtained. Using sterile technique, a specimen is collected and immediately taken to the laboratory. There, it is placed in or on a special culture medium. The culture is placed in an incubator to encourage growth of the organism outside the body. Most cultures take 24 to 36 hours to grow. Then the culture is examined under the microscope to identify the offending microorganism.
- Sensitivity studies determine which antibiotics are most effective against the identified pathogen. Often, several antibiotics are listed. The healthcare professional selects the appropriate drug based on host and pathogen factors.

- Antibiotic peak and trough levels monitor therapeutic blood levels of a prescribed medication, especially aminoglycosides. It is important to maintain drug levels within a therapeutic range, the amount of drug that will effectively destroy pathogens while producing few toxic effects.
- Lumbar puncture, done to obtain cerebrospinal fluid (CSF) for examination and culture if meningitis or encephalitis is suspected.
- Ultrasound examination, used to detect abscesses or evaluate organ function. An echocardiogram assesses cardiac function and is ordered when pericarditis or endocarditis is suspected. Renal ultrasonography may reveal defects in the urinary tract that would predispose the patient to infection.

3.4 Assessment of Patient with Infection

Subjective Data Ask the patient about:

- General health and nutritional status.
- Fever: How long has the fever existed? Has patient had chills?
- Describe cough and/or sputum; sore throat, congestion, runny or stuffy nose. Anorexia, nausea, vomiting, abdominal pain, diarrhea.
- Weakness, malaise, muscle aches, joint pains, headache.
- Pain on urination, odor, urgency, frequency, flank pain.
- Vaginal discharge—color, odor, itching.
- Describe any rash or presence of animal or insect bite.
- Any prior infections or exposure to infectious person.
- Treatment for tuberculosis or sexually transmitted disease.
- Has the patient been tested for HIV?
- Use of antipyretics, antimicrobials; immunization history.
- Any travel overseas?

Objective Data

- Vital signs: blood pressure, pulse, respirations, temperature.
- Height and weight.
- Observe for fatigue, shortness of breath, and altered mental status.
- Assess for dehydration: increased thirst, dry mucous membranes, decreased skin turgor.
- Auscultate chest for crackles and wheezes.
- Inspect sputum, stool, genitourinary excretions for amount, color, consistency, and odor.
- Inspect throat for redness.
- Palpate the skin for the presence of any rash, warmth, or tenderness
- Palpate for enlarged lymph nodes and tenderness.

- Monitor WBC and culture and sensitivity (C&S) report; report abnormal findings.

3.5 Medical Medications of a patient with infection

Management of infectious diseases focuses on administering antimicrobials (drugs capable of killing or incapacitating pathogens).

Antimicrobial therapy includes

- antibiotic
- antifungal
- antiviral
- antiparasitic drugs.

Antibiotics are classified according to the way they interfere with bacterial growth.

- **Bacteriostatic agents** inhibit the growth of microorganisms. Tetracyclines, macrolides, and sulfonamides are bacteriostatic preparations.
- **Bactericidal agents** kill the microorganism and include penicillin, cephalosporin, and aminoglycoside antibiotics.

In addition, antibiotics have either a narrow spectrum or broad spectrum of action. **Narrow-spectrum antibiotics** are drugs that act against a limited number of pathogens, whereas **broad-spectrum antibiotics** are those that inhibit a wide variety of microbes. Antimicrobials can be applied topically or administered by oral, intramuscular, intravenous, intraperitoneal, or intrathecal routes. Oral and intravenous routes are most commonly used. A culture and sensitivity test should be done before antimicrobial therapy is started. If antibiotics are started before the culture is collected, they could interfere with organism growth on the culture medium. When patients are scheduled for surgery or invasive procedures that could cause an infection, they are started on prophylactic (preventive) anti-infective therapy.

Selection of an appropriate antimicrobial is based on

- its effectiveness,
- level of toxicity,
- ease of administration,
- cost effectiveness.

The healthcare professional must also consider several factors about the patient, such as:

- History of allergic reactions
- Patient’s age and childbearing status

- Patient's present health status; presence of malnutrition, cancer, or AIDS
- Renal and hepatic function
- Site and extent of the infection
- History of chronic diseases and other drug therapy

Antibiotic Drugs Medications used to treat bacterial infections are generally known as antibiotics. New antibiotics are constantly being developed to overcome multidrug-resistant bacteria. Antibiotics fall into different classes of drugs with related chemical structure and activity. Some are effective only against gram-positive bacteria; others are effective only against gram-negative organisms. Newer broad-spectrum antibiotics have activity against a wide variety of bacteria, including both gram-positive and gram-negative forms.

Antifungal Agents Fungal infections can be superficial or systemic. Topical antifungal preparations are used to treat superficial infections such as candidiasis, tinea, and ringworm. One of the most frequently ordered drugs is nystatin (Mycostatin) for treating candidiasis. Vaginal preparations are available to treat vaginal yeast infections. Amphotericin B (Fungizone) is a systemic antifungal agent for parenteral administration. It is used to treat severe, life-threatening fungal infections, including histoplasmosis, coccidioidomycosis, and candidiasis. Fluconazole (Diflucan) is preferred over amphotericin B because it is less toxic and is available in oral and parenteral forms.

Antiviral Drugs Viral infections can be as mild as the common cold, chronic like herpes infections, or life threatening like acquired immunodeficiency syndrome (AIDS). Antiviral therapy is relatively new and quite limited because new viruses can reproduce before a drug is developed. The drugs in this class are expensive and fairly toxic to the patient.

Antiparasitic Agents Drugs used to treat parasitic infections are as varied as the organisms that cause them. Generally, these drugs are expensive and often toxic. Quinine was one of the first antiparasitic drugs developed to treat malaria. Quinine is very toxic, but newer forms such as chloroquine (Aralen), primaquine, and hydroxychloroquine (Plaquenil) are widely used as antimalarial drugs. Metronidazole (Flagyl) is used to treat protozoan infections

3.6 Nursing Management of a patient with infection

Nursing management of patients with an infection or infectious disease focuses on prevention, health promotion, and health maintenance. Prevention includes assessing the patient's risk for infection, immune function, and the need for immunizations. Health promotion and maintenance activities include monitoring vital signs, administering prescribed antibiotics, using aseptic technique and infection control measures, and promoting rest, activity, and nutritional intake.

- Before implementing nursing care, the nurse must collect assessment data. These data can help determine the extent to which an infection or infectious disease is interfering with the patient's life, can identify risk factors for complications, and can be used by the physician to determine the type of medical intervention needed.
- Patients with an infectious disease usually develop a fever. Although fever serves a useful purpose, abnormally high fevers can put the patient at risk for other complications. Expected outcome: Fever will be reduced to normal limits.
- Monitor temperature, pulse, and respirations at regular intervals. This helps to determine the fever pattern and effects on other body systems.

Observation and fluid balance

- Increase oral fluid intake to 2,500 mL/day, as appropriate, for the patient's cardiopulmonary status. Fever can cause dehydration; increased fluid intake reduces this risk. Fluids are given cautiously to patients with cardiopulmonary disease to prevent fluid overload.
- Administer IV fluid and electrolytes as ordered. If fluid loss is severe, patient will need IV electrolyte solutions.
- Record intake and output at least every 8 hours. Decreased urine output may indicate dehydration.
- Give prescribed antipyretics as ordered for an elevated temperature. Antipyretics lower the body's temperature; however, they decrease WBC activity, especially phagocytosis. Some microorganisms can be destroyed when the body reaches a certain temperature.
- Maintain bed rest. Bed rest conserves energy and reduces metabolic demands.
- When the patient becomes diaphoretic, bathe and replace wet gowns and linen. Personal hygiene promotes patient comfort.
- Monitor the patient for decreased level of consciousness and seizures. High fevers can cause dehydration, leading to an altered mental status and seizures.

Prevention of infection

- Preventing infection requires understanding the importance of immunizations, the guidelines for using antibiotics to prevent multidrug-resistant microorganisms, and the ways to prevent the spread of infection. Encourage all family members to keep immunizations current. If they are not up to date, discuss where immunizations can be obtained.
- Prevent the spread of infection to others by avoiding crowds and contact with infectious persons and using disposable tissues when coughing or sneezing.
- Use appropriate food-handling precautions for diseases spread by the oral–fecal route, such as hepatitis A. Avoid contact with or sharing of body fluids. For example, do not share needles or razors.
- Practice safe sex practices by using a condom during sexual activity.

- Keep the home clean by disinfecting with 1:10 bleach solution for blood spills.
- Complications are varied and are usually specific to the infecting organism and the body system affected. Acute invasion of the blood by certain microorganisms or their toxins can result in septicemia and septic shock.
- Admit patients with known or suspected infections to a private room. This minimizes risk to other patients.
- Wash hands thoroughly on entering and leaving the patient's room. Hand washing removes microorganisms from the skin and prevents transmission of infection to or from the patient.

Infection Control

- Use Standard Precautions for all patients. Standard Precautions significantly reduce the risk of disease transmission during patient care.
- Use Transmission-based Precautions when appropriate. Transmission-based Precautions reduce the spread of disease by airborne, droplet, or direct and indirect methods.
- Explain to the patient and family the reasons for isolation precautions. Patients with isolation precautions may feel neglected or dirty. Explaining the reasons and procedures can enhance understanding and acceptance.
- Place a mask on the patient or cover all infectious lesions or wounds completely when transporting the patient to other parts of the facility for diagnostic or treatment procedures. These measures minimize air contamination and the risk to visitors and personnel.
- Collect a culture and sensitivity (C&S) specimen as ordered. C&S can identify infectious organisms and determine the most effective antibiotics.
- Administer prescribed antimicrobial agents. Antimicrobial agents are given to destroy invading microorganisms.
- Notify all personnel who have contact with the patient about the diagnosis. Personnel must take appropriate precautions, particularly for patients with diseases requiring category specific isolation.
- Ensure that visitors wear appropriate protective garments before they enter the patient's room. Protective wear reduces visitors' risk of infection.
- Follow facility guidelines for disposal of contaminated tissues, dressings, or other material, and for removal of soiled linens and equipment from the patient's room. These measures prevent the transmission of pathogenic organisms

Nutrition

- Fever, especially prolonged high fever, increases the body's metabolism. Inadequate nutrition may prolong the infectious process.
- Encourage a high-calorie, high-protein diet. Increased calories and protein are needed to meet increased metabolic demands.
- Provide liquid or soft, easily digested foods. Difficult-to-digest foods increase heat production. If the patient has a sore throat, liquids and soft food are easier to swallow.

- Encourage patient to choose appealing foods. Patients with a systemic infection often lose their appetite. If they can choose foods they like, it may stimulate their appetite.
- Minimize offensive odors from draining wounds. Decreasing odors may increase the patient's appetite.

Standard Precautions Guidelines

Wash hands immediately after touching blood, body fluids, secretions and excretions, mucous membranes, non-intact skin, and contaminated items; between patient contact; and after removing gloves.

- Wear clean, non-sterile gloves when touching blood, body fluids, secretions and excretions, mucous membranes, non-intact skin, and contaminated items.
- Change gloves between tasks on the same patient.
- Wear PPE (mask, eye protection, face shield, gown, or plastic apron) to avoid being splashed or sprayed with blood, body fluids, secretions, and excretions.
- Remove soiled protective clothing as soon as patient care is completed.
- Do not recap or break needles; dispose of needles and other sharp objects in puncture-proof containers. Use one-handed "scoop" technique or a special needle-recapping device.
- Clean spills immediately with 1:10 bleach solution or facility recommended germicide.
- Handle used patient equipment and linen carefully to prevent self- and clothing contamination and transfer of organisms to other patients. Place in leak-proof bags and follow institution's policies regarding double-bagging.
- Place the patient who may contaminate the environment in a private room with a private bathroom.

Respiratory Hygiene/Cough Etiquette

- Cover the mouth and nose with a tissue when coughing and dispose of soiled tissues into a waste container.
- Perform hand hygiene immediately after disposal of the soiled tissue.
- Turn the head away from others to avoid coughing in their face.

4.0 Tutor-Marked Assignment

Virulence is the power of a microorganism to cause infection Bacteria are single-celled organisms Viruses are the smallest pathogens..

1. The smallest pathogens of the mircoorganism that cause infection are the ……..

2. Some people who have the infectious disease but do not show any clinical manifestations. These people are called
A. Makers
B. Markers
C. Conductors
D. Carriers.

3. Which of the organisms are singled-celled?
A. Virus
B. Bacteria
C. Fungi
D. Protozoa

4. The power of a microorganism to cause infection is called
A. Multiplication power
B. Competency
C. Virulence
D. Multiplier

5. Some of the key elements of the chain of infection are the following except
A. microorganism,
B. reservoir
C. portal of exit from the reservoir
D. reactionary chain
6. For treatment of an infection, antibiotics are used. An antibiotics can either be narrow spectrum or …… of action

Answer

1. Viruses
2. D
3. B
4. C
5. D
6. broad spectrum

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Self Assessment Question

1. Explain the components of the immune system?

2. Explain the process of inflammation?

3. State the standard precaution for infection prevention?

4. Explain the role of nurses in the management for Patients with Immuno-deficiencies?