NATIONAL OPEN UNIVERSITY OF NIGERIA

SCHOOL OF SCIENCE AND TECHNOLOGY

COURSE CODE: NSS 505

COURSE TITLE: MEDICAL SURGICAL NURSING (CRITICAL CARE I)

COURSE GUIDE

NSS 505
MEDICAL SURGICAL NURSING (CRITICAL CARE I)

Course Team Dr. Joel A. Afolayan (Course Developer/Writer) - Niger Delta University, Wilberforce Island, Bayelsa State
Prof. Afolabi Adebanjo (Programme Leader) – NOUN
Simeon Kayode Olubiyi (Course Coordinator) – NOUN

NATIONAL OPEN UNIVERSITY OF NIGERIA

National Open University of Nigeria
Headquarters
14/16 Ahmadu Bello Way
Victoria Island, Lagos

Abuja Office:
5 Dar-es-Salaam Street
Off Aminu Kano Crescent
Wuse II, Abuja

e-mail: centralinfo@nou.edu.ng
URL: www.nou.edu.ng

Published by
National Open University of Nigeria

Printed 2010

Reprinted 2014

ISBN: 978-058-882-5

CONTENTS **PAGE**

INTRODUCTION

NSS 505: Medical Surgical Nursing (Critical Care I) is a course that introduces the learner to various methods and approaches in Critical Nursing Care. This course will develop in you the knowledge and skills required to meet the varying needs of your patients in Critical Care. It is also the foundation for NSS 506 which is a systemic approach to patients' needs.

THE COURSE

This Course Guide tells you briefly what the course is all about, what course materials you will be using and how you can work your way through these materials. It also gives you some guidance on your Tutor-Marked Assignments and tutorial classes which you are encouraged to create time to attend and for you to be an active participant. The Course consists of infection control in the critical nursing care limits, psychosocial issues in critical nursing, trauma, nutrition and patients undergoing transplantation.

COURSE AIM

The course aims at providing the learners with in depth understanding of the basics in the Critical Nursing Care in preparation for NSS 506 which is systemic coverage of Critical Nursing Care of Patients.

COURSE OBJECTIVES

To achieve the aim set out above, the course sets the overall objective. In addition, each unit has specific objectives stated at the beginning of a unit. Learners are expected to read them carefully before going to the unit, and then you have to refer to them during the course of your study to monitor your progress.

The wider objectives of the course are set below. By meeting these objectives, you should have achieved the aims of the course as a whole. On successful completion of the course, you should be able to:

- describe how infection can be controlled in the Critical Nursing Care unit
- discuss the psychosocial issues in Critical Nursing Care
- explain the concept of trauma in relation to Critical Nursing
- describe the relationship between nutrition and Critical Nursing Care
- enumerate various patients undergoing transplantation.

WORKING THROUGH THE COURSE

To complete the course, you are expected to study through the units, the recommended textbooks and other relevant materials. Each unit has Tutor-Marked Assignment which you are required to answer and submit to your facilitator through your Counsellor at the appointed time.

COURSE MATERIAL

The following are the components of this course:

- The Course Guide
- Study Units
- Textbooks

STUDY UNITS

Module 1

Unit 1	Infection Control in the Critical Nursing Care Unit.
Unit 2	Psychosocial Issues in Critical Nursing Care I: Stressors in Critical Care.
Unit 3	Psychosocial Issues in Critical Nursing Care II: Stressors in Critical Care.
Unit 4	Trauma.

Module 2

Unit 1	Nutrition.
Unit 2	Patients Undergoing Transplantation I.
Unit 3	Patients Undergoing Transplantation II.

TEXTBOOKS

Walsh, M. (2005). *Watsons's Clinical Nursing and Related Sciences*, 6th Ed. London: Bailliere Tindall.

Burkitt, H. G., Qiuck, C. R. G. and Gatt, D. (1996). *Essential Surgery*, 2nd Ed. Edinburgh: Churchill Livingstone.

Lennard, J. E. (1992). *A Positive Approach to Nutrition as Treatment*. London: King's Fund Centre.

Helman, C. (1990). *Culture, Health and Illness*, 2nd Ed. Oxford: Butterworth-Heinemann.

Hinchiliff, S. M., Montague, S. E. and Watson, R. (1996). *Physiology for Nursing Practice.* London: Bailliare Tindall.

Robertson, G. (1999). *Individual's Perception of their quality of life following a Liver transplant*: An exploratory study. Journal of Advanced Nursing. 30(2):497-505.

Naidoo, J. (1994). *Health Promotion*. London: Baillaire Tindall.

ASSESSMENT

There are two components of assessment for this course. The Tutor-Marked Assignment and the End of Course Examination. The Tutor-Marked Assignment is the Continuous Assessment component of your course which accounts for 30% of the total score; these Tutor-Marked Assignments must be answered by you at a stipulated time which must be submitted at the Study Centre while the End of Course Examination concludes the assessment for the course which constitutes 70% of the total course. It is a three-hour written paper which covers all the units of the course. It is expected that you create quality time to study all the units properly in preparation for the End of Course Examination.

Best of luck.

MAIN COURSE

CONTENTS **PAGE**

MODULE 1

UNIT I INFECTION CONTROL IN THE CRITICAL CARE UNIT

CONTENTS

1.0 INTRODUCTION

An individual in the critical care environment is at constant risk for acquiring a nosocormial infection. Various factors lead to this enhanced susceptibility including:

1. decreased body defenses from illness, immunosuppression altered skin integrity, or stress.

2. increases exposure form the numerous interventions required such as multiple antibiotics, suctioning, etc.

3. the use of invasive devices fares with healing.

Unfortunately, the most frequent source of contamination is cross-infection by health care providers. Nurses have very frequent interaction with patients and must take responsibility for a portion of these cross-contaminations.

Nosocomial infections complicate the hospitalization and increase the length of stay. Although universal precautions have improved basic infection control practices, they are designed to protect the health care provider, not the patient. Nurses must continue to be very aggressive in controlling cross-contamination to protect the critically ill patient. The most effective way is to wash hands before and after every patient contact, whether or not gloves are worn.

In this unit, basic infection control issues are discussed to protect both the patient and the nurse from infectious disease.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- explain nosocomial infection
- state the types of transmissions of nosocomial infections
- describe the universal precautions
- discuss the nursing interventions for infection control.

3.0 MAIN CONTENT

3.1 Nosocomial infection

Definition: an infection acquired in the hospital

Types of transmissions

1. Infectious disease transmitted directly from infected person to susceptible person

2. Infectious disease transmitted indirectly from infected person to susceptible person by a carrier (i.e., nurse, physician, other health care worker).

3. Normal flora that invade and colonize other systems in the same person

4. Normal non pathogenic organisms that invade and colonize susceptible patients

5. Infections passed from an infected mother to her newborn

Extent

1. 5%-7% of patients admitted to a general hospital

2. Approximately 25% of all nosocomial infections occur within the intensive care unit (ICU)

3. As many as one third of all ICU admissions will experience a nosocomial infection

Common sites (in decreasing order of frequency)

1. Urinary tract

2. Surgical wounds

3. Lower respiratory tract

4. Blood (primary bacteremias)

5 Skins

Common pathogens

1. Escherichia coli

2. Pseudomonas aeruginosa

3 Enteococci

4 Staphylococcus aureus

Risk factors

1. Impaired host defenses from effects of critical illness

2. Disease-altered immune function (ie, diabetes, cirrhosis, renal failure, malignancy)

3. Immunosuppression (ie, organ transplantation, corticosteroid therapy)

4. Prolonged and frequent exposure to pathogens, resistant organisms in particular in the Intensive Care Unit

5. Invasive devices

6. Poor nutritional status

Nursing interventions for infection control

1. General guidelines

a. Wash hands before contact with patients to prevent cross-infection and after removing gloves, since leaks and tears are not always apparent and wrists may be contaminated.

b. Adhere to universal precautions

c. Adhere to isolation procedures in suggested categories

3.2 Centres for Diseases Control Recommendations: Universal Precautions

- All health care workers should routinely use appropriate barrier precautions to prevent skin and mucous membrane exposure when in contact with blood or other body fluids of any patient is anticipated. Gloves should be worn before touching blood and body fluids; mucous membranes or skin of all patients. Before handling any item or surface soiled with blood or body fluids and before performing venepunctures and other vascular access procedure, gloves should be changed after contact with each patient. Masks and protective eyewear or face shields should be worn during procedures that are likely to generate droplets of blood or other body fluids to prevent exposure of mucous membrane of the with nose, and eye. Gowns or aprons should be worn during procedures that are likely to generate splashes of blood or other body fluids.

- Hands and other skin surface should be washed immediately and thoroughly after contamination with blood or other body fluids. Hands should be washed immediately after gloves are removed.

- All health care workers should take precautions to prevent injuries caused by needles, scalps and other sharp instrument or devices during procedures; when cleaning used instrument during disposal of used needles and when handling sharp instrument: after procedures. To prevent needles injuries, needles should not be recapped purposely bent or broken by hand, removed from disposal syringes or otherwise manipulated by hand. After they are used, disposable syringes and needles, scalpels and other sharp items should be placed in punctured resitance containers for disposal, the punctured resistance container should be located as

close as practical to the use area. Large-bore reusable needle should be placed in a punctured resistance container for transport to the reprocessing area.

- Although saliva has not been implicated in HIV transmission, to minimize the need for emergency mouth to mouth resuscitation, mouthpieces resuscitation bags or other ventilation devices should be available for use in areas in which the need for resuscitation is predictable.

- Health care workers who have exudative lesion or weeping dermatitis should refrain from all direct patient care and from handling health care equipment until the conditions resolves.

- Pregnant health care workers are not known to be at greater risk of contracting HIV infectious than the health care workers who are not pregnant; however, if a health care worker develops HIV infections during pregnancy, the infant is at risk health care worker should be especially familiar with and strictly adhere to precautions to minimize the risk of HIV transmission.

- All health care workers participating in invasive procedure must routinely use appropriate barrier precautions to prevent skin and mucous membrane contact with blood and other body fluids of all patient. Gloves and surgical mask must be worn to prevent contact with blood or other body fluids, or the generation of droplets. Aprons made of materials that provide an effective barrier should be worn. All health care workers when handling the placenta or the infant should wear gloves during post delivery care of the umbilical cord.

- If a glove is torn or a needle stick or other injury occurs, the gloves should be removed and new gloves used as promptly as patient safety permits; the needle or instrument involved in the incident should also be removed from the sterile field.

- Wear gloves whenever contact with bodily secretions is anticipated.

- Change gloves immediately after contamination occurs, even when one is completing tasks on the same patient.

- Keep glove hands away from face area (i.e. do not wipe nose or mouth).

- Use aseptic technique when one is opening sterile package and during insertion of invasive devices.

- Use aseptic techniques during dressing changes.
- Keep surface and equipment in patient room clean.
- Disinfect surface and equipment if contaminated by infectious blood or body fluids; disinfection solutions are regulated and vary by hospital; any tuberculodal solution is acceptable to disinfect area contaminated with bodily secretion (Centers for Disease Control, telephone communication, September 3, 1994).
- Follow sterilization procedures for reusable equipment.
- Administer antibiotic therapy at prescribed times and adhere to schedule to maintain adequate drug levels.

2. **Intraveinous (IV) Catheters**.

a. Wash and glove hands before venipuncture.

b. Use antiseptic preparation before venipuncture

c. Use sterile needles for IV infusions

d. Secure Catheter and apply sterile dressing

e. Inspect catheter site daily.

f. Insert new cannula every 48-72 hours

g. Change dressing and possibly apply antibiotic ointment every 48 hours or in accordance with nursing practice guidelines.

h. Change IV tubing every 48 hours and after blood product or lipid emulsion infusions.

3. Ventilators

a. Use sterile, disinfected or disposable mouthpieces (tubing, cannula)

b. Replace circuitry every 24-48 hours

c. Remove fluid buildup in tubing

d. Change, sterile or disinfect aerosol-producing equipment every 24 hours and between patients.

e. Use sterile solutions in fluid reservoirs; discard unused portions after 24 hours.

f. Use sterile catheter and sterile gloves when one is suctioning if open catheter system is used.

g. Change suction catheter after each use

h. If closed tracheal suctioning apparatus used, change entire setup every 24 hours.

4. Waste Disposal

a. Recommendation based on the occupational safety and health administration's Blood Borne Pathogen Standard.

I. Sharps

- Do not recap, bend or break disposable needles; if recapping is unavoidable, place cap on flat surface and thread needles into cap using only one hand.
- Do not remove needles from disposal syringes.
- Place contaminated disposal sharps in container specifically designed for sharps disposal immediately after use.
- Place contaminated reusable sharps in a puncture-resistant, leak proof (on sides and bottom), color-coded or labeled container.
- Containers for contaminated sharps must be easily accessible, stand upright throughout use, and replaced before allowed to overfill.
- Close containers of contaminated sharps before removing or replacing.
- If leaking occurs or is possible, place container within a secondary container that is closable leak-proof and color coded.

II. Specimens and other regulated waste

- Wear gloves when one is handling specimens and all waste materials.
- Place in containers that are closable leak proof, color coded or labeled, and contain all contents without leakage or prolusion.

5. Contaminated laundry

a. Wear gloves and any other appropriate personal protective wear when one is handling contaminated laundry.

b. Handle as infrequently as possible

c. Bag or contain at site of use

d. Do not rinse or sort at site of use

e. Place wet laundry in containers that prevent soaking through

f. Use labeled or color-coded bags.

3.3 Isolation Procedures

A. Purpose: to prevent the transmission of microorganisms among patients personnel and visitors.

B. Universal blood and body fluid precautions: in 1987 the Centers for Disease Control (CDC) published guidelines to prevent the transmission of human immunodeficiency virus (HIV) and other bloodborne pathogens. These universal precautions (See Table 1.1) are to be used consistently by all personnel who come in contact with blood and body fluids, regardless of patient history/diagnosis.

C. Other isolation categories: Institutions usually develop their own isolation categories, and they should be followed contently.

3.4. Special consideration

A. Tuberculosis

1. Definition: Tuberculosis (TB) is an infectious disease caused by the tubercle bacillus, *Mycobacterium tuberculosis*. Pathologic characteristics include inflationary infiltrations, formation of tubercles, caseation, necrosis, abscess, fibrosis, and calcification. Infection may occur in the respiratory system (most common), GI and genitourinary tracts, bones, joist, nervous system, lymph nodes and skin. The incidence of TB has increased in recent years, and the emergences of resistant strains have been identified. TB occurs in several stages as described below.

a. Stage

i. Primary TB infection is characterized by the presence of M tuberculosis organisms in the host that multiply and create inflammatory lesions. This phase is generally without clinical symptoms

ii. The latent phase is the time between the primary infection and the development of active disease. This time period is variable (up to 50 years) depending upon the host's immune system; active TB can occur at any time after exposure, usually when the patient is under stress or otherwise immunocompromised. Although the patient is not contagious in the latent period, there will be a positive TB skin test reaction if patient is not immunosuppressed.

iii. TB (active TB) is characterized by pathologic and functional symptoms indicating destruction of host tissue by mycobacterium. The skin test and chest radiograph are positive. Transmission to others can occur.

1. Transmission/communicability

Inhalation of dried droplets nuclei containing tubercle bacilli dispelled from patient through coughing, sneezing, laughing and sneezing. Ingestion or skin penetration, although rare. Communicable for as long as bacilli are in sputum; may be years for some.

2. Incubation

4-12 weeks after exposure

Anytime disease is latent stage

3. Risk factors

a. Close contact of person with infectious TB, especially if person is at high risk for any infection.

b. HIV infection.

c. Medical conditions known to increase the risk of active TB (ie, immunosuppression, diabetes, leukemia, and Hodgkin's disease).

d. Medically, underserved, low –income populations.

e. Foreign-born person from a country with high incidence of TB or living in areas with high incidence of immigration from such countries.

f. Chronic illness

g. Malnourishment.

h. Being a resident of a log-term care facility (elderly, incarcerated mentally ill)

i. Alcohol addiction or user of HIV drugs

j. Working with silicone or asbestos

4. Postexposure precautions

a. Skin test: Once TB bacilli enter the body, antibodies are usually produced that result in a positive skin test within 2-3 weeks; does not indicate active disease; it is possible to have TB infection with a negative skin test.

b. Chest x-ray: may show calcification at infections site; possible pleural effusion

c. Collaborate with occupational health to evaluate need of preventative treatment if exposure to TB is realized or new infection develops.

d. Multiple resistant strains of TB required treatment with two or more drugs.

5. Nursing interventions for infection control

a. Acid-fast bacilli (AFB) sputum smears on patient with pulmonary symptoms who are at risk for TB.

b. AFB isolation until sputum smear result are unknown.

c. AFB (special respiratory) isolation for patients with active infection).

d. AFB isolation may be discontinued after patient demonstrates evidence of reposes to therapy such as decreased cough, decreased maximum daily temperature, resolution of night sweat, and improved general health with increased appetite and weight gain; usually improvement is seen after approximately 2 weeks of continuous antibiotic therapy.

e. Secretion precaution on patient with external TB lesions.

f. Skin test on close contacts of infections TB patient who do not have a documented history of positive test results.

g. Negative pressure room until there are no organism on smear.

h. Observed ingestion of TB medications.

i. Teach patient to cover nose and mouth while coughing, wear mask properly when out of room, limit excursion from room, and take medications appropriately and complete medications course.

j. Report new cases of TB to public health department.

k. Mask patient when in transit out of room.

l. TB skin testing of nurses upon employment and every 6-12 months depending on prevalence of TB in the unit.

m. Chest radiograph for nurses with a documented history of positive skin test for active disease at employment and yearly thereafter.

b. HIV and acquired immune deficiency syndrome (AID)

1. Definition: Infection with HIV is characterized by a gradual and accelerating destruction of the immune system. This degeneration occurs in five phases and results in AIDS. Criteria for diagnosing AIDS have been established by the CDC. For a diagnosis of AIDS, a patient must have either a T4 lymphocyte cell count less than 200/mm3 or certain AIDS indicator conditions.

   a. Five phases of infection (2) (transmission may occur during gall phases)

      i. infection; no detectable antibodies land no symptoms

      ii. Second (also called acute primary HIV infection): lasts 1-2 weeks; antibodies may be detected; flulike symptoms, skin rash

      iii. Third (also called asymptomatic HIV infection): lasts 1-15 or more years; antibodies are detectable; no symptoms

      iv. Fourth: lasts up to 3 years; although symptomatic, does not meet CDC criteria for

AIDS diagnosis; antibodies are detectable; symptoms include fever, night sweats, diarrhea, weight loss fatigue, neuropathy, lymphadenopathy, oral lesions, and cognitive slowing

v. Fifth (AIDS): variable length, may survive 1-5 years form first include severe opportunistic infections, tumors in any body system, and neurologic deficits.

2. Transmission/Communicability

a. Contact with contaminated blood (needle-stick, transfusion, and open skin wounds, ocular and oral mucous membranes)

b. Oral, anal, vaginal intercourse

c. Perinatal (transplacental, exposure to infected blood at birth, breast milk)

d. Communicable from presence of HIV in sera until death

3. Incubation

a. Variable: Time form exposure to seroconersion is 4 weeks to 6 months, and time form symptomatic immune suppression to AIDS can be 20 years.

4. Risk factors

a. Risk of HIV transmission with a typical needlstick form a HIV-positive source is 0.4% (3)

b. Individuals participating in unprotected sexual activities with HIV-positive persons

c. Multiple sex partners

d. IV drug use

e. Persons receiving blood

f. Persons with hemophilia or coagulation disorders

g. Infant born to HIV-positive mother

h. Obtain HIV serology at baseline (exposure), 6 weeks, 3 months, and 6 months (also at 12 months if zidovudine therapy initiated as sero-conversion is delayed by therapy).

5. Nursing interventions for infection control

a. Universal precautions.

b. Wear face mask, protective eyewear, apron, and gloves when at risk for splash contamination.

c. Follow sterilization procedures for ventilators.

d. Clean contaminated surfaces and equipment with disinfectant.

e. Flush mucous membranes with water if contact with blood or other infectious material occur.

f. Do not eat, drink, or apply makeup or contact lenese in areas where infectious materials are present.

g. Report new cases of AIDS to Public Health department; HIV reporting varies by state.

c. Hepatitis B virus

1. Definition: Infection with the hepatitis B virus (HBV) causes damage in the liver including inflammation, mononuclear cell infiltration in the parenchyma and portal ducts, hepatic cell necrosis, proliferation of Kupffer cell, and cellular collapse.Bilirubin excretion becomes impaired resulting in jaundice. Infection with HBV can be acute or chronic, and clinical severity may range from subclinical infection to acute fulminating disease.

2. Transmission/Communicability.

a. Contact with infectious blood through needle sticks, transfusions, open skin wounds, or mucosa of eye and mouth; contact with environmental surfaces

containing contaminated blood. HBV virus can survive 1week or longer on surface

b. Sexual contact (saliva, semen, vaginal secretions)

c. Perinatal (transplacental or exposure to infected maternal blood at birth)

d. Communicable during incubation and throughout clinical course of disease; carrier state (infectious) may persist for years.

3. Incubation period: 45-180 days, average 60-90 days

4. Risk factors

e. Male homosexual activity

f. Female prostitution

g. Heterosexual relations with multiple sex partners

h. IV drug use

i. Hemodialysis

j. Foreign person from areas with high HBV rates

k. Blood contact in the health care environment

5. Post exposure precautions

a. Report immediately to occupational or employee health for follow-up treatment.

b. Follow post exposure immunoprophylaxis guidelines recommended by CDC for percutaneous (needle stick, laceration, bite) or permucosal (ocular, mucous membrane) exposure found in hepatitis B immune globulin (HBIG) may be recommended.

c. Follow serologic markers: blood infectious if positive hepatitis B surface antigen (HBsAg) occurs with present infection or carrier state; positive

hepatitis B antigen (HbeAg) is associated with progression from active hepatitis to chronic hepatitis and represents a highly infectious state.

d. Clean contaminated surfaces and equipment with disinfectant.

e. Do not eat, drink, or apply makeup or contact lenses in areas where infectious materials are present.

f. Report new cases to Public Health Department.

d. Cytomegalovirus

1. Definition: Cytomegalovirus (CMV) is a member of the herpes virus group. CMV typically produces an asymptomatic mononucleosis-type infection in adults. It remains latent in body tissue and may produce recurrent infections. Congenital and acquired CMV infections in newborns can lead to irreversible central nervous system damage. Infections in the immunocompromised patient may lead to pneumonitis, hemolytic anemia, hepatitis, and pericarditis.

2. Transmission/Communicability

a. Congenital: CMV crosses the placenta and can cause severe congenital anomalies.

b. Prenatal: CMV is present in the cervical secretions of mothers with primary infection or reactivation of latent infection; long-term effects on neurologic development of baby are unknown.

c. Blood transfusions
d. Organ transplantations

e. Close and prolonged contact with infected body secretions (CMV is found in all body secretions)

f. Sexual contact and kissing

g. Communicable for as long as virus is excreted in saliva and urine; may be months to years

3. Incubation

    a. Unknown, estimated to be 3-8 weeks following transfusion, 3-12 weeks in neonate following perinatal exposure

4. Risk factors

    b. Immunosuppression (HIV, transplantations)

    c. Chronic illness

    d. Foetus and neonate.

5. Postexposure precautions

    a. If pregnant or immunocompromised, notify physician if exposure is suspected.

6. Nursing interventions for infection control

    a. Universal precaution.

    b. CMV is a special concern to pregnant nurses. Although universal precautions should be effective against transmission, the danger to the unborn fetus may prompt the nurse to request reassignment.

e. Antibiotic resistant organisms

1. Definition: organisms that are resistant to multiple antibiotics. Examples include Staphylococcus aureus resistant to methicillin (MRSA), oxacillin, nafcillin, the cephaloporins, erythromycin, clindamycin, tetracycline, or aminoglycosides and vancomycin-resistant enterococci (VREC). Infection with resistant organisms in a critically ill patient often leads to systemic inflammatory response syndrome with multiple organ failure and death as an end result.

2. Transmission/Communicability

    a. Direct contact with contaminated hands (ie, from sputum or dressing changes). MRSA can be carried on contaminated body surfaces (hands, wrists, and nose) for more than 3 hours after inoculation

b. Communicable for time of infection or colonization

3. Incubation

a. Varies with each organism

4. Risk factors

c. Numerous and prolonged antibiotic therapies

d. Prolonged hospitalization

e. Burn injury

f. Surgical procedure

g. Traumatic wounds

5. Postexposure precautions

a. None known

6. Nursing interventions for infection control

a. Hand washing before and after every patient contact.

b. Contact isolation (gowns and gloves when in contact with patient or patient's environment) for duration of hospitalization to prevent nosocomial spread of infection.

c. Private room, or group similar resistant patients together.

d. Collaborate with physician/staff to control antibiotic therapy.

e. Disinfect surfaces objects regularly.

f. Epidemiologically significant organisms

1. Definition: There are many microorganisms that cause nosocomial infections in the hospitalized patient as a result of cross-contamination. Protection of the patient can be achieved through meticulous hand washing and basic

infection control measures. However, there are a few normally nonpathogenic microorganisms that may cause disease in the compromised critical care patient. These organisms are often found in water sources such as flower arrangements and in tap water in many areas of the country. Examples of commonly detected organisms include pseudomonas and Acinetobacter, and contamination with these organisms may cause pneumonia or central line sepsis.

2. Transmission/Communicability

    a. Direct contact with contaminated hands or items exposed to tap water (ie, ventilation bag (Ambu-bag) or suction apparatus rinsed in tap water)

    b. Communicable each time exposure occurs

3. Incubation

    a. Nonspecific

4. Risk factors

    b. Wounds

    c. Central venous catheter

    d. Artificial airway (ie, endo- or nasotracheal airway or tracheotomy)

5. Postexposure prophylaxis

    a. None known

6. Nursing interventions for infection control

    a. universal precautions

    b. Wash hand before and after manipulating IV lines or respiratory and suction apparatus.

    c. Use sterile water to flush suction catheters and to rinse all airway apparatus (i.e., ventilation bag or suction apparatus); never rinse patient items in tap water.

d. Never clean tracheotomy area with gauze soaked in tap water, use sterile saline water only.

e. Never allow tap water to come in contact with IV catheter insertion sites.

f. Avoid handling central venous catheters unless necessary.

g. Do not allow fresh flowers or potted plants in the patient's room, since they may harbor microorganisms in the waster or soil.

4.0 CONCLUSION

Nosocomial infections complicate the hospitalization of patients and increase the length of stay, with adverse effects, on the patents, families and society at large, even the hospital workers. It should be the concern of all hospital workers to prevent nosocomial infections at every stage in the hospital.

5.0 SUMMARY

This unit has looked at infection control in the critical care unit (nosocomal infections), the types of transmissions, common pathogens, risk factors, nursing interventions for infection control, universal precautions, isolation procedures and special considerations for some specific infections. No doubt, a thorough understanding of the unit will assist the nurse to prevent nosocomial infections thereby avoiding complication on individual patents.

6.0 TUTOR-MARKED ASSIGNMENT

Discuss various precautions a nurse in a surgical ward nurse should take to prevent nosocomial infections in her ward.

7.0 REFERENCES/FURTHER READING

Centers for Disease Control. (1987) *Recommendations for Prevention of HIV Transmission in Health- Care Settings*. *Morb. Mortal.* Wkly. Rep.36 (uppl.2S): 6S.

Grimes, D. (1991) *Infectious Disease*. St. Louis: Mosby-Year Book.

Bartlett. J. (1993) *Pocketbook of Infectious Disease Therapy*. Baltimore: Williams & Wilkins, P. 166.

UNIT 2 PSYCHOSOCIAL ISSUES IN CRITICAL NURSING CARE 1: STRESSORS IN CRITICAL CARE

CONTENTS

1.0 INTRODUCTION

Physical and emotional crises, suffering, and significant distress occur daily in the critical care environment. The stress of being critically ill, or watching a significant critically ill, greatly influences an individual's psychological state and emotional responses. Personality structure, in conjunction with the nature of the illness interacts to determine what coping strategies an individual will use to manage and decrease stress. Critical care nurses often discover that an individual's anxiety and/or coping strategies could hinder his or her health and recovery as well as the health care provider's ability to deliver effective care. Understanding the specific stressors in critical care and their impact on the patient, family, and nursing staff is of the utmost importance in the delivery of holistic nursing care while balance is maintained in the health care provider's life.

The common presentation of the dying patient in critical care is significant stressor that impact on all of these environments and, therefore, is addressed in this discussion of psychosocial issues. In particular, the provocative nature of suicide can produce intense emotional responses in the client, his or her family, and in the health care team. The care of the suicidal patient is specifically addressed in order to provide the critical care nurse with concrete skills and independent nursing strategies to be used in conjunction with suicide aftermath care for the client and self-care strategies for the health care providers.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- explain stressor in critical care
- discuss the impact of stress on patient, family and nursing
- describe general adaptation syndrome
- discuss stress management strategies for patient family and hospital Workers.

3.0 MAIN CONTENT

3.1 Stressors in Critical Care: Impact on Patient, Family, and Nursing

Definition

Stress is a complex psychobiological response to the demands of a stressor. A stressor is any internal or external demand(s) that exceed the available resources of the individual. Stress is represented in a variety of responses manifested as anxiety, anger, emotional tension, frustration, an inability to adjust to a situation, or difficulty with judgment and decision making abilities.

Stressor can be a temporary, continual, or recurrent experience. Recurrent and/or continual stress responses can produce psychological and/or physiological exhaustion. Stress is healthy when it produces stimulation and alertness, contributes to personal growth and development, and assists an individual in meeting personal psychophysiologic needs. However, when stress becomes “distressful” to the individual, it can create feelings of helplessness, apathy, and fatigue, interfering with optimal functioning and eventually contributing to the development of illness.

3.2 Etiology

A. General adaptation syndrome

B. Stressors on critical ill patients

1. Physical stressors:

a. Pain

b. Sleep deprivation

c. Treatment side effects

2. Psychological stressors such as fear, lack of control, crowding,depersonalization, depression and loss

3. Sensory stressors: such as noise, lighting, technological overload and lack of environmental cues (lack of outside environment stimulation)

C. Stressors on families of the critically ill

1. Transition of a “healthy” person to a critically ill patient

2. Potential death of patient

3. Separation from patient

4. Recurrence of won illness.

5. Financial insecurity

6. Changing family roles/responsibilities

7. Strange and overwhelming hospital environment

8. Uncertainty

D. Stressors of critical care nursing

1. Environment

a. Crowded work space

b. Noisy environment

c. Shift rotation

d. Inadequate equipment/personnel

2. Interpersonal (work) relationships

a. Communication barriers/lack of communication

b. Lack of authority

c. Lack of reward

d. Negative feedback

e. Nurse/physician relationship difficulties

f. Patient/family relations

g. Inexperienced peers

h. Potential aggression/violence in workplace

3. Knowledge level

a. Constant technologic advances

b. Complicated ever-changing equipment/devices

4. Patient care

a. Crisis-laden environment

b. Continual exposure to loss

c. Seriousness of patient's condition

5. Professionalism

a. Downsizing effect in critical care units

b. Feelings of inadequacy

3.3 Assessment

A. Assessment of life and coping responses

1. Assess life events and stressors over last 12 months

a. Use Holmes and Rahe Social Readjustment Rating scale to obtain types and degree of cumulative stress that individual have experienced over the last year.

2. Assess how individual has coped with these stressors

a. Problem-focused coping

b. Emotion-focused coping

B. Assessment of psychophysiologic response to stressors

1. Behavioural responses

a. Anger

b. Defensiveness

c. “Criticalness,” increased criticism of others

d. Easily upset

e. Emotional/prone to outbursts

f. Irritability

g. Mood fluctuations

h. Rigid thinking

i. Sad

j. Seeks constant reassurance

k. Withdrawn

l. Tearful

2. Physical responses

a. Cognitive disturbances

b. Eating disturbance such as anorexia or overeating

c. Gastrointestinal (GI) disturbances

d. Headache

e. Increased vulnerability to illness or injury

f. Weight fluctuations

g. Sleep disturbances

h. Sympathetic nervous system activation

3. Kinetic responses
    a. Agitation
    b. Anxiety
    c. Fatigue
    d. Frustration
    e. Restlessness
    f. Tremors
4. Functioning/Productivity
    a. Accident proneness
    b. Decreased interest in work
    c. Decreased productivity
    d. Sense of being overwhelmed

C. Assessment of present coping measures
1. Activity
    a. Hobbies
    b. Physical exercise
2. Chemical mediation
    a. Stimulants
        i. Caffeine
        ii Nicotine
        iii. Illicit drugs
    b. Depressants
        i. Alcohol

ii. Prescription medications

iii. Anxiolytics (antianxiety medication)

iv. Sleeping medication

v. Pain medication

3. Communication

a. Discussion of problems/conflicts with family, friends, colleagues

b. Problem solving

4. Escape mechanisms

a. Avoidance

b. Absenteeism, not visiting

c. Alcohol

d. Drugs to relax

5. Mind/Body techniques

a. Guided imagery

b. Meditation

c. Progressive eating behaviours

d. Self-hypnosis

6. Nutrition

a. Compulsive eating behaviours

b. Balanced eating habits

3.4 Stress management strategies for patient, family, and staff members

A. Infective individual coping related to inability to manage stress effectively

1. Problem: Anger, agitation, hostility, and emotional instability

2. Intervention

    a. Initiate a relationship with patient, family member, or staff persons

    b. Patient/family teaching

        i. Assertive communication

        ii. Establish realistic expectations and goals

        iii. Relaxation techniques

    c. Assist patient/family in setting reasonable, achievable life-style goals

    d. Encourage patient/family to plan for changes in life (proper diet exercise)

3. Desired outcomes

    a. Identify and acknowledge sources of stress

    b. Identify and use skills, knowledge, and abilities to cope with stress

    c. No evidence of self-destructive behaviour

B. Potential fear related to life-threatening illness

1. Problem: anxiety, agitation, fear, panic

2. Intervention

    a. Observe patient/family for signs of fear

        i. Increased agitation

        ii. Increased heart rate, respiration, blood pressure

        iii. Diaphoresis

iv. Panic

v. Pupil dilation

b. Share and clarify your observations of physical symptoms with patient/family.

c. Remain with patient/family during periods of fear

d. Assist patient in identifying source of fear.

e. Explain all test, procedures, and expectations to patient and family.

f. Consultation and collaboration with medical psychiatry to determine appropriateness of psychopharmacologic intervention

g. Use mental health clinical specialist to assist in developing plan to manage patient, family and staff member conflicts or strain that may develop.

3. Desired outcomes

a. Diminish and control fear

b. Use health enhancing coping skills more effectively and frequently

c. Verbalization of fears related to life-threatening illness.

C. Potential alteration in family process related to life-threatening illness

1. Problem: family disruption, emotional outburst, distancing of family

2. Intervention

a. Assess family reactions to this crisis situation

b. Discuss with the patient and family member the impact of the crisis

c. Assess

i. Ability to adapt

ii. Anticipatory grieving

iii. Expectations for family members

iv. Negative reactions

v. Role adjustments

d. Consider referral for family members to supportive therapy or spiritual counseling

e. Facilitate access to patient for family members

3. Desire outcome

a. Containment and reduction of crisis and stress symptoms that contribute to ineffective coping

b. Effective family problem solving

c. Patient and family are able to discuss problems and concerns.

D. High risk for violence due to stress of life-threatening illness on patient and family

1. Problem: anger, hostility, verbal intimidation, physical assault

2. Interventions

a. Assess and document degree of anger/agitation present in patient and family.

i. Accusatory statement

ii. Anger

iii. Fear

iv. Distrust

v. Fist clenching

vi. Pacing

vii. Swearing

viii. Screaming

ix. Shouting

x. Verbal threat of violence

xi. Statement expressing loss of control

b. Determine “reason: for angry/agitated responses by patient or family

c. Discuss methods to manage anger without loss of behaviour control

d. Encourage patient/family to express anger, frustration, or unmet expectations.

e. Instruct patient/family in relaxation techniques and practise with them.

f. Collaborate with physical therapy/occupational therapy regarding patient’s increased level of physical agitation to facilitate a therapeutic release of tension. This will contribute to improved functional capacity.

g. Maintain at least an arm’s length from an extremely agitated potentially violent, patient or family member.

h. Attempt verbal engagement and de-escalation of the agitated patient.

i. Talk with the patient/family in a low voice; show concern and respect.

j. Assure the patient/family that your intention is to help them.

k. Make certain you have an exit available in case the violence of the patient/family escalates.

l. Use restrictive/restraining mechanism for the protection for the patient: monitor the patient every 15 minutes to assure his or her safety.

m. Explain to family members the reason for using restrictive/restraining devices.

n. Collaborate with security officer(s) to facilitate the safe exit of the family if it becomes necessary to have them removed.

o. Directly observe and monitor a potentially violent family member who is visiting a critical ill patient (especially if there has been a history of family/interpersonal violence)

3. Desired outcome

a. The patient will not harm self, family member, or staff.

b. Family member will remain safe and nonthreatening towards patient who is critically ill.

c. Family members will not use threatening behaviour or violence toward staff.

4.0 CONCLUSION

Stress can be temporary/continual or recurrent experience. Recurrent and/or continual stress responses can produce psychological and/or physiologic exhaustion. Stress is healthy when it produces stimulating and alertness, contributes to personal growth and development and assist an individual in meeting personal psychophysiologic needs. However, when it becomes distressful to the individual it can create feeling of helpless, apathy and fatigue, interfering with optimal functioning and eventual contribution to the development of illness.

5.0 SUMMARY

This unit has exposed learners to what stress is, how stress could be healthy and unhealthy, general adaptation syndrome, causes of stressor and the impact of stressors on patient, family and nursing.

6.0 TUTOR-MARKED ASSIGNMENT

Describe the available means of coping with stressors of a professional nurse working at the Critical care Unit of your hospital.

7.0 REFERENCES/FURTHER READING

Centers for disease Control. (1987). *Recommendations for prevention of HIV transmission in health- care setting*. Morb, Mortal. Wkly.Rep. 36(suppl.2S):6s.

Grimes, D. (1991). *Infection Disease.* St. Louis: Mosby-Year Book, 1991

Bartlet, J. (1993). *Pocketbook of Infections Disease Therapy*. Baltimore: Williams & Wilkins,. p. 166

Dooley, S. et al *Guidelines for preventing the transmission of tuberculosis in health care settings, with special Focus on HIV Related Issue*. Morb. Mortal. Wkly. Rep. 39:Rep. 39RR.17.

Centers for Disease Control. (1991). *Hepatitis B Virus: A compressive strategy for eliminating transmission in the United states through universal childhood vaccination. Recommendations of the immunization practice advisory committee.* Morb Mortal Wkly Rep 40:9.

UNIT 3 PSYCHOSOCIAL ISSUES IN CRITICAL NURSING CARE II

CONTENTS

1.0 INTRODUCTION

In the previous unit, we looked at stressor in the critical care, what stress is, causes of stressor, types of stressors, impact of stressor on patient, family and nursing, we also explored stress management strategies for patient, family and nurses. This unit will look into some specific cases like suicidal patient in the critical care environment and dying patient or death.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- explain the concept of “suicide”
- discuss the various theoretical explanations on the issues of suicide
- list various ways of assessing suicide
- discuss the process of dying
- enumerate assessment of a dying patient
- explain nursing responsibilities to a dying patient.

3.0 MAIN CONTENT

3.1 The Suicidal Patient in the Critical Care Environment

3.1.1 Definition

Suicide is the act of voluntarily and intentionally taking one’s own life. Suicide can be accomplished in ways that range from active to passive,

acute to chronic and consciously to unconsciously determined self-destructive behaviors that result in the end of life. Suicide may be methodically planned or committed on an impulse.

There can be two distinct presentations of suicidal behaviour: the actively suicidal patient and the potentially suicidal patient. However, potentially suicidal behaviour can quickly progress to actively suicidal behaviour. Presently suicide is the fifth major cause of death in the United States.

3.1.2 Etiology

There are several theoretical explanations addressing the issues of suicide. These theories include psychophysiologic, psychodynamic, and psychosocial conceptualizations.

In the category of psychophysiologic studies, there have been several correlates reported with suicide. In review, lethal attempts and successful suicides tend to be associated with a decrease in the neurotransmitter serotonin in the brain, in conjunction with a decrease in its primary metabolite, 5-hydroxyindoleacetic acid, in the cerebrospinal fluid. Additionally, the ratio of norepinephrine to epinephrine is decreased in the urine of individuals who have attempted suicide while corticotrophin releasing factors (CRF) is demonstrated to be hypesecreted. These findings suggest the presence of hyperactivity in the hypothalamic-pituary-adrenal axis in suicidal patients. Another significant biochemical finding is the dexamethasone suppression test (DST), which demonstrates high rates of nonsuppression among those who attempts or succeed in suicide.

The psychodynamic model of suicide focuses on the individual, specifically his or her personality development and ability to balance between two basic instincts- the will to live and the will die. Some theorist characterizes suicidal individuals as narccisstic and attempting to harm or hurt others by destroying themselves. Other theorists propose that under sufficient distress and conflict, the wish to live and the will to die.

Finally, the psychosocial framework of suicide behavior explores the factors that influence the relationship between the individual and his or her sociocultural system. The psychosocial perspective attempts to provide meaning to the rising statistic of suicide in the United States. A specific finding is that individuals who repeat attempts at suicide tend to have histories of more frequent episode, beginning at an earlier age. They experiences more powerlessness and normlessness and suffer more feelings of externally directed hostility.

In reality the psychophysiologic, psychodynamic, and psychosocial factors interact in complex systems. Therefore, multiple interactive etiologies are involved in producing suicidal behaviour.

3.1.3 Assessment

A. Mental status assessment

1. Behaviour and general appearance

a. Verbalizes direct statement such as, “I want to die,” wish I were dead,” the voices are telling me to hurt/kill myself”

b. Makes indirect statement about “not being here anymore,” they will miss me,” I know the pain will be over soon”

c. Ask about suicide methods

d. Hides medication to ingest alter

e. Shows agitation

f. Neglects personal hygiene and appearance

2. Focused suicide assessment

a. A directed interview with a focused suicide assessment must be completed by a psychiatric/mental health professional before decreasing the level of observation, transferring the patient from the critical care unit, or discharging the patient from the hospital.

b. Focused suicide assessment includes the following questions:

i. Have you ever felt depressed for several days at a time?

ii. During this time, have you ever had thoughts of killing yourself?

iii. When did these thought occurs?

iv. What did you think about doing to yourself?

v. Did you act on your thoughts?

vi. How often have these thoughts occurred?

vii. When was the last time you had these thoughts?

viii. Have your thoughts ever included harming someone else in addition to yourself?

ix. How often has that occurred?

x. What have you thought about doing to the other persons?

xii. When does this thought occur?

xiii. Recently, what specifically have you thought about doing to yourself?

xiv. Have you taken any step towards acquiring the means (gun, pills) of suicide? Do you presently have a weapon (gun) at home? What other equipment, bullet, rope, pills is still in your home?

xv. Have you thought of when you would do this?

xvi. Have you thought about what effect your death would have on your friends and others?

xviii. You sound ambivalent or unsure about these plans. What are some of the reasons that have kept you from or on them thus far?

xix. More specifically, what are your feelings about religion, suicide, and God?

xx. What are your thoughts about responsibilities for your family and children if you kill yourself?

xxi. What are your thoughts about other reasons for living and staying alive?

xxii. What help would make it easier for you to cope with your current thoughts and plans?

xxiii. Have you made any plans for your possessions or to communicate with people after your death such as a note or a will?

xxiv. How does talking about this make you feel?

3. Mood/emotional responses/coping

a. Depression is a major risk for all age groups.

b. Hopelessness is more predictive of suicide than depression.

c. Individuals with personality disorders have an increased rate of suicide.

d. Unrelieved anxiety disorder, particularly pain disorder

e. Excessive guilt and self-blame

f. Low self-esteem

g. Chemical abuse

4. Thoughts, beliefs, and perceptions

a. Chaotic, disorganized, and or/irrational thinking

b. Delusions of persecution

c. Hallucinations especially command hallucinations, telling the patient to commit suicide

d. Poor judgment

e. Poor impulse control

5. Interpersonal relationships

a. Recent loss of significant other(s) through death, divorce, separations

b. Cumulative losses in a limit time frame

c. Social isolation and withdrawal

d. Recent psychotherapy termination/interruption of psychiatric treatment.

e. Availability of social support.

6. Physical illness

a. Chronic, debilitating, terminal, or traumatic illness

b. Chronic pain

c. Recent, catastrophic loss of physical functions

B. Physical examination

1. Level of treatment required

a. First aid, emergency department care

b. Hospital admission, routine care

c. Critical care, aggressive technologic treatment

2. Agent or method used

a. Ingestion (overdose), cutting, stabbing

b. Drowning, asphyxiation, self-strangulation

c. Jumping, shooting

3. Injury/Lesion/Toxicity

a. Minimal

b. Moderate

c. Severe

4. Physical function recovery

    a. Good: complete recovery predicted

    b. Fair: recovery expected over time

    c. Poor: residual deficits expected

    d. Not reversible: no recovery expected

5. System assessment during critical care phase

    a. Cardiovascular system: Monitor for hemodynamic instability due to cardiovascular disruptions from overdose or direct traumatic injury.

    b. Respiratory system: Monitor respiratory function for possible aspiration, respiratory failure due to medication overdose, ingestion of toxic chemicals, or asphyxiation.

    c. Musculoskeletal system: Asses functional alterations due to traumatic injuries from motor vehicle crashes, jumping, stabbing, or gunshot wounds.

    d. Neurological: Assess central and peripheral nervous system function related to attempted suicide; monitor degree of impaired consciousness.

        i. No impairment demonstrated

        ii. Confusion

        iii. Stuporous

        iv. Comatose

C. Diagnostic parameters

1. Comprehensive serum and urine toxicology screen: If the chosen method of suicide is medication overdose or toxic chemical ingestion, comprehensive serum/urine toxicology screen are necessary to obtain baseline data to plan medical/nursing care during the critical illness phase.

2. Hemoglobin/Hematocrit is necessary to asses degree of hematologic stability, especially when the chosen method is cutting stabbing, or jumping, which have produced significant outer/covert injuries and potential blood loss.

3. Arterial blood gases: Monitor for acidosis pH less 7.35, carboxyhemoglobin due to a carbon monoxide poisoning

4. Urinalysis: Myoglobinuria may exist due to muscle destruction (rhabdomyolysis) from toxic chemical ingestion or from remaining in a confined position after an overdose

D. Patient/family management

I. In planning comprehensive care in the patient who survives the suicide attempt, the nurse needs to use the following question to direct care:

1. Is the patient actively suicidal?

2. What is the degree of lethality of the plan?

3. Does the patient need to be in a protected environment? does he or she need to be monitored closely until a protective environment is arranged?

4. What is the level of commitment from the patient's support system?

II. Potential for self-directed violence related to suicidal ideation and poor impulse control

1. Problem: Self-harm, self injury

2. Intervention

a. Assess current suicide risk.

b. Seek consultation with medical psychiatric services to determine level of suicidality.

c. Implement appropriate level of observation/precaution; 1:1 if necessary (in accordance with hospital policy).

d. Notify all appropriate staff if patient is placed on suicide precautions.

e. Acknowledge feelings and explain precautions; inform patient that staff members will protect them until they are able to resist impulses.

f. Provide a safe physical; and interpersonal environment based on level of suicide risk.

g. Do not promise absolute confidentiality about pertinent information that is important for the entire health team to know in planning and delivering care.

h. Document all patient/family contacts and planning: include assessment of risk and plan with specific restrictions, the method and frequency of observation, and staff responsibility for observation and escort if going out of unit for diagnostic procedures.

i. Arrange consultation and collaboration with psychiatric/mental health specialist and social worker to facilitate comprehensive psychosocial assessment and effective plan care.

j. Transfer to psychiatric services when patient is medically stable.

3. Desired outcome

a. Patient remains safe.

b. Patient doesn't act on suicidal impulses while in hospital.

c. Patient/family verbalizes thoughts, feelings of suicide attempt.

III. Ineffective family coping: compromised due to completed suicide of patient.

1. Problem: death of patient in critical care environment related to successful suicide.

2. Intervention

    a. Provide an opportunity for family to discuss the death of the patient

    b. Encourage consultation and use of psychiatric mental health specialist to assess and assist family in coping with loss and dealing with the impact of a successful suicide.

    c. Discuss fears from family to discuss fears family members are experiencing

    d. Allow family members to express feelings (especially anger) toward the patient for abandoning them: allow family to discuss their feelings about not being able to prevent the suicide from occurring.

    e. Refer to a survivors of suicide group such as the following:
        - Survivors of suicide (SOS)
        - Loving Outreach to Survivors of Suicide (LOSS)
        - Striving To Reach Every Survivor of Suicide (STRESS)

IV. Patient teaching and home health considerations

A. Patient survives suicide attempt

1. Confirm patient has been cleared by medical psychiatric services.

2. Assured that patient/family (if discharged from critical care unit) has out-patient referral appointment before leaving units.

3. Ensure that both patient and family have written instructions concerning how to

obtain emergency assistance if suicidal impulses return.

4. Review with patient/family indications of exacerbation of suicidality

B. Patient dies from successful suicide

1. Be available to family members and provide community support information after they return home.

2. Encourage the survivor(s) to attend and participate in a support group.

3. Review with survivors the importance of follow up with mental health consultation to effectively manage psychologic trauma, shock, and grief.

3.2 Death/Dying

3.2.1 Definition

Death is an inevitable event every living being faces. Dying is a process, which can occur suddenly or over time and involves the dying persons, family members, friend, colleagues and the health care providers working with the patient.

Death of the body as a whole is known as somatic death. When cessation of vital organs such as the heart, lung, and brain occurs, cellular death proceeds in a rapid though uneven manner. This downward spiral cessation of function produces cellular death through entire organism. The cessation of function can be specific for each individual.

Understanding the complex physiologic interrelationships between cell death, somatic death, and the failure of vital orgasm is an integral but only initial step in developing nursing care for the dying patient and his or her family knowledge and attention to the underlying physiologic change during the dying process can facilitate the health care provider’s ability to alleviate pain, discomfort, and suffering, improving the overall quality of remaining life and minimizing the negative effects of the dying process on family members.

3.2.2 Process of dying

During the last hours of life, there are three important aspect of the dying process: the death watch, the death scene, and the final death. The death watch must be facilitated by the health care providers caring for the patient and family members. Physiologic control is achieved by aggressive pain control/management, sleep promotion and relief of anxiety and restlessness while promoting overall comfort for the patient and family members. It is of primary concern to health care providers and family members since watch can last for hours. Where the death scene is typically brief and terminates at the time of the patient's actual physiologic death there is the ritual of pronouncing the death of the patient. Many times the family members are most intimately involved in this final aspect of the death process.

There are several expected death patterns that described when the patient is expected to die and in what type o predicable manner. Health care providers can assess when a patient will die and, therefore, can plan their nursing care in an appropriate manner. Death patterns can be delineated in the following five categories: (1) too sudden death, (2) fluctuating pattern in (3) certain death within a known time, (4) certain death within an unknown time, and (5) lingering.

3.2.3 Assessment

A. Pattern of patient's illness

1. What are the medical diagnoses?

2. When and how was the "bad news" given? How often and recent?

3. Who delivered the "bad news"and how was it done?

4. What does the patient and family understand about the illness?

5. Is the patient still actively participating in decisions and treatment?

6. Does the patient acknowledge physical limits and/or symptoms that are related to illness and treatment?

a. Stage of dying trajectory

1. Acute phase: begins when the patient initially learns that death is a possibility.

2. Chronic living-dying functional status, and increase in dependence. This is a period of exacerations and remissions; however, the general trajectory is a downward spiral.

3. Terminal phase: characterized by generalized physical exhaustion. The patient is experiencing his last hospitalization.

b. Coping assessment

1. Is the patient/family aware of the terminal" diagnosis?

2. How are the patients and family coping/ what specific behaviors or defence mechanisms are being used by the patient and family?

3. What degree of agitation or anger is present in the patient?

4. What fears exist-unknown, loneliness, sorrow, loss of bodily function, loss of self control, pain/suffering, loss of self-identity/self-worth, regression?

5. How much control does the patient have over decisions in the remaining days?

6. Is the patient/family requesting staff members to be in the room?

7. Is the patient/family restricting visitors

c. Pain assessment

1. Degree of pain experienced

2. What, does the patient report, reduces the pain? What increases the pain

3. What makes the patients comfortable?

4. What is the patient's attitude

d. Spiritual and cultural assessment

1. What homes does the patient have?

2. Who are the spiritual professionals important to the patient?

3. What is the patient's and family's cultural view of death?

4. What specific rituals are necessary or important?

e. Assessment of death preparations

1. What are the "tasks" that the patient and family still need to accomplish?

2. What preparations for dying has the patient made? (these include wills, funeral arrangements, living will, final messages).

3. Where does the patient want to die

f. Assessment of past losses in life

g. Assessment of family coping

1. Is the family capable of carrying out the patient's wishes?

2. Does the family need additional support to make decisions when the patient is unable to do so?

3.2.4 Patient/family management

A. Self-care deficit related to terminal phase of critical illness

1. Problem: increased dependence for physical care due to critical illness with active dying process.

2. Interventions: Physical care of the dying patient include attention to the following aspect of nursing care

a. Elimination: Keep the incontinent patient clean, dry, and odour-free, and assess for impaction; the nurse's attitude when dealing with the incontinent patient may communicate rejection or protective care.

b. Hair: Care for hair has a great influence on self-image and self esteem.

c. Mucous membranes: The nose, mouth, and eye need to be kept moist and clean; use of lubricants and mouthwashes is desirable

d. Nutrition and hydration: Small, frequent feeding of favorite foods are likely to be accepted; ice chips of favorite soft drinks need to be available constantly if the patient is capable of nutritional intake.

e. Positioning: Frequent positioning is necessary to protect the patient from skin breakdown and to ensure that the airway is not partially or totally obstructed.

f. Skin: Skin should be clean; lotion should be applied to provide moisture and pressure areas should be protected from skin breakdown and decubitus formation. Massage therapy can be used for skin and muscle integrity, as well as a pain management and relaxation strategy.

3. Desired outcome: To provide physical care and maintain hygiene and comfort for the patient.

B. Pain related to physiologic alterations due to terminal phase of critical illness.

1. Problem: fear, procedural intolerance, emotional distress anxiety

2. Intervention

a. Use medications (both analgesic and antianxiety agents when appropriate) in adequate doses to provide pain relief.

b. Consultation to clinical specialist in pain management to establish an effective regimen.

c. Utilize alternative measures such as hypnosis, guided imagery, massage, and acupunctural pressure therapy as adjuncts of pain medication. (At a stage of dying, it is not appropriate to attempt imagery or hypnosis if the patient has not already used them).

3. Desired outcome

a. Patient and family report or acknowledge pain relief

b. Patient is able to participate in his or her care within restriction of his physical condition.

c. Absence of or diminished level of agitation.

C. Anxiety related to impending death due to helplessness, loss of control, and abandonment

1. Problem: fear(s) anxiety, ineffective coping, increased sympathetic nervous system responses.

2. Interventions: emotional care of the dying patient and his or her family.

a. Spend time daily with patient creating an accepting atmosphere.

b. Listen, rather than talk, allow for the expression of feelings.

c. Allow and support the patients own decision making as regards planning time of care, visitors and continued treatment.

d. Use touch when the patient indicates through verbal or nonverbal behaviour (crying, relating sad stories) that it is needed.

e. Meet with family and significant others to answer questions, listen to feelings, provide information, and give support.

f. Allow as much time as the patient needs with family and significant others.

g. Make appropriate referrals, based on the patient wishes, to social workers, psychiatric clinical specialist, lawyer, minister, priest, or rabbi.

h. Aid the patient in completing unfinished business.

i. If the patient is not able to be a decision maker, assist family member in making decisions.

j. Use anxiolytic medication in conjunction with relaxation strategies to manage anxiety.

k. Explain all tests and procedures to patient and family. Also include what the patient and family know during the process.

3. Desired outcomes: Patient and family do the following

a. Comfort and express fears

b. Express feelings

c. Use support services offered to them

d. Demonstrate a diminished level of death-related anxiety

e. Complete preparations for death

D. Anticipatory grieving related to potential loss of significant other death of self

1. Problems: Cognitive changes, behavioral changes, altered feelings, somatic symptoms

2. Interventions

a. Determine what is known or feared about potential loss

b. Encourage open discussion of fears and concerns

c. Identify and validate impact of previous experiences with loss.

d. Avoid either reinforcing denial or causing a premature disruption of the denial process during the early stage of shock and disbelief.

e. Instill hope for the abilities of patient and family to cope with loss.

f. Identify the need for information of the patient and family.

g. Provide family with ongoing, honest information concerning patient

h. Facilitate communication (when possible) between patient and significant others.

i. Consult bereavement or mental health specialist and pastoral services to assist in supporting patient and family members.

j. Encouraging family members to maintain their own self-care

k. Identify any indications of dysfunctional grieving (suicidal ideation/intent, pathologic denial, uncontrolled behaviour such as violence).

3. Desired outcome

a. Patient and family will express thoughts and feeling about the anticipated loss.

b. Patient and family are able to make informed decision related to the anticipated loss.

c. Family members maintain constructive relationships

d. An ‘appropriate’ death is achieved, which meets the following expectations:

i. Conflict reduction

ii. Reinforcement of significant relationships

iii. Behaviour is in alignment with patient's idea and values

iv. Basic instincts and wishes are realized.

V. Interventions of health care provider staff to manage the impact of disenfranchised grief

A. Actively participate in staff meetings and support group meetings with mental health nurse specialist to explore nursing staff members' feeling about dying patients.

B. Clearly communicate, during report time and in team meetings exactly what the patient and family know, with specific discussions about level of care decisions that have transpired

C. Use ethics committee consultations for health care, patient, and/or family conflicts surrounding a difficult death event.

D. Use peer consultation to validate personal feelings of loss.

E. Use personal mental health consultation to assist in identification and management of disenfranchised grief.

VI. Patient and family teaching and home health considerations

A. Immediate "postloss" emotional care for family members:

1. Review care provided to patient.

2. Determine if family members would like to see the patient before leaving the hospital.

3. Consultation with spiritual leader, social worker, or mental health clinical specialist may be necessary if grief responses are intense and family exhibits ineffective coping with loss.

4. Provide referral to bereavement therapist.

5. Arrange a mental health clinical specialist follow-up after 24 hours to determine level of coping.

6. Provide referral to support group.

B. Patient leaving critical care unit to be cared for at home with high technology-assigned nursing care:

1. Instruct patient and family on what to expect concerning illness trajectory.

2. Arrange a family member to “sleep over” in the critical care unit to facilitate family members knowledge and skill in caring for patients.

3. Arrangement referral and consultation to discharge planning team members to facilitate a smooth transition to the home care setting.

4. Encourage family members to participate in counseling, if hospice to home care program has access to mental health specialist, to explore impact of a family member dying at home.

4.0 CONCLUSION

Since it is the primary responsibility of a nurse to restore health and rehabilitate his her client/patient, so in the course of managing a suicidal patient, the onus lies on the nurse to ensure that her patient remains safe, does not act on suicidal impulses while under her care and that the patient or family verbalizes thought or feeling of suicide attempt.

5.0 SUMMARY

In this unit you have learnt what suicide is, how to assess a patient attempting suicide and how to manage a suicidal patient effectively. The dying patient was also looked at, assessment of dying patient, management of dying patient and the dead including nurses responsibilities towards the dead and grieved families.

6.0 TUTOR-MARKED ASSIGNMENT

i. Grieved management is essential to nursing practice. Why?

ii. Discuss the responsibilities of professional nurse to the dying patient and his family.

iii. Why is suicidal attempt on the increase in developing countries today?

7.0 REFERENCES/FURTHER READING

Barbara, S.J. (1989). *Psychiatric Mental Health Nursing*, 2nd Ed. London J.P. Lippin COH Company.

Elhart, D., Firsich, S.C., Gragg, S. H. and Rees, O.M. (1978). *Scientific Principles in Nursing*, Saint Louis: The C.V Mosby Company.

Woods, S.L., Froelicher, E.S.S Halpenny, C.J. and Motzer, S.U (1995). *Cardiac Nursing* 3rd Ed. J.P Lippin COH Company.

UNIT 4 TRAUMA

CONTENTS

1.0 INTRODUCTION

This unit looks at trauma which is the physical injury caused by intentional and unintentional forces exerted on the body. Disabilities and deaths caused by trauma cannot be estimated especially in developing countries where record keeping is inadequate. This unit will expose the reader to various ways trauma is caused, prevention and management of various cases of trauma.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- explain the causes of trauma
- discuss the nursing management of various injuries sustained by patients
- explain specific extremity injuries and their management
- describe the discharge procedure of trauma patient.

3.0 MAIN CONTENT

3.1 Definition

Trauma is the physical injury caused by intentional and unintentional forces exerted on the body. Traumatic injuries kill 150,000 Americans per year and leave 60 million injured and 300, 000 permanently disable. Trauma is the eluding cause of death in persons 45 years old or younger

and is ranked as the fourth major cause of death in all age groups. The trimodal death distribution illustrates three peaks of death after injury.

A. Peak 1:50% of death occurs in the first few minutes after injury resulting from massive head or thoracic injuries, high spinal cord damage, large vessel transaction (aortic), and exsaguination.

B. Peak 2:30-35% of death occur 1-3 hours after injury resulting from hemothorax or pneumothorax; subdura or epidural hematoma hypovolemic shock secondary to uncontrolled hemorrhage of the liver, spleen, femur; or pelvic fractures.

C. Peak 3: 10% of death occurs a day or week after injury as a result of sepsis, multisystem organ failure, and secondary effects of trauma.

The trauma continuum of care begins at the event of injury and ends with full recovery, temporary or permanently disability, or death. Interventions by trained pre-hospital, medical and nursing personnels can impact a favourable outcome in trauma patients otherwise it could result in potential fatal complications.

3.1.1 Causes of Traumatic Injuries

Mechanism of injury: Potential injuries and secondary complications can be predicted by knowing the mechanism of injury. The extent and nature of injury depend on the type of force applied and the body's response to the applied energy. Traumatic injuries are generally divided into blunt and penetrating assaults. Compression, Crushing, shearing, acceleration and deceleration forces can damage protective tissues, bones, organs, and muscle structures. Blunt trauma can be more life-threatening than penetrating trauma because of the potential for injuries to go unrecognized and undiagnosed. Burns are also considered trauma injuries.

A. Blunt Trauma Patterns of Injury

The cause of injury in penetrating trauma is the energy formed and transmitted by the penetrating instrument into the surrounding tissues. Organs commonly punctured include liver, small intestines, vascular structures, and spleen. Intestinal penetrating damage has significant mortability due to complications from fecal contamination. The injuries depend on the site of impact, the position of the assailant (angle of penetration), and type of instrument used.

1. Motor vehicle accidents

These accidents are the leading cause of death for American between the ages of 1 and 34 years.

a. Head-on/rear-end collisions

Injuries of the aortic arch, liver, spleen, diaphragm, kidney, and bowels causing tears and ruptures lacerations to the face, chin, or mouth, anterior neck brushing and injuries to the chest or abdomen with underlying cardiac contusion. Rear impact can result in hyperextension of the neck, commonly referred to as “whiplash”.

b. Lateral impact (“T-bone” impact)

Impact on the driver’s side will poteinate left sided fractures and splenic injury. Impact on the passenger’s side may cause right sided injuries and liver involvement. May have contralateral injury of the head, neck spine, spine, chest and abdomen.

c. Rollover/ejection

High probability of multisystem injuries

d. Front seat passenger no safety belt

Injures include fracture/dislocation of the ankle, knee, femur, posterior dislocation of the acetabulum: compression injuries of abdomen, chest, head, neck, and maxillofacial region.

e. Limited use of safety devices

Shoulder harness alone can lead to brushing, severe lacerations, rib fractures, and neck injuries. Lap belt use only can cause facial, neck, chest, lumbar spine, and bladder injures. A lap belt worn too high causes soft abdominal injury and thoracolumbar and spinal injuries.

2. Motorcycle and bicycle crashes

Head on, lateral impact, ejection, and laying the bike down commonly result in fractures to the skull, neck, ribs, or extremities; avulsions, abrasion; and “road rash.” Head injury is the cause of 75% of motorcycle deaths. Head injuries are reduced with protective helmet use.

3. Pedestrian vs vehicle

Closed or open fracture of lower extremities including ankle, patella, tibia, fibula, femur, pelvis, head, thoracic, abdominal and spinal injuries.

4. Falls or jumps

In general, in any fall greater than 10 feet, suspect internal injuries. Spinal and brain injury, bilateral skeletal fractures of the calcaneus's (heel bone), lower extremities, long bones and pelvis; vertical shear and compression fracture. Axial loading (force applied upward or downward without bending) of cervical vertebral and lumbar spine may result in burst fractures, compression fractures, dislocations, or disc extrusion, detachment of thoracic, aortar and solid organs such as the liver, spleen, or colles fracture. Backward falls onto the occiput cause high-mortality skull fractures.

5. Aggravated assaults

Stomach perforation, diaphragmatic laceration and esophageal rupture, lacerated liver or spleen, or acute subdural hematoma.

6. Gunshot wound

Tissue cells move forward and lateral from the site causing tissue compression and stretching in a process called civation. The result is tissue, bone and organ destruction from burning expanding gases. Bullet exit wounds are larger than entry wounds and have trayed edges. Each tissue wounds and tract of the bullet trajectory should be examined carefully.

7. Impalement/stab wound

Impaled objects should only be explored and removed in the operating room. Diaphragmatic thoracic injuries (below the fourth intercostals space) may involve structures in the abdomen. One in four people sustaining penetrating abdominal injuries has associated chest injuries.

Extensive internal damage may result from weapon movement.

8. Nursing process

Bodily response to trauma: Each traumatized patient incurs varying disruptions in the hemodynamic, immunologic, and metabolic system of the body. Improved survivability of trauma patients is accomplished by

early and aggressive management of bleeding, airway complications and infectious complication and by assurance of adequate nutritional intake.

B. Homodynamic response

Trauma and injury are the most common causes of life-threatening hemorrhagic or hypotensive shock states. Hemorrhage (acute bleeding) may be obvious or occult. The extent of injury and sum of lost blood correlates with four stages of shock. Fluid replacement for:

1. Assessment

    a. Sign and symptoms (for a 70kg person)

        i. Mild hemorrhage-up to 15% of blood volume (750 mL): slight hypotensive due to low blood volume; tachycardia >100 beats/minutes to increase cardiac output; cool, pale skin; anxiety; dilated pupils; capillary refill (>2 seconds); fluid shifts; sympathetic responses; release of norepinephrine and epinephrine hormones, all in order to increase cardiac output. Response to fluid resuscitation.

        ii. Moderate hemorrhage-up 25% of blood volume (1250 mL): moderate hypotension (>90 mm Hg systolic); hypoxia due to miunute) ; tachypnea; cool, pale skin; capillary refill poor; lethargy; weakness; decreased urine output (25 mL/hour) venous return decrease; “look bad.” Respond to fluid rescistation.

        iii. Severe hemorrhage-up to 35% of blood volume (1800 mL): moderate to severe hypotension (60-90 mm Hg systolic); hypoxia; tachycardia (> 120 beats/min); cold; cyanosis; agitation; confusion; decreased urine output (<15 mL/hour); shunting to core organs (brain, heart, kidneys), metabolic dysfunction. Refractory to crystalloid fluids resuscitation. Likely to need blood transfunction and surgery to corrct the underlying problem

        iv. Extreme hemorrhage-up to 50% of blood volume (2500 mL): profound hypotension (<60 mmHg sytolic), severe hypoxia, bradycardia with decreased pulse pressures, skin cold and motled, oliguria unconscious; may result in irreversible cell

and organ death. Exasanguination and circulatory failure lead to cardiac arrest.

b. Diagnostic tests.

i. Serum

- Trauma laboratory protocol: used for most patient with severe trauma. Includes complete blood count, chemistry, coagulation studies, arterial blood gases (ABG) toxicology screen, liver function test (LFT), amylase, urine analysis, and blood test for type and crossmatch.

- Complete blood count: Used as an indicator of the severity of blood loss, need for blood transfusion, and assessment of on-going blood loss (based on progressively decreasing hemoglobin and hematocrit), and provides baseline values for white blood cells, and platelets.

- Chemistry: Provides data for assessment of electrolytes imbalances, particularly important in cases of hypovolemia and dehydration. Also helpful to evaluate renal function based on blood urea nitrogen (BUN) and creatinine values.

- Coagualtion studies: most commonly used are the prothormobin time and partial thromoboplastin time. May be altered in cases of severe injury or when coagulopathy develops.

- ABG: Important for the assessment of respiratory dysfunction, hypoxemia, hypercarba, and metabolic or respiratory acid based imbalances.

- Toxicology: useful for the assessment of alcohol intoxication and presence of illicit drugs, any of which may cause alterations in the patient mental status.

- LFT: Frequently used as an early indicator of liver injury. Also helpful to assess for the presence of chronic liver disease.

- Amylase: Indicator of pancreatic injury. May also be elevated in cases of severe peritonitis.

ii. Urine

- Urine analysis: The presence of red blood cells in the urine may suggest renal or urogenital trauma. In addition, the urine can be used for toxicology screen and assessment of adequacy of renal function. Concentrated urine with high specific gravity is commonly seen with hypovolemia and dehydration.

iii. Others

- Plain radiography: Commonly ordered x-rays in all patent with severe blunt trauma include: three view cervical sine x-rays anterior posterior views of the chest and pelvis.

- Consider administration of vasoactive drugs, but ensure that fluid repletion is completed before initiating.

- Monitor and maintain urine output (UOP) greater than 50 mLhour (must be greater than 1 mL/kg per hour for children). If myoglobin is present in urine from severe muscle or burn injury, maintain UOP greater than 100mL/hour to avoid nephrotoxicity.

- Assess pulses and skin temperature every hour.

- Complete neurologic exams every 1-4 hours to asses cerebral perfusion.

- Monitor chemistry lab work to asses renal function (BUN, creatinine) and LFT. Fellow

serial hemoglobin/ hematocrit electrolyte imbalances.

iv. Desired outcome

- Adequate oxygen perfusion of tissues and organs as evidenced by normal mentation, UOP greater than 50mL/hour, normal renal and electrolyte lab values.
- Bleeding controlled with appropriate wound management or operative intervention. Rememeber that hemorrhage from soil organs (such as liver and spleen) can be self limited if the extent of injury is not severe.
- Arterial pressure, cardiac output oxygen saturation, and central venous pressure return to baseline.
- Vital signs to normal range.
- Shock and fluid volume overload are avoided evidence by clear lung fields and absence of edema.

c. Anxiety related to acute decrease of health status and actual threat of death.

i. Problems: fear of dying, restlessness to aggression, hopelessness, resistance to treatment.

ii. Interventions

- Immediate nursing actions to reverse traumatic shock descent.
- Ensure patient has adequate pain medication coverage. Patients who are illicit drugs may required large doses of pain medications.
- Listen to the patient.
- Talk to the patient and family; explain intervention and provide information as appropriate.

- Maintain hopeful outlook.
- Allow family and patient private time.
- Encourage family members to remain close by as appropriate.
- Be prepared to repeat instructions many times.
- Administer antianxiety medications as needed.
- Accurately assess alcohol and illicit drug use prior to trauma.
- Alcohol withdrawal will cause severe anxiety and should be avoided with appropriate prophylactic treatment: lozazepam and oxazepam.
- Consult psychologists, social workers, and clergy personnel's as needed.

iii. Desired outcome

- Patient able to follow command, verbalize feelings and complaints and make appropriate health care and recovery decisions.
- Patient and family feel supported and cared for by trauma team.
- Patient states, pain and anxiety, relieved.

C. Immunologic response

Early recognition of any form of infection in the trauma patient is essential to avoid bacteremia, sepsis and multisystem organ failure. This will reduce morbidity and save lives. Increased bacterial proliferation and colonization may activate acute inflammatory, chemical, and cellular responses. Common sources of infection include wound and extended pressure sites, respiratory and urinary tracts; and the gastrointestinal system, all of which can lead to bacteremia. Other potential sources include bacteria translocation from gastrointestinal tract, sinus infections, tooth, brain, abdominal/perirectal absencesses,

organ and tissue infections of the heart lining, colon, pancreas, gallbladder, prostate, appendix, or ears; and indwelling catheters and lines.

1. Assessment

    a. Signs and symptoms

        i. Systemic infection: Suspect sepsis if there is a change in the clinical picture including chills followed by fever or hypothermia, tachycardia, tachypnea, oliguria, malaise, confusion, hemodynamic changes, and leukocytosis (increased leukocytes: white cells increase).

        ii. Localized infection: Redness, tenderness, warmth, swelling, purulent drainage from injury site, and dysfunction

    b. Diagnostic tests

        i. Serum

            - Serum: Low platelet count; white blood cell count and differential fluctuations and increases (> 10%) of bands (occurs with leukocytosis); lactate; must obtain blood cultures (for assessment of bactereamia and sepsis).

            - ABG: acidosis.

            - Urinalysis culture and sensitivity.

            - BUN: increase, creatinine clearance: decreases.

            - Coagualtion studies: disseminated intravascular coagulation may develop from sepsis.

            - Liver function test and bilirubin: may be elevated in acalculosu cholecystitis.

        ii. Cultures: always obtain prior to drug therapy or a change in antibiotic therapy. Document and specify

drugs administered throughout the regimen; bedside bronchoscopy cultures.

- Aerobic and anaerobic cultures of the wound site and drainage sites
- Blood cultures; total of two sets obtained from different sites and at times.
- Sputum; Gram stain and culture
- Lumber puncture

iii. Radiographs

- Chest, abdominal, or sinus x-rays
- Ultrasound or CT scan.

2. Patient management

a. Potential for infection related to disruption of normal defense mechanisms.

i. Problem: circulatory shock state, hypoxemia, pneumonias, sepsis and systemic inflammatory responses syndrome.

ii. Intervention

- Resuscitation phase.
- Use strict aseptic and sterile techniques during procedures.
- Use universal precautions during the care of open wounds.
- Exercise excellent hand-washing skills.
- Institute infection control and isolation precautions.
- Complete dressing changes on peripheral and central lines according to institutional policy.

- Change intravenous catheter sites according to institutional policy.
- Assess intravenous sites every shift for redness or sign of infection; discuss with physicians the need to change infected central lines; immediately discontinued any infected peripheral lines and start new intravenous lines in another site.
- Discontinue all invasive devices as soon as possible.
- If closed suction system used, change system every 24 hours; use closed suction if patient intubates every 24 hours.
- After wound cultures are obtained, eliminate the possibility of contamination by infections, with early treatments of irrigation, debridement, and surgical intervention if needed.
- Administer intravenous antibiotics as prescribed.
- Critical care phase.
- Monitor for early signs of sepsis and systemic inflammatory responses syndrome.
- Document and trend quantity and quality of wound drainage.
- Debride necrotic tissues with local wound, with frequent dressing changes.
- Administer antibiotics judiciously to maintain adequate levels in blood; monitor drug incompatibilities closely.
- Prevent pulmonary infections by repositioning patient and assisting in and out of bed frequently, completing chest physical therapy, using sterile suctioning techniques,

and changing ventilatory tubing and closed suction per institutional policy.

- Decrease exposure to nosocomial organism by using basic infection control techniques.
- Ensure adequate nutritional support: oral, enteral, or parenteral; obtain daily weights.
- Maintain skin integrity: Position and turn every 2 hours, provide a pressure relieving sleep surface, bathe patient using mild soap ad warm water, protect skin from urine and fecal exposure.
- Transfer to intermediate care unit as soon as possible to decrease frequency of nosocomial exposure found in the intensive care unit.

iii. Desire outcome

- Absence of sign and symptoms of infection.
- Blood, urine, sputum, and wound cultures are negative.
- Prevention of nosocomial infection.

a. Altered tissues perfusion related to hyperdynamic state of septic shock and sepsis

i. Problem: catabolic metabolic; ineffective wound healing; diminished cerebral, coronary, and organ blood flow.

ii. Intervention:

- Attempting to identify source of infectious; obtain urine, serum, sputum, and wound cultures.
- Provide pulmonary support: oxygen, ventilation and positive and-expirary pressure, constant repositioning with head of bed up as necessary.

- Correct fluid volume deficits with crystalloid. Administer fluids (lactated Ringer's solution or normal saline) to maintain systolic blood pressure greater than 90 mm Hg UOP greater than 50Ml/hour.
- Transfuse colloids (blood products) according to hemoglobin/hematocrit result in order to improve oxygen-carrying capacity.
- Administer vasopressors, but only after fluid volume has been replaced, to maintain adequate blood pressure.
- Steroid use to decrease capillary leak is controversial and is not recommended in the trauma patient at present.
- Monitor arterial pressure, central venous pressue , pulmonary artery pressure, and ABGs; if changes occur, discuss plan of care with physician.
- Monitor BUN and creatinine to assess renal functioning and recognizes need for dialysis.
- Monitor orientation and mental functioning to determine cerebral perfusion.
- Provide adequate nutritional support: calculate to account for increase caloric requirement caused by the hyperdynamic state.
- Monitor and document intake and output.

iii. Desire outcome

- Fluid volume overload is prevented as evidenced by normal central venous and pulmonary artery pressures.
- Oxygenation of blood is adequate and evidenced by pulse oxygenation greater than 94% and normal ABG.

- Organ perfusion urine Output, palpable pulses, warm dry skin, normal LFT.

c. Hyperthermia related to inflammatory process, hypermetabolic state, or circulating pyrogenic.

i. Problem: Increase metabolic requirements.

ii. Intervention

- Identify infectious source and organism by obtaining urine serum, sputum, and wound cultures.
- Document and trend core temperatures every hour for ineffective thermoregulation.
- Monitor heart rate; fever is often associated with tachycardia.
- If febrile, administer antipyretic drug therapy, as ordered.
- After patient has reached maximum temperature assist with cooling techniques: cool room, maximize airflow, provide cool water bath, provide dry clothing.
- Assist with surgical drainage of exudative lesions and abscesses.
- Minimize invasive therapies; discontinue invasive lines and tubes as soon as possible.
- Administer systemic antibiotics based on suspected pathogens, culture result and the organism’s antibiotic sensitivity, as ordered.
- Monitor caloric intake to ensure that nutrition meets increased metabolic demands.

iii. Desired outcome

- Restoration to normal core body temperature (37^0C)
- Caloric intake sufficient to meet demands
- Heart rate return to baseline.

A. Metabolic responses

Injured and critically ill patients experiencing varying stress levels that can trigger the breakdown of carbohydrate, protein and fat (catabolic state). Increased stress and energy demands due to injury and decrease intake of life sustaining nutrient necessitate a nutritional assessment and replenishment within 48-72 hours posinjury. Hypermetabolic state increase oxygen demand and consumption as well as basal energy needs. If nutrients are not readily available, there will be a delay in wound healing, compromise of immune response, and loss of energy reserves and muscles mass. The key to prevention of metabolic deficiencies is early nutritional support with adequate protein and calories.

1. Assessment

a. Signs and symptoms

i. Edema

ii. Weight loss, fat loss, and muscles wasting

iii. Fatigues easily

iv. Pulmonary insufficiency and inability to wean

v. Opportunistic infections.

b. Diagnostic tests

i. Serum

- Blood volume deficiencies of sodium, potassium, serum albumin, transferring, prealbumin, low total lymphocyte count, creatinine, glucose magnesium, phosphorus and trace elements

ii. Urine

- Urinalysis: measure nitrogen and glycosuria.

2. Patient management

a. Alterations in nutrition, less than body requirements, related to increased metabolic demand.

i. Problem: insulin resistance, protein depletion, malnutrition, impaired wound healing, increased infections and organ dysfunction, negative nitrogen balance (urine nitrogen loss due to increased protein catabolism).

ii. Interventions

- Nutritional assessment and early supportive strategies are required to replenish stores of carbohydrates, proteins and fats with oral intake, tube feelings (enteral), or sterile intravenous (parenteral) administration.
- Early consultation with dietician
- Calculate caloric requirements and monitor daily weights. Must estimate Basal Energy Expenditure and multiply by 1.5 to obtain caloric requirement during recovery from severe injury.
- Maintain accurate calorie counts
- Obtain a 24 hour urine sample once a week to monitor for creatinine clearance and nitrogen balance.
- When initiating parenteral nutrition obtain finger-stick blood sugars frequently.
- Administer insulin, potassium, multivitamin, trace minerals, and other nutritional adjuncts as needed.
- Monitor input and output frequently.

- If oral nutritional supplements, order space administration so that patients is hungry at meal time. Add flavors to enteral formulas (such as strawberry or chocolate syrup).
- If patient can eat, encourage family members to bring favourite foods to stimulate caloric intake
- Monitor for diarrhea.

iii. Desired outcome

- Patient consumes minimal daily requirement and vitamins. Must ensure adequate intake of proteins, carbohydrates and fats on a diet plan.
- Adequate wound healing
- Fluid and electrolyte balance normal
- Positive nitrogen balance
- Weight gain
- Return to normal basal metabolism need: 1500-1800 calories day (6300-7560 J/day) or 1 calorie/kg per hour (4.2 J/kg per hour).
- Return to normal diet as soon as possible
- Return of appetite

3.1.2 Severity categories of trauma

Penetrating injuries causing transaction or severe lacerations to heavily vascularized areas or vital organs are life-threatening injuries. Multisystem injuries, have varying degrees of shock. Burns vary depending upon intensity of heat and amount of time of body surface contact with the heat source. Blood loss and hypotension vary depending upon the time to definitive intervention (direct pressure, adequate fluid replacement and surgical procedure).

A. Life-threatening: Injuries incompatible with life involved massive crushing injuries to vital structures in chest, abdomen, pelvis, head or neck.

1. Injuries

a. Disruptions of oxygen exchange or lung process, airway obstruction or respiratory insufficient; open or tension pneumothorax, massive hemothorax, flail chest and pulmonary contusion, tracheal disruption; and airway inhalation injury.

b. Disruptions of circulatory status or organ process: great vessel or arterial disruptions such as aortic transaction or rupture, intimal disruption, or pericardial tamponade.

c. Disruption of neurologic status: loss of sympathetic tone, unconsciousness, high cord injuries, intracerebral hemorrhage, brain stem compression, or hemispheric damage.

d. Disruptions of bone continuity or vascular process: orthopedic injuries such as pelvic crush and extremity amputations.

2. Complications

a. Apnea or hypoxia: anoxia; may be immediately fatal

b. Severe hypotension, severe shock, or exsanguinations.

c. Ischemia (muscles, tissue, and brain)

d. Adult respiratory distress syndrome.

e. Aspiration or nosocomial pneumonial

f. Sepsis and systemic inflammatory response syndrome

g. Coagulopathies (frequently due to hypothermia).

h. Brain death

i. Cardiac arrest.

B. Potentially life-threatening

1. Injuries

a. Disruptions of exchange or lung process: respiratory insufficiency; pneumothorax, pulmonary contusions with or without flail segment, tracheobronchial disruption and traumatic diaphragmatic rupture

b. Disruptions of circulatory status or organ systems: hemodynamic compromises possibly due to cardiac contusion, abdominal organ injuries (liver and spleen most common), esophageal disruption, or eviscerations.

c. Disruptions of neurological status: altered level of consciousness, brain anoxia, cerebral edema, increased intracranial pressure, paralysis, or loss of sensation possibly due to head or spinal trauma or degloving injury.

d. Disruption of bone continuity or vascular process: arterial or initimal disruption, open or closed multiple fractures or dislocation, frail chest, first rib fracture with possible underlying subclavia artery injury, blunt chest or abdominal trauma, crushed pelvis two or more proximal long-bone fractures, maxillofacial trauma, or traumatic amputations.

2. Complications

a. Hypotension or occult bleeding

b. Severe medical problems induces by the traumatic event (i.e, myocardial infarction).

c. Brain death

d. Septicemia

e. Nerve injury (phrenic, laryngeal, vagus, brachial plexus).

f. Vascular problems: deep vein thomobsis, arteriovenous fistula, pseudoaneurysm.

g. Pulmonary or fat emboli

h. Disseminated intravascular coagulation.

i. Loss of a limb

C. Non-life-threatening: Some dramatic injuries may look extremely severe and seem to warrant immediate intervention; however, they may not be life-threatening (such as orbital blow-out fractures). Always address basic and advanced life support needs before proceeding.

1. Injuries

a. Disruptions of lung processes: lung contusion or simple hemothorax or pneumothorax.

b. Disruptions of bone continuity or vascular compromise: orthopedic injury, digital amputations, simple fractures, surface trauma, or peripheral vascular injury

c. disruptions of mental health: psychologic or emotional problems induced by traumatic accident.

2. Complications

a. Volkman's contractures (contractures resulting from injury to the blood supply to that area).

b. Compartment syndrome (damage caused by ischemia secondary to increase compartment pressure).

c. Inappropriate behaviors threatening injury to themselves or someone else.

3.1.3 Specific extremity injuries

A. Fractures

1. Definition: Normal bone continuity is disrupted and usually involves a zone of injury including soft-tissue

structures. Fractures are described according to the three following classifications:

a. Antomic site: epiphyseal (head of a long bone), metaphyseal (wider shaft, growth zone), diaphyseal (shaft of the long bone), or intraticular (joint). A diaphyseal fracture can be further described as distal, media, or proximal third of the shaft.

b. Type of displacement: closed (simple), open (comminuted), complete incomplete, compression, displaced, greenstick (twisting), impacting, or overriding.

c. Plane of fracture: linear, longitude, oblique, spiral, or traverse

2. Etiology: The mechanism of injury and the extent and duration of an energy source impacting the specific body region forecast injuries to surface tissues and bone.

3. Nursing process.

a. Assessment: Important data include pre-hospital extrication time, immobilization techniques, resuscitative stabilization measures, and mechanism of injury commodities (motor vehicle accidents (most common), ejection from a vehicle, fall, crush/compression injuries, violent assaults, industrial). Examine any photography accompanying chart.

i. Sign and symptoms

- Primary survey (airway, breathing, circulation, disability(neurologic status), and exposure/environmental control(prevent hypothermia) is executed first(1).
- Estimate blood loss
- Secondary-survey orthopedic assessment
- Fracture and associated injuries

ii. Diagnostic test

- Radiograph of all fracture should include anterior posterior and lateral views on order to multiple angles of the injury and determine extent disruption. Oblique and comparison views of the unaffected extremity and films of joint above and below the injury may also be necessary.
- Arteriogram/angiography: Used when vascular involvement is suspected.
- Magnetic resonance imagery: identifies soft-tissue injury disk involvement of spinal injuries, ligamentous injuries.
- CT scans and myelograms to identify fractures undetected by plain films, document amount of dislocation, confirm amount of communication and stability of the fracture.
- Urethrogram/cystogram identify disruption of urethral system by bony displacement secondary to impact
- Serum
- Trauma laboratory protocol (see Hemodynamic response,)
- Hemoglobin and hematocrit for blood loss
- Chemistries for fluid balance; monitors for a decrease of serum calcium, magnesium, and phosphate
- Type and crossmatch to prepare for possible transfusion.
- Coagualtion studies for hemorrhage potential

- Urinalysis for toxicology screen and myoglobin; adequate output=0.5-1.0 mL/kg per hour urine output for an adult
- ABG or pulseoximery measurement preferred

b. Patient management

i. Impaired physical mobility related to immobilization devices and pain

- Problem: Interferes with ability to perform activities of daily living, potentiates the development of deep vein thrombosis, constipation/ileus, pressure ulcers, fluid and electrolyte abnormalities, foot drop, and pneumonia
- Intervention: Resuscitation phase
- Early intervention in pre-hospital and emergency department (first 24 hours). Urgent surgical intervention by orthopedic surgeon can reduce the extent of extremity disability.
- Immediate immobilization and reduction/realignment of bony injury within 8 hours. Immobilize joint above and below injury. Consider use of a Pneumatic Antishock Garment (PASG) to temporarily immobilize pelvis or femur fracture and tamponade pelvic hemorrhage. However, the clinician must monitor hidden external bleeding under the PASG. The PASG should not be used in patients with congestive heart failure or pregnant patients.
- Apply insulated ice, splint, and elevate extremity above level of heart to reduce swelling and pain.

- Continue revaluation of circulatory and neurovascular status of injured extremity. Assess pulses (palpable and Doppler) and skin temperature. Observe for compartment syndrome. The presence of pulses extremity, pallor of the skin, paresthesia and pain are highly suggestive of compartment syndrome.

- Monitor for external bleeding

- Assist in temporary fracture reduction measures.

- Provide pain and anxiety relief with short-acting, IV analgesic and anxiolytics after neurologic examination and determination of association injuries. Ensure that pain medications have been administered before fracture reuction

- Intervention: critical care phase

- Ensure that pulses are present distal to immobilization site

- Avoid manipulation of injury

- Apply sterile dressing and complete dressing changes to wounds and immobilization pin sites as ordered

- Pulmonary management: Encourage patient to get out of bed as soon as possible. Instruct or assist patient to turn, cough and complete deep-breathing exercises or spirometry every 2 hours and as needed.

- Consult physical therapy and occupation therapy as soon as possible.

- Review allowable positioning out of bed with patient. Use padding to pressure point. Maintain clean, dry skin surface.
- Fracture realignment management: appropriately utilize and maintain traction devices, sterile cleansing of pin site, circulatory and neurovascular limb reassessment
- Initiate rehabilitative exercise early. Encourage patient to participate actively in passive range of motion exercises including pantar flexion and dorsiflexion of feet. Consider using foot splint to prevent foot drop.
- Instruct patient to assess pain on a scale of 0-10 and document every 2 hours or after any pain-relieving interventions; provide pain relief as appropriate.
- Provide distraction such as movies, music, games, and reading materials.
- Desired outcome
- Skin integrity disruption prevented
- Further damage prevented
- Patient report pain relived
- Restored mobility to optimal, level, healing of fracture without malunion
- Patient verbalizes understanding and assists with care procedures, adaptive devices and exercises.

ii. Potential for infection related to contaminants of open fractures and soft-tissues injury

- Problem: Nosocomial infection, slowed healing process, sepsis, tetanus, gas gangrene, and osteomyelitis

- Intervention (resuscitative phase)

- Obtain aerobic and anaerobic wound cultures prior to irrigation.

- Use wet saline dressing on exposed tissue. Avoid iodine-based solution due to tissue irrigation and delayed wound healing.

- Provide irrigation and contaminant debridement with copious amount of saline. This procedure may be done in the operating room.

- Use sterile technique diligently to avoid further contamination

- Administer appropriate broad-spectrum antibiotics to cover suspected organism. Be sure to administer on time to maintain adequate level in blood

- Administer tetanus toxoid immunization or booster to prevent tetanus.

- Intervention (critical care phase)

- Monitor for sign of infection: erythema, edema, pain, wound drainage, fever, chills, changes in vital signs

- Administer antibiotics as ordered; give on time to maintain adequate levels in blood

- Use sterile technique during dressing changes and pin-site care; wash hands

before especially at skin/devices contact

- Observe for sign of osteomyelitis, common to open fractures and marked contamination: low-grade fever, swelling, tenderness, pain at site, and purulent drainage.
- Observe for signs and symptoms of gas gangrene: pain, swelling, color changes in the zone of injury, purulent drainage, hemorrhagic bullae (blisters), tachycardia, fever, altered sensorium.
- Provide adequate hydration and nutrition
- Apply antimicrobial topical agents as ordered
- Instruct patient how to maintain clean wound sites
- Instruct patient to inform nurse if new pain at site occurs.

Desired outcome

- Absence of infection evidenced by normothermia, white blood cell counts less than 15,000 mm^3 negative wound cultures and absence of foul-smelling drainage
- Resolution of infection and identified organism treated with antibiotics in timely manner.
- Good skin color temperature.
- Absence of swelling
- Patient demonstrates aseptic wound self-care

iii. Potential for impaired gas exchange related to pulmonary occlusion caused by pulmonary embolus/fat embolus from fat globule release, secondary to manipulation of fracture or from prolonged immobility.

- Problem: acute hypoxia from pulmonary artery occlusion.

Interventions

- Monitor for sign of respiratory distress (dyspnea, tachypnoea); provide ventilatory support as needed; assist with intubation as needed
- Obtain vital signs every 4 hours; obtain temperature every hour if fever develops.
- Assess for petechiea on chest, axillae and conjunctive. Notify physician if present
- Monitor ABG data and arterial oxygen saturation greater than 94%: make needed ventilation changes.
- Assess breath sound every 4 hours to ensure adequate gas exchange in all lobes.
- Monitor for thrombocytopenia (platelet level <150,000-250,000/mm^3).
- Assess neurologic status every hour due to the potential for cerebral ischemia
- Limit movement of fracture to avoid mobilization of fat

Desired outcome

- Normal gas exchange evidence by normal respiratory, arterial oxygen tension greater than 80 mm Hg, arterial carbon dioxides less than 45 mm Hg, arterial oxygen saturation greater than 94%, arterial blood pH 7.35-7.45.
- Restlessness secondary to dyspnea is diminished

B. Traumatic amputations

1. Definition: Severe pains can be life-threatening, but bleeding is usually well managed with direct pressure to wound or stump. Amputations are classified as traumatic, partial, complete, incomplete, or surgical. Descriptive types of include the following.

    a. Cut or guillotine: well-defined wound edges and localized damage to soft tissue, vessel, and nerves

    b. Crush wound: diffuse soft-tissue damage involving arterial intimal

    c. Avulsive amputation: tearing to stretching of tissue with nerve and vasculature torn away from injury site; degloving (shearing) injury.

2. Etiology

    a. Most common cause of upper-extremity amputation is motor vehicle accident, then farming accident, industry-related crush injuries, and violent assaults.

    b. other mechanism include saws, knives, hatchets and lawn mowers.

    c. Common sites of amputation include digits (fingers and toes): hand; forearm; arm; ear; nose; penis; transmetatarsal; and below, through and above the knee.

3. Nursing process

a. Assessment

i. Sign and symptoms

- Decrease systolic blood pressure (<90 mm Hg) if extensive bleeding at injury causes hypovolemia
- Decreased UOP (<30 mL/hour) from hypovolemia.
- Increased heart rate from povolemia
- Diminished mentation related decrease cerebra perfusion

ii. Diagnostic tests

- X-rays of both the stump and amputated part to determine presence of foreign body
- Trauma laboratory protocol: same as mentioned under hemodynamic response.

c. Patient management

i. Actual fluid volume deficit related to blood loss

- Problem: possible tissue or organ destruction from decreased perfusion.
- Intervention (resuscitation phase)
- Address life-threatening injuries first, by primary and secondary assessment.
- Determine mechanism of injury to considere possible contamination at stump site.

- Control hemorrhage with direct pressure and saline-moistened dressing; elevate and immobilize stump; avoid tourniquet, since circulation can be compromised further.
- Monitor hemoglobin and hemotocrit, administer blood products if necessary.
- Frequent checks of vital signs and neurologic status.
- Estimate actual blood loss as outlined in Hemodynamic response.
- Administer warned intravenous fluid and blood products
- Fluid replacement with two large-bore intravenous catheters in unaffected limb with lactated Ringer's solution
- Administer oxygen by face mask
- Insert a Foley catheter to monitor hourly UOP. Maintain at least 50 mL/hour during resuscitation phase
- Provide stump, amputated part, and reimplantation care.

Intervention: critical care phase

- Monitor central venous pressure, pulmonary artery wedge pressure, and other hemodynamic data.
- Monitor intake and output measurements
- Consult psychiatry to address body image concerns, sensory, changes.

- Use aseptic technique when completing dressing changes; assess site carefully for sign of infection (redness, swelling, pain, or purulent drainage).

Desired outcome

- Vital signs within normal limits
- Lab. data reflect adequate hemoglobin and hematocrit levels
- Further bleeding prevented.

ii. Potential for infection of stump

- Problem: Localized infection causes pain and has potential for systemic infection

Intervention

- Debride and irrigate wound thoroughly; remove all necrotic tissues may require operating room.
- Prevent edema by using nonrigid strile dressing application consult physical therapy and occupational therapy to select appropriate stump wrapping.
- Administer tetanus immunization and antibiotics as ordered
- Use strict hand washing and strile technique.
- Immediately consult orthopedic surgeon
- Support partial amputation by immobilizing the area

Desired outcome

- Absence of infection
- Wound healing

iii. Impaired physical mobility related to pain and contractures

- Problem: Loss of limb, dysfunctional ambulation. Altered balance, coordination deficit contracture, alteration in sensory function.

Intervention

- Provide prescribe skin care of stump.
- Consult physical therapy early
- Encourage and assist with isometric exercise of involved extremity with repetition. Above the knee amputation; avoid hip flexion and abduction; do not elevate stump on pillows.
- Reposition patient and stump frequently
- Stump wrapping with elastic fabric bandage: always wrap distal to proximal to prevent swelling; and shrink and shape stump or prosthetics.
- Encourage range-of-motion exercise to increase muscle strength and flexibility.
- Provide sufficient pain control with analgesic to ensure complacence with exercises
- Instruct family in physical therapy assistant role and patient's need for functional activities

Desired outcome

- Absence of contractures
- Optimal range of motion
- Pain controlled.

iv. Disturbance in body image and self-concept related to disfigurement.

- Problem: Loss of limb or part, powerlessness, anger, fear, depression, unwillingness to accept loss or view stump

Intervention

- Consider psychologic consultation.
- Discuss with the patient, feeling of loss and the normal grief cycle. Provide a supportive environment to assist in grieving process.
- Allow patient to make as many choices as possible (food, routine naps) to gain a sense of control.
- Discuss plan of care related to prosthesis fitting
- Encourage patient to participate in plan of care and decision making.

Desired outcome

- Patient exemplified adequate coping mechanisms.
- Patient is actively involved in rehabilitative phase.

C. Compartment syndrome.

1. Definition: A complication of orthopedic trauma when a nerve, tendon vessel or muscle is constricted within a closed space that is surrounded by membranes that do not stretch. May also result from acute arterial occlusion. Resticted circulation to microvasculature changes casues ischemia of nerve and muscle (Volkmann's ischemic contracture)

2. Etiology: Compartment syndrome is a function of time and pressure. Increased duration of stressor and pressure produce symptoms. Internal pressure is from bleeding or edema, external pressure from restrictive devices such as casts, or prolonged inflation of the PASG. Injuries at risk of developing compartment syndrome include closed fractures accompanied by tissue contusion and bone displacement, compression/crush injuries, open fracture, arterial injuries from gunshot wounds, and burns.

3. Nursing process.

    a. Assessment

        i. Sign and symptoms: Presence of all of the following denotes very advanced ischemia from compartment syndrome.

            - Pain: related to muscle ischemia
            - Pallor: skin color changes related to lack of blood supply to the area.
            - Pulses: may be diminished or absent related to arterial inflow compression.
            - Paresthesia of the affected area due to sensory nerve ischemia.
            - Paralysis: due to ischemia of motor nerves

        ii. Diagnostic tests.

            - Serum: myoglobin may be present if muscle necrosis has occurred.

- Urine: myoglobin present if muscle necrosis has occurred
- Other: intracompartmental pressure measurements with monitoring devices to measure the intracompartmental pressure at the injury site.
- Pressure less than 20 mm Hg: normal
- Pressure 20-30 mm Hg: ischemic damage and immediate need for pressure reduction. arterial blood flow is not usually obstructed by compartment pressure of 30-60 mm Hg. Distal pulses may still be palpated.

b. Patient management

i. Potential for decreased tissues perfusion and neurovascular compromise related to increased compartment pressure.

- Problem: pain, edema, parasthesia, myglobinuria, necrosis

Interventions

- Ascertain time of injury and time since onset of symptoms; damage can occur within the first few hours after injury.
- Identify site and mechanism of injury
- Suspect associated injuries: soft-tissues contusion, hematomas, fracture or dislocations.
- Assess and monitor for pain, pallor, puilse, parethesia, and paralysis (“the five Ps”)

- Investigate pain, complaints of throbbing disproportional pain at injury site, unrelieved by analgesic drugs and increased in response to passive stretch of the muscle.
- Examine firmness or tenseness of compartment by compacting with injuries extremity
- Observe pallor and capillary refill delay distal to the compartment.
- Identify paresthesia or loss of sensation. These are signs indicating pressure on the nerves and may manifest as numbness and tingling. Examine with two-point discrimination, sharp and dull touch.
- Assess for limited or weak motor ability of extremity because of pain from pressure.
- Assess pulses distal to injury. Check pulses with palpable and Doppler method every 1-2 hours: if diminished, late sign and irreversible, presence of pulses does not rule out compartment syndrome. The mechanism of injury and accompanying signs and symptoms are the key to detection.
- Maintain the extremity at heart level to decrease swelling, yet maintain perfusion.
- Release constrictive devices such as casts or tight dressings
- Monitor and record trends in patient's pain patterns and effects of medication.

- Trend compartment pressure and notify physician of rising pressures indicating compartment syndrome; measure circumference of extremity.

- Prepare patient for operating room when surgical decompression of the compartment fascia sheath by fasciotomy is required.

Intervention (postfacsitomy)

- Assess neurovascular status hourly, pattern of responses to intervention and continued limb assessment (crucial to prevent further disability). Fasciotomy should immediately return pulse.

- Monitor for skin infection, assuring sterility of fasciotomy sites and wet - to-wet (open tissue) or wet –to-dry sterile saline dressing as appropriate.

- Monitor for bleeding

- Monitor clinical signs of increasing compartment pressure due to mobilization, persistent edema, or venous leaking.

- Assist with compartment syndrome measurements

- Expect delayed primary or secondary skin closure with grafts after swelling has receded.

Desired outcome

- Increased arterial blood flow and improved venous return to injured area.

- Intra-compartmental pressure less than 20 mmHg.

- Prevention of neuromuscular deterioration and irreversible sequelae.
- Absence of signs of infection to fasciotomyu sites
- Skin graft heals properly.

ii. Impaired physical mobility related to pain, pressure and fasciotomy incisions

Problem: Decreased extremity function, weak motor responses, and fear of pain

Intervention

- Early intervention to relieve pressure and subsequent destruction to microvasculature.
- Initiate range-of-motion exercise early
- Identify pressure point and pad appropriately to avoid pressure sores.
- Ensure sufficient pain control to improve compliance with exercises.

Desired outcome

- Full range of motion of inured extremity
- Functional ability to complete activities of daily living
- Prevention of contractures
- Patient participates in rehabilitative phases.

3.1.4 Discharge planning for the trauma patient

A. Patient, caretaker, and family have been provided and understand all written discharge instructions.

1. All questions answered.

2. Understanding of appropriate locations to return to for continued health care needs.

3. Knowledge of names and telephone numbers of personnel to call for answer to questions.

B. Home health care agency and rehabilitation arrangements are competed prior to discharge.

1. Home environment conducive to recovery, especially for elderly and challenged populations.

2. Home assessment for running water, electricity, cleanliness, and care-taker support.

3. Nutritional requirements met and healthy foods identified.

C. Patient and caretaker understand and demonstrate wound care.

- Infection prevention techniques
- Hand –washing technique
- understanding of signs and symptoms of infection
- Understanding of sterile versus environment
- Recognition of signs and symptoms of wound infection.

D. Patient and caretaker understand causes and treatment of pain.

1. Distinction of pain types: acute pain (compression, tearing, cramping, edema) and chronic pain (phantom limb pain, incorrect joining of bone fractures).

2. Knowledge of medication appropriate for types of pain.

3. Mobility and range-of-motion exercise encouraged as appropriate.

4. Proper use of crutches or mechanism equipment.

E. Patient and family offered support group

a. Counseling for body image changes or abuse (victims and their abusers).

b. Substance abuse counseling

c. spiritual support groups

d. Financial counseling

e. Legal guidance (wills, power of attorney, organ donation).

f. Psychological counseling of anxiety, depression suicidal tendencies.

g. Return to work as soon as possible, encouraged.

F. Prescription filled an instructions explained

a. Medication, side effects and contractions

b. Dosage, route, and regularity of administration

G. Trauma-prevention education and behaviour modification.

a. Stress management for patient and caretaker

b. Seatbelts, child safety seat, and helmet use.

c. Pedestrian and bicycle traffic safety

d. Education about guns and knives and violence avoidance strategies

e. Education about drinking, driving and drugs avoidance strategies

H. Follow-up appointment are made and explained to family

a. Determine how patient will return to clinic.

b. Facilitate arrangement to assure return to clinic.

4.0 CONCLUSION

Zone-Smith in Hebra and Kuhn (1996) stated that traumatic injuries kill nearly 150,000 Americans a year and leaves 60 million injured and 300,000 permanently disabled Figures in developing countries are not readily available. No doubt traumatic injuries are at an alarming rate in developing countries.

5.0 SUMMARY

The unit has looked into the concept of trauma, etiology, nursing process of traumati injuries, precautions, assessment, specific extremity injuries and their nursing management and finally the discharge procedure/preparation for the trauma patient. It is expected that you have learnt greatly and this knowledge will better your qualitative care to your patients.

6.0 TUTOR-MARKED ASSIGNMENT

Explain various causes of traumatic injuries and discuss the care and prevention of each cause identified.

7.0 REFERENCES/FURTHER READING

American College of Surgeons Committee on Trauma. (1993). *Advanced Trauma Life Support Instructor Manual* (5th ed). Chocog: American College of Surgeon. Pp. 11, 21.

Trunkey, D. (1982). *The Value of Trauma Centers*. Am Coll Surg Bull 67:5.

National Safety Council. (1987). *Accident Facts* (1987 ed). Chicago, 1987.

Creel, J.H. (1988) In JE Campbell (ED), *Basic Trauma Life Support Advanced Prehospital Care* (2nd ed) Englewood Cliffs, NJ: Prentice-Hall, 1988. P. 13.

Young, and HA, Schimdek HH. (1982). *Complications accompanying Occipital Skull fractures.* J Trauma 22:914, 1982.

Vanore, ML. (1992) Module 2. In EW Baleye, SAT Turcke (eds) *A, Comprehensive Curriculum for Trauma Nursing*. Boston: Jones and Bartlett,. p. 19.

Lyerly, HK, (1987). *The Handbook of Surgical Intensive Care*: *Practice of the Surgery Resident at the Duke University Medical center*. Chicago: Year Book,

MODULE 2

Unit 1 Nutrition
Unit 2 Patients Undergoing Transplantation I
Unit 3 Patients Undergoing Transplantation II

UNIT 1 NUTRITION

CONTENTS

1.0 INTRODUCTION

The last unit looked at traumatic injuries at various levels and the management critical care patients. Nutrition is pertinent to the survival of critical care patients and in situations where malnutrition sets in, the survival rate of the patient is grossly affected. Hospitalized patients are at high risk for the development of malnutrition. Some suggest that, as many as 50% of hospitalized patients, have documented moderate to severe protein-calorie malnutrition. Protein calorie malnutrition is associated with increased morbidity and mortality. As the most common form of malnutrition in the hospital setting, it is characterized by decreased levels of visceral and somatic proteins as well as depleted fat stores and muscle wasting.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- define marasmus, kwashiorkor and mixed kwashiorkor and marasmus
- explain ebb and flow phases of responses to critical illness and injury
- discuss nursing assessment of nutrition
- describe nursing management of malnutrished patients.

3.0 MAIN CONTENT

3.1 Definition

A. **Marasmus:** Inadequate calorie intake result in decreased fat stores and depleted muscle mass; most common in the moderately stressed patient.

B. **Kwashiorkor:** Inadequate supply of amino acids to support protein synthesis; results in decreased levels of plasma, anemia, impaired immune responses and edema.

C. **Mixed kwashiorkor/marasmus** (protein-calorie malnutrition): Characterised by skeletal muscle, decreased fat stores, and depleted viscera proteins; deficits in energy and protein are most common in severely stressed patients who are catabolic.

3.2 Responses to critical illness and injury

The responses to critical illness and injury are characterized by two distinct phases: ebb and flow phases.

3.2.1 Ebb phase

Goal is to maintain blood flow and oxygenation of vital organs short duration; characteristics include the following:

1. Decreased cardiac output

2. Decreased core temperature

3. Decreased oxygen consumption

4. Increased levels of catecholamine, glucagons

5. Decreased insulin

6. Increased serum glucose level

7. Hepatic glucose production normal

3.2.2 Flow phase

Goal is to provide fuel for organ function and tissue repair’s peak elevations occur 5-10 days after injury; characteristics include the following:

1. Increased cardiac output
2. Increased core temperature
3. Increased oxygen consumption
4. Increased levels of catecholamine glucagons
5. Normal or increased insulin
6. Serum glucose normal or increased
7. Hepatic glucose production markedly elevated
8. Hypermetabolism and hypercatabolism

    a. Flow phase is mediated by counter regulatory hormones (cortisol, glucagons, catecholamines, growth hormones) and cytokines (interleukin-1tumor necrosis factor, interferon).

    b. Alterations in substrate metabolism occur during flow phase

        i. Carbohydrate metabolism

            - Increased hepatic glucose production
            - Increased glucose consumption by wounds, cell of the reticuloendothelial system, inflammatory tissue.
            - The increased glucose production is not reduced with exogenous glucose administration.
            - Insulin resistance result in hyperglycemia

        ii. Fat metabolism

            o Breakdown of fat from adipose tissue stores
            o Increase levels of free fatty acids
            o Fatty acids oxidized for fuel or recycled back to peripheral tissues

iii. Protein metabolism

- Accelerates breakdown of skeletal muscle
- Liver utilizes amino acids from skeletal muscle catabolism to synthesize acute-phase-reactant protein, which support immune function and wound healing
- Increased catabolism of skeletal muscle result in negative nitrogen balance.

3.3 Nursing Assessment

Assessment: within 24 hours of the patient being stabilized

Signs and symptoms

1. General appearance

a. Depletion of muscles and fat stores

i. Temporal washing

b. Edema-severe hypoalbuminemia disrupts oncotic pressure and may cause fluid to leak from vascular space into surrounding tissues

c. Skin texture-dryness or scales can be secondary to essentially fatty acid efficiency.

d. Skin turgor-indication of hydration status

e. Teeth. Mouth, and gums-poor condition, bleeding may indicate vitamin deficiency.

f. Condition of hair and nails-hair loss is associated with zinc deficiency.

2. Muscle strength

a. Decreased ability to assist in turning or transferring from bed to chair

b. Reduced hand-grasping strength

3. Cardiac

a. Hemodynamic assessment – blood pressure, central venous pressure, pulmonary artery pressure (PAP), pulmonary artery wedge pressure (PAWP), cardiac output

i. Assess for indications of over hydration or under hydration.

ii. Decreased blood pressure, decreased cardiac output may preclude enteral feeding, because inadequate blood flow to the intestine will not support digestion and could cause intestinal ischemia.

b. Identify need for fluid restrictions

4. Respiratory

a. Respiratory rate, tidal volume, capacity, minute ventilation

i. Decreased diaphragm muscle mass will increase tidal volume decrease vital capacity, increase respiratory rate and minute ventilation.

ii. Over feeding nonprotein calories will increase CO_2 production.

5. Renal

a. Urine output- assess quantity and quality of urine output

i. Decreased urine output

ii. Fluid overload

iii. Decreased creatinine clearance

b. Electrolytes, blood urea nitrogen, creatinine

c. Accumulation of urea in blood: This will rise in the hypercatabolic patient as skeletal muscle is mobilized. It also rises during protein administration without dialysis.

i. Increased potassium, magnesium, and phosphorus

ii. Increased creatinine indicates worsening renal function.

d. Type and frequency of dialectic therapy

i. Dialysis is a catabolic therapy and contributes to protein depletion.

ii. Continuous arteriovenous hemofiltration dialysis or peritoneal dialysis is a significant source of nonprotein calories.

6. Gastrointestinal

a. Quantify output from any tube accessing the Gastro Intestinal Tract

i. Fluid/electrolyte depletion can occur with excessive losses from the Gastro Intestinal Tract.

b. Measure abdominal distention.

c. Stool output- quantify amount, describe consistency

i. Excessive stool or fistula losses contain significant amount of measurable nitrogen.

d. Auscultation of bowel sounds - least useful information, and absence of bowel sounds does not mean Gastro Intestinal Tract is nonfunctional.

E. Anthropometric data

1. Admission weight and height

a. Evaluate degree of weight loss; greater than 10% is significant.

2. Calculate Ideal Body Weight (IBW)

a. Men: IBW = 106Ib for first 5ft; 6Ib for each additional inch

b. Women: IBW=100Ib for first 5 ft; 5Ib for each additional inch

c. Calculate % IBW (Table 4.1) [1]

- Severe malnutrition less than 70% of IBW
- Moderate malnutrition 70-80% of IBW
- Mild malnutrition 80-90% of IBW

e. Skin fold measures are less reliable during acute periods of stress.

F. Metabolic assessment

1. Visceral protein status- catabolic illness results in depletion of albumin, - prealbumin, and transferring because of a decreased production of these proteins to support increased synthesis of acute-phase-reactant proteins.

   a. Albumin-long half- life (21 days) limits its usefulness as a marker of nutritional deficit; however, it is a good indicator of the severity of critical illness. Fluid status will affect serum measures: Overhydration results in decreased albumin, underhyration results in elevated values.

   b. Prealbumin- a shorter half –life is approximately 8-10days. Levels appear low when iron stores are low such as with massive hemorrhage.

2. Measures of immune function – total lymphocyte count and skin antigen testing

   a. Less reliable measure of nutritional status in the critically ill because of impaired immuno competence results in stress, trauma, and many chronic diseases.

3. Energy expenditure- total expenditure is usually increased in proportion to the severity of injury and stress.

   a. Estimating Metabolic Rate: Harris-Benedict equation (BMR)

      i. Equation predicts basal metabolic rate.

ii. Equation underestimates needs during critical illness and overestimates energy needs in patient who are in barbiturate coma.

iii. Predictive equations are typically multiplied by stress factors to define the total daily nonprotein calorie prescription.

d. Measuring resting energy expenditure (REE): indirect calorimery

i. Measures oxygen consumption and CO_2 production

ii. Requires a portable metabolic cart

iii. Most accurate way to determine energy expenditure; greater than 12% reflects hyperabolism

4. Nitrogen balance

a. Nitrogen balance = nitrogen- nitrogen output.

b. Collect 24-hour urine urea nitrogen and creatinine.

c. Negative nitrogen balance is characteristic of acute illness.

5. Serum chemistry measure: Electrolytes –serum levels fluctuate rapidly during periods of acute illness.

a. Potassium, magnesium, -phosphorus – serum levels drop in response to aggressive refeeding because potassium and phosphorus ions are driven into the cell to support anabolism.

b. Blood urea nitrogen and creatinine- increases may reflect hydration status and signal worsening renal function.

c. Serum glucose- hyperglycemia (> 200 mg/dl) characteristic feature during severe stress

d. Serum triglyceride-hyperiglyceridemia may reflect decrease clearance of lipid

e. Hemoglobin/hematocric-anemia is common with protein calorie malnutrition.

3.4 Patient management

A. Alteration in nutrition/ metabolic status related to hypermetabolism and hypercatabolism caused by the response to severe stress/acute illness.

1. Problem: weight loss, negative nitrogen balance, delayed wound healing

2. Intervention
   a. Nutritional support indicated if patient will be taking nothing orally for more than 5 days.

   b. Determine energy needs

      i. Caloric needs are based on the goals for fat stores/body weight.

         - Weight gain: (resting energy expenditure [REE] x1.5) – not recommended during critical illness

         - Weight maintenance. (REEx1.2)

         - Weight loss: (REE x 0.8-1.0)-not less than 800 nonprotein kcal/d

      ii. Estimated needs during critical illness

         - Weight maintenance = 35-40 kcal/kg body weight per day

         - Use ideal body weight if patient is morbidly obese.

   c. Determine protein needs.

      i Protein repletion is usually required for highly catabolic patients.

      ii. 2.0 g/kg body weight per day

      iii. Measure nitrogen balance weekly.

3. Desired outcome

    a. Meet goals for fat stores and body weight.

    b. Reduce net negative nitrogen balance.

        i. Difficult to achieve positive nitrogen balance during periods of extreme catabolism

    c. Decrease morbidity and mortality

B. Nutritional deficit related to inability to use GI tract during period of hypercatabolism and hypermetabolism secondary to severe hemodynamic instability (reduced blood flow to intestine); disruption of the continuity of the GI tract because of obstruction, fistula, or ileus; decreased absorption caused by GI bleeding, acute pancreatitis, or intractable diarrhea.

1. Problem: potential weight loss, negative nitrogen balance, delayed wound healing, increased morbidity and mortality

2. Intervention: total parenteral nutrition (TPN)

    a. Energy-supply –dextrose (l g = 3.4 kcal

        i. Provide 60-70% of total nonprotein calorie needs

        ii. Do not exceed 7 dextrose/kg body weight per day.

        iii. Minimal requirement is 200 g/d (700 kcal).

        iv. Dextrose solutions available in concentration ranging from 5% to 70%

    b. Energy supply- lipid (l g = 9 kcal)

        i. Provide 30-40% of total nonprotein caloric needs.

        ii. Do not exceed 2.5 g fat/kg body weight per day.

iii. Lipid solutions available in 10% or 20% concentrations

c. Protein supply

i. Standard amino acid formulas contain a mix of essential and nonessential amino acids.

ii. Amino acid solutions available in concentrations ranging from 8.5% to 14%

d. Electrolytes

i. Add electrolytes to total parenteral nutrition (TPN) regimen daily for maintenance

- Sodium – 70- 100 mEq/d
- Potassium – 70- 100 mEq/d
- Chloride – 80- 120 mEq/d
- Magnesium – 15-20 mEq/d
- Phosphorus – 20-30 mmol/d
- Calcium -10- 20 mEq/d
- Acetate – 0 60 mEq/d
- Daily adjustments based on daily laboratory values

e. Vitamins

i. Add daily parenteral vitamin supplement to TPN

ii. 1 mg vitamin K added to TPN for maintenance

iii. 10 mg vitamin 1.M x 3 days for repletion if there are clotting abnormalities

iv. Additional thiamine, folate, vitamin B12 with alcohol abuse

f. Trace elements

i. Add daily parenteral trace element mix to TPN.

ii. Standard solution contains zinc, copper, manganese, chromium and selenium.

iii. Additional zinc required during acute catabolic stress

iv. Reduce copper and manganese in the setting of billary

g. Administration techniques

i. Delivery requires central access because of increased osmolarity of the TPN solutions.

- May use existing lines that have been properly maintained
- Femoral catheters can be used.
- Proximal ports of hemodynamic monitoring lines can be used.
- Initiate TPN at goal: no rationale to slowly tapering solutions.
- Check blood glucose every 6 hours for 48 hours and then, if stable, daily.
- Monitor serum magnesium, calcium, potassium daily for 3 days, then every 3 days.
- Discontinuation of TPN: No rational supporting the need to slowly taper down TPN solutions before discontinuing

h. Prevent potential complications of TPN

i. Metabolic complications: (1) hyperglycemia: monitor blood glucose and adjust glucose calories

accordingly, add short-acting insulin to TPN to keep sugar less 200 mg/dL, increase amount of nonprotein calories provided as fat; (2) hypertriglyceridemmia: monitor baseline serum triglycerides, reduce lipid calories in triglyceride level to asses clearance; (3) hypercapnia: avoid overfeeding to prevent increased carbohydrate production; (4) hepatic dysfunction: avoid overfeeding, expect mild transient elevations in transaminase and alkaline phosphates that peak within 10-15 days of staring TPN, monitor liver function tests weekly.

3. Desired outcome

a. Goals for weight/fat stores met

b. Reduced net negative nitrogen balance

c. Increased visceral protein levels (peralbumin, albumin, transferring)

d, Serum electrolyte levels within normal limits

C. Nutritional deficit related to inability to eat and meet requirements during periods of hyermetabolism and hypercatabolism secondary to upper GI tract obstruction, ileus, fistula; pancreatitis; risk of aspiration; decreased pharyngeal reflexes or depressed mental status

1. Problem: potential for weight loss, negative nitrogen balance, delayed wound health, and increased morbidity and mortality

2. Intervention: initiate enteral feeding

a. Determine where in the GI tract to feed: stomach or small intestine

i. Gastric ileus common in severe head injury, after extensive abdominal surgery, and during severe sepsis

ii. Delayed gastric, emptying can occur from pharmacologic intervention or is associated with chronic illness such as diabetes.

iii. Postpyloric enteral feeding will reduce the risk of feeding-related aspiration

b. Select enteral access device (Table 4.2)

i. Determine if enteral feeding will be short-term (<.1 month) or long-term (>1month).

ii. Permanent enteral access is indicated if forced feeding is necessarily greater than 1 month.

c. Select enteral formula

i. Standard polymeric formula – contains 1 kcal/mL and is 70-80% free water. Most contain approximately 40g of protein per litre and are indicated for moderately stressed patients.

ii. Calorically dense formula- contains 1.5-2.0 kcal/mL and is 60-70% free water. Use in fluid-restricted patients.

iii. High-protein formula-contains greater than 50-60g of protein per litre and is indicated for highly catabolic patients.

iv. Enteral formula-limited application but may be of use in pancreatitis or malabsorption syndromes

v. Enteral formulas contain vitamins, trace elements.

d. Administration techniques

i. Intermittent feeding: Enteral feeding is administrated via gravity drip every 4-6 hours. This delivery method is only for intragastric feeding. Each feeding should infuse over 30-60 minutes. Each intermittent feeding should not exceed 480mL. Introduce feeding at 120mL every 4 hours and advance as tolerated to goal regimen.

- Monitor tolerance to feeding regimen
- Check gastric residuals before each feeding: Hold if residual is greater than 150 mL.
- Assess for nausea, vomiting or bloating- may indicate gastric motility is slowed

ii. Continuous feeding can be delivered into the stomach or small intestine. Start feeding at a rate 30-50 mL/h and advance in increments of (30 mL until hourly rate reaches goal. Feedings into the small intestine must be continuous via a pump to prevent diarrhea.

- Monitor tolerance to regimen
- Check gastric residuals every 4 hours.
- Monitor abdominal girth-hold feeding for increased abdominal distention.
- Monitor for nausea and vomiting-may indicate tube tip has migrated from small intestine to stomach.
- Monitor for diarrhea: Rule out infectious causes, dilute hypertonic medications that are delivered via the feeding tube with water, and treat with routine administration of antidiarrheals.

f. Prevent complications of enteral feeding

i. Overhydration: select enteral formulas that are calorically dense that contain less free water.

ii. Dehydration: dilute enteral formual with water to meet calculated daily fluid requirements.

iii. Aspiration: keep head of bed elevated 30-45 degrees, use coloring agent to detect feeding in tracheal aspirate, use PH testing, administer enteral feeding post pylorically, use only small-bore nasoentric tubes.

iv. Diarrhea: exclude and/ or trace other causes of diarrhea; consider fiber formula for severe diarrhea caused by a malabsorption syndrome; consider an elemental or peptide-based formula.

v. Administer loperamide

vi. Feeding tube blockage; avoid medication administration if possible; if no other route available, use liquid medications or thoroughly crushed pills; flush tube every 3-4 hours with warm water during continuous feeding and before and after each intermittent feeding.

3. Desired outcome

a. Meet goals for weight/fat stores.

b. Reduce net negative nitrogen balance.

c. Reduce morbidity and mortality.

d. Minimize complications of enteral feeding.

e. Alterations in fluid and electrolyte status related to impairment of organ function (renal, liver, cardiac, respiratory) complicating delivery of nutritional goals.

4. Problem: Deteriorating organ function impairs clearance/tolerance of calories, protein, fluid and electrolytes resulting in fluid overload, abnormal serum electrolytes, increased BUN, increased CO_2 production.

5. Intervention: Adjust nutrient prescription to account for worsening organ function.

a. Renal

i. Protein prescription: Decrease total amount of standard amino acids (1.4 g/kg per weight) if dialysis is ineffective or contraindicated.

ii. Keep blood urea nitrogen (BUN) less than 100 g/dL.

iii. Specialized renal formulas (essential amino acids) are only indicated in patients who cannot be dialyzed. The efficacy of these specialized formulas is controversial.

iv. Maximally concentrate all nutrient solutions

v. Restrict/delete magnesium, potassium, and phosphorus.

vi. Provide additional acetate.

vii. Calculate caloric contribution of dialytic therapies such as CAVHD and peritoneal dialysis.

b. Hepatic

i. Protein prescription: Slowly introduce standard amino acid solutions (0.8-1 g/kg per weight) and advance as tolerated, monitoring for worsening encephalopathy.

ii. Restrict hepatic formulas (branched-chain amino acid formula) for patients with worsening encephalopathy who are unresponsive to medical therapy.

iii. Provide at least 150-200 g of glucose/dL

iv. Restrict fluid and sodium

v. Supplement vitamin K1 mg daily, monitor clotting studies

vi. Delete copper and manganese

c. Respiratory

i. Avoid overfeeding patients (> 150% of measured energy expenditure).

ii. Select a 50:50 mix of glucose and fat to meet daily nonprotein calorie requirements.

4.0 CONCLUSION

The relevance of adequate nutrition to the survival of patient in critical care cannot be undermined so the nurse will need to pay holistic attention to the patient receiving nursing care under her. The nurse must be knowledgeable in this area to be able to assist the patient, she must be able to make adequate judgment with the assessment already done in order not to put the patient in further danger.

5.0 SUMMARY

In this unit, you have learnt about marasmus, kwashiorkor and the mixed, response to critical illness and injury by the patients, nursing assessment of nutrition and management of nutrition of various patients. It is expected that the knowledge acquired in this unit will better your nursing care of your patients at various levels.

6.0 TUTOR-MARKED ASSIGNMENT

1. With specific headings, differentiate between Marasmus and Kwashiorkor.

2. What are the various measures in the assessment of nutrition?

7.0 REFERENCE/FURTHER READING

Ackerman, M. H., Evans, N. J. and Ecklund, M.M. (1994). *Systemic Inflammatory response syndrome, sepsis, and nutritional support*. *Crit. Care Nurs. Clin. N. Am.* 6:321,

UNIT 2 PATIENTS UNDERGOING TRANSPLANTATION I

CONTENTS

1.0 INTRODUCTION

This Unit is on patients undergoing transplantation, what the concept of organ transplantation is all about, types of grafts and organ transplants, criteria for matching donor and recipient, organ transplant immunology and nursing process approach of patients undergoing various organ transplantations. The subject of organ transplantation will continue in the next unit for better coverage.

2.0 OBJECTIVE

At the end of this unit, you should be able to:

- define organ transplantation
- state the types of grafts and organ transplantation
- list the criteria for matching donor and recipient
- describe the nursing process of organ transplantation
- explain organ transplant immunology.

3.0 MAIN CONTENT

3.1 Definition

A. Organ transplantation is the process of transferring a functioning organ from one person to another in order to replace a nonfunctional, diseased organ. Organ transplantation has become

the treatment of choice for end-stage organ disease. The donated organ is called a graft. Organ transplant patients most likely to require intensive care intervention include those receiving heart, lung, heart-lung, liver, pancreas, islet cells, kidney-pancreas, and bone marrow transplant. Discussions pertinent to each are included in this chapter.

B. Types of grafts

There are three types of grafts. These are:

1. Isograft: A graft transplanted into an identical historical histocompatible recipient (eg. Twin sibling).

2. Allograft: A graft transplanted into recipient of the same species. (e.g. Skin transplant).

3. Autograft: A graft transplanted from one area of the recipient's body to another (e.g. skin transplant).

3.2 Types of organ transplants

There are four types of organ transplants:

1. Cadaveric: The donor is genetically different than the recipient, and the donor has been pronounced brain dead but is medically supported to maintain organ perfusion.

2. Syngeneic: The organ donor is a living, blood-related individual with an identical genetic match.

3. Autologous: The graft is "self" donated.

4. Allogeneic: The organ is donated from a genetically different living donor.

3.3 Criteria for matching donor and recipient

There are protocols or institutionalisation variations in the applications of these transplantation criteria; in some centers, transplantation is contraindicated in a patient who may be considered eligible for transplantation elsewhere.

1. Human leukocyte antigen (HLA) match: More emphasised in bone marrow transplant (BMT).

2. ABO compatibility: All major organ transplants except BMT, islet cells.

3. Mixed lymphocyte count: Done with living related donors and whenever else possible. Positive mixed lymphocyte reaction predicts increased incidence of rejection.

4. Equivalent donor/recipient organ size.

5. No active infections in donor or recipient (particularly human immuno-deficiency virus infection or hepatitis).

6. Donor criteria (ideal, but not applied uniformly in all transplant centers)

   i. No history of intravenous (IV) drug use

   ii. Core temperature greater than 32^0F.

   iii. Laboratory tests within normal limits

   iv. No history of metastasizing cancer, except basal cell carcinoma or an isolated brain tumor.

   v. For cardiac transplant, donor must have normal 12-lead electrocardiogram, echocardiogram, creatine phosphokinase, and creatine phosphokinase MB isoenzyme

   vi. For liver transplantation, normal transaminases are required.

3.4 Organ transplant Immunology

A. HLA matching

1. All persons have their own genetic universal product code called the HLA, which distinguishes their body cells from foreign cells.

2. HLAs are proteins on the outside of cells that distinguish an individual’s cells from other cells.

3. This Universal Product Code is used to match the donor and recipient as closely as possible to prevent rejection by the recipient.

4. HLAs are divided into class I or major antigens (A, B, C) and class II or minor antigens (D, DP, DQ, DR).

    a. Normal immune respond of foreign HLA.

    b. Class II antigens stimulate helper T cells.

    c. Helper T cells stimulate B cells to produce antibodies against class I antigens on foreign tissue

B. HILA typing

1. Used to match donor/recipient for reduced likelihood of rejection.

2. Tissue typing for class I antigens.

3. Mixed Lymphocyte Culture (MLC) is used to detect class II antigens with living donors. It takes days to obtain these results, but whenever time permits or if multiple donors are available, the potential donor who has the lowest MLC response is the preferred donor. Theoretically, a highly positive reaction indicates an increased risk of poor graft survival; however, the predictive value of the MLC in solid organ transplant such as kidney transplantation in unknown.

3.5 Nursing process: Assessment

A. Signs and symptoms of engraftment include return of normal organ function.

B. Signs and symptoms of rejection:

1. Definition: An immune response against transplanted tissue; often both humoral and cellular mediated

2. Hyperacute rejection

    a. Occurs within minutes.

    b. Characterized by the recipient’s antibodies adhering to the vascular endothelium of the graft, triggering complement, and clotting.

c. Signs and symptoms: Rapid, widespread vascular thrombosis causes severe graft netrosis and organ failure.

d. No curative treatment except retransplantation.

3. Acute rejection

a. Occurs within hours or days following transplantation.

b. Antigens on the recipient's macrophages process the antigens on the transplanted organ. The B and T lymphocytes become sensitized to these antigens and trigger humoral and cellular responses causing injury to the graft. Cytotoxic T cells cause lyses and direct injury to the graft; lymphokines produce activated T cells that enhance graft rejection.

c. Signs and symptoms: Pain, tenderness over graft site, decreasing graft function, fever, malaise.

d. Treatment with immunosuppressive medications.

4. Chronic rejection

a. Occurs months to years after transplantation.

b. Involves the minor histocompatibility antigens.

c. Results in proliferation of endothelial and mononuclear cells with narrowing of the vascular arterial bed in the graft and other organs.

d. Signs and symptoms; Gradual loss of graft function.

e. Rejection signs and symptoms unique to the organ transplanted.

C. Initial post-transplant assessments are uniform whether solid organ surgical procedure or BMT.

1. Immediate postoperative care (exept BMT, islet cells).

a. Immediate monitoring for signs or hyperacute rejection by thrombosis or organ.

b. Routine cardiopulmonary critical care monitoring based on length of anesthesia, fluids lost, complexity of organ resection, or prior medical history. Many of these monitoring paramenters are not needed with routine kidney transplantation.

Cardiac monitoring.

i. Oxygen saturation monitoring and arterial blood gas analysis.

ii. Vascular volume assessments: Blood pressure, central venous pressures, weight, intake and output.

iii. Blood chemistry monitoring.

iv. Hematology monitoring.

c. Presence of pain.

d. Monitoring of incision and drain sites for excess or abnormal drainage, signaling altered vascular integrity or rejection symptoms.

e. Breathe sounds, lung expansion, ability to cough, and deep breathing signaling atelectasis or early pneumonia.

f. Temperature monitoring to detect potential infection. Other symptoms of infection are not usually appreciable due to immunosuppressive therapy.

3.5.1 Nursing process: planning

A. Potential alteration in tissue perfusion

1. Problem: In the post-transplant period failure to engraft leads to ischemia and dysfunction of the engrafted organ. Symptoms of failure to engraft are particular to each type of transplant; however, some nursing care is universal for all transplant patients experiencing potential rejection.

Altered tissue effusion in the posttransplant period also may be caused by reduced perfusion of the graft, so careful evaluation of graft circulation is essential.

2. Etiology: Hyperacute, acute, or chronic transplant rejection phenomena are the usual cause; however, inadequate vascular value or postoperative shock may also produce ischemic graft symptoms.

3. Interventions:

   a. Monitor engrafted organ's function carefully, especially during the first 2 weeks when severe rejection phenomenon is most common.

   b. Administer antirejection medications (immunosuppressives) as ordered Regimens and doses vary greatly among organs, types of transplant, and transplant centers.

   c. Administer IV fluids, blood components, or vasopressors as ordered to maintain vascular volume and adequate perfusion of the engrafted organ. Specific goal mean arterial pressure (MAP) differs with various types of transplants. The literature reports goal MAPs form 60 to 75 mm Hg.

4. Desired outcome: normal graft function demonstrated by normalisation of organ function, and normal mental status.

B. Potential for infection

1. Problem: Patients who have undergone organ transplantation must be given immunosuppressive medications to prevent graft rejection, but the most serious adverse effect of these drugs is potential for infection additional risks for infection are associated with the surgical procedure administration of anesthetic agents, and invasive therapy (eg, Foley catheters, central venous catheters) required to ensure recovery.

2. Etiology: Patients undergoing organ transplantation are prone to infection due to immunosuppressive medications used to prevent rejection, exposure to nosocomial infections in the intensive care unit (ICU), and many breaks in the barrier defense (ie, during operative

procedure; with IV lines, catheters, and drains). The administration of broad-spectrum antibiotics kills undesirable microbes but also destroys normal flora and encourages the growth of resistant microorganisms.

3. Interventions

   a. Protect from environmental infection risks (eg, sterile technique; avoid assignments with patients having resistant infections; clean multipatient equipment prior to use).

   b. Maintain meticulous hygiene of the patient (including dental care, frequent cleansing, and sheet changes).

   c. Consider carefully the need for invasive lines, realizing infection risks.

   d. Avoid unnecessary invasive procedures such as intramuscular injections or nasogastric tubes. Attempt to maintain barrier defense whenever possible.

   e. Measure body temperature at least once every 2 to 4 hours Hyperthermia may be the only symptom of infection in the immunosuppressed patient.

   f. Implement institutional “Immunosuppressive precautions,” such as daily dressing changes, use antimicrobial soap, or other unique measures.

   g. Obtain body fluid cultures as ordered with febrile episodes or as a surveillance measure.

   h. Administer antibiotics as ordered and monitor medication levels, reporting new fevers or abnormal serum antibiotic levels.

4. Desired outcome

   a. Patient is afebrile

   b. No cultures positive for microbes.

   c. Normal leukocyte count and differential.

   d. No wound drainage.

C. Alteration in comfort, postoperative pain

1. Problem: Most solid organ transplants (kidney, kidney-pancreas, pancreas, liver, heart, lung, and heart-lung) require a major surgical procedure involving resection and anastomosis of the engrafted organ. Most patients require a large chest or abdominal incision that produces considerable postoperative discomfort.

2. Etiology: Pain is caused by extensive tissue damage required during the surgical procedure and is enhanced with immobility during a prolonged surgical procedure. Intensive care routines (eg, weights, dressing changes), pulmonary hygiene measures, and in-dwelling lines exacerbate this discomfort.

3. Interventions

   a. Assess patient's perception of comfort at least every shift using a quantitative scale that reflects when the discomfort is worse or relieved by interventions (eg, visual analog scales).

   b. Administer pain and sedating medications to relax the patient and to decrease oxygen consumption, which may contribute to cellular hypoxia.

   c. Premedicate the patient with analgesics prior to coughing and deep breathing or early ambulation.

   d. Monitor for common adverse effects of analgesics (especially opiates); hypoventilation, excessive sleepiness, hallucinations confusion, constipation, urinary retention, nausea, headache, lower diastolic blood pressure, or itching.

   e. Augment pharmacologic agents with other comfort measures such as positioning, pillows, or relaxation exercises.

4. Desired outcome

   a. Patient denies discomfort.

b. Patient verbalizes relief of discomfort with ordered analgesics.

c. Absence of analgesic adverse effects.

d. Patient is able to perform mobility and breathing exercises as required.

D. Potential alteration in gas exchange

1. Problem: Patients undergoing transplantaing often require assistance with ventilation and oxygenation.

2. Etiology: Prolonged anesthesia, which is common with some transplant surgeries, reduced independent ventilation and decreases vital capacity, which can impair gas exchange. Many patients also have complex postoperative courses with large chest or abdominal incisions and limited physical activity, which contribute to this problem and therefore compromise gas exchange. Last, immunosuppressive therapy administered to patients to prevent graft rejection predisposes patients to the risk of infectious lung processes when hypoventilation and atelectasis occur.

3. Interventions.

a. Place patient in high Fowler's or reverse Trendelenurg's position to provide maximal ventilation and oxygenation.

b. Encourage coughing and deep breathing postoperatively.

c. Early ambulation posttransplant.

d. Assess respiratory rate, quality, and breath sounds frequently in the early posttransplant period.

e. Monitor fluid status and cardiovascular tolerance to fluids to assess for hypervolemia or heart failure, which contributed to altered oxygenation.

f. Assess arterial blood gases, oxygen saturation, and capnography as needed for indications of respiratory decompensation.

g. Assess and manage pain to promote maximal respiratory effort and mimimal medication-induced respiratory suppression.

h. Assess sputum, breath sounds, and sputum cultures as ordered.

i. Monitor sputum, breath sounds and temperature for evidence of pulmonary infections.

j. Change respiratory care equipment daily to prevent infection.

k. Turn patient every 2 to 4 hours to ensure adequate ventilation and circulation throughout both lungs.

4. Desired outcome

a. Arterial oxygen saturation (Sao_2) greater than 90%

b. Arterial oxygen tension (pao_2) is greater than 60mmHg by arterial blood gas analysis.

c. Patient is afebrile.

d. Patient has minimal clear sputum.

e. Patient's chest x-ray is clear, without infiltrates.

E. Altered skin integrity

1. Problem: Patients undergoing transplantation have prolonged illnesses and recovery periods that alter mobility and nutrition, both of which influence skin integrity. Altered resistance to infection form immuno suppressant medication also contributes to the risk of altered skin integrity and its subsequent infectious complications.

2. Etiology: The etiologies of altered skin integrity cover a broad range of problems related to critical illness and the transplant process itself. Surgical wounds are often large, inolve several major muscle groups (except routine kidney transplant), and are accompanied by multiple drains that may cause skin excoriation: more subtle causes include coexisting immune suppression. Multiple Intraveinous lines and catheters are necessary for immediate postoperative care and monitoring, but they contribute to

the problem of altered skin integrity. The prolonged recuperative period for most patients may predispose them to immobility or altered nutrition, which inhibits wound healing and increases risk of intraoperative or incisional infection.

3. Interventions

   a. Assess skin every shift for breaks in integrity, evidence of pressure, or poor wound healing. Attempt to observe catheter sites every shift.

   b. Administer skin lotion to maintain skin integrity.

   c. Change sterile dressings daily. Be certain that wound drains do not leak on the skin.

   d. Use paper tape, hypoallergenic tape, Duoderm (ConvaTec, Bristol Mayers-Squibb, Princeton, NJ), or other skin preparation products if necessary to prevent skin breakdown.

   e. Perform passive or active range of motion to enhance circulation and joint mobility.

   f. Perform assessment and cultures of every catheter site, wound, break in skin integrity, and orifice with temperature spike.

   g. Attempt to keep all skin surfaces clean and dry. Moist, dark areas are likely to enhance microbial growth. Fungal skin infections are common in the immunocompromised host.

   h. Use topical antimicrobial agents as ordered for skin infections. Recognize that skin excoriations may be infectious in nature, and if ordered, use antifungal powder in skin folds.

   i. If the patient is immobilized for an extended period of time, obtain splints of extremities to prevent contractures.

4. Desired outcome

   a. Wound heals without complications (infection, dehiscence, and evisceration).

   b. No pressure breakdown areas occur.

   c. No evidence of infection at suture site or invasive IV lines and catheters.

F. Altered nutrition, less than requirements

1. Problem: The prolonged hospitalization and recovery process in tramsplantation frequently interferes with adequate nutrition.

2. Etiology: During transplantation, a long surgical procedure, prolonged recovery period, disruptions in barrier integrity and immunosuppression contribute to a clinical situation in which the patient is unable to meet his or her metabolic demands. Even with initial parententeral supplementation, followed by enteral supplementation caloric and nutrient needs often are not fully met during the posttransplant period. Complications in this time period accentuate this problem.

3. Interventions.

   a. Maintain intake and output records at least every shift.

   b. Weigh daily.

   c. Obtain nutrition consultation on all transplant patients.

   d. As diet progresses, monitor calorie counts and nutrition intake.

   e. Encourage vitamin supplementaion as the patient’s condition improves

4. Desired outcome

   a. Patient shows a less than 10% weight loss in the immediate post transplant period.

   b. Maintain a caloric intake matching the assessed needs

4.0 CONCLUSION

For organ transplantation to be successful, all things being equal, adequate preparation of donor and recipient must be made by all health workers involved or else it will be a labour in futility and a waste of resources. It is important that all parties involved must be knowledgeable and active participants in the care of these special cases so that good result can be attained.

5.0 SUMMARY

The learners have gone through the following in this unit, i.e. the meaning of organ transplantation, types of grafts and organ transplants for matching donor and recipient, organ transplant immunology and nursing process of management of patient undergoing organ transplantation. I believe that you have learnt quite a lot and that the knowledge will improve your nursing care of patients undergoing organ transplantation. You will learn further in the next unit that deals with specific organ transplantation and their management.

6.0 TUTOR-MARKED ASSIGNMENT

Discuss special precautions needed in the management of patient undergoing organ transplant.

7.0 REFERENCES/FURTHER READING

Civetta, Y. M, Yaylor, R. W and Kirby, R. R. (1988). *Critical Care.* Philadelphic: Y. P. Lippincott Company

Hebra, J. and dKuhn, M. A. (1996). *Manual of Critical Care Nursing*, New York: Little, Brown and Company

UNIT 3 PATIENTS UNDERGOING TRANSPLANTATION II

C**ONTENTS**

1.0 INTRODUCTION

This unit is a continuation of the previous unit that looked at the patients undergoing organ transplantation. In the previous unit, we looked at the concept of organ transplantation, types of grafts and organ transplantation critical for donor and recipient, organ process of patients undergoing organ transplantation.

This unit will look into specific cases of organ transplantation such as the heart, liver, lung, and kidney-pancreas, bone marrow and immunosuppressive agents. Happy reading

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- list at least four organs that can be transplanted
- discuss the nursing care of patients undergoing heart, lung, liver, and kidney-pancreas or bone narrow transplantation
- explain the relevance of immuno suppressive agents.

3.0 MAIN CONTENT

3.1 Nursing process: Overview

A. Heart transplantation

B. Lung transplantation

C. Liver transplantation

D. Kidney-pancreas transplantation

E. Bone marrow transplantation

F. Immunosuppressive agents

3.1.1 Heart Transplantation

Table 7 Heart Transplantation

Feature		Specifics
Indication		End-stage heart disease from an irreversible weakened or damaged cardiac muscle (eg, cardiomyopathy, myocarditis, valve disease, coronary artery disease, congenital heart disease).
Eligibility	1.	Age <65 years always a clean age cutoff
	2.	Expected survival <1 year
	3.	Complaint, well motivated individual
	4.	Heart failure: NYHA classifications.
	a.	class III-marked physical limitation due to cardiac symptoms with less than ordinary activity
	b.	Class IV-symptoms of chronic heart failure rest

5. Inoperable coronary artery disease with intractable anginal symptoms

6. Malignant ventricular arrhymias unresponsive to medical or surgical treatment.

Contraindication

1. Pulmonary infarction within the past 8 week

2. Severe pulmonary hypertension with fixed pulmonary vascular resistant >6-10 U.

3. Significant functional impairment of other organs that is not reversible (e.g coagulation abnormalities).

4. Alcohol/drug abuse, mental illness, or inability to stop smoking.

i. orthoptic

a. Most common

b. Donor's heart is anastomosed to remnant left and right artial cuffs following removal of the diseased heart.

Process

2. Denervation-normal heart function controlled by the autonomic nervous system

a. Denervation of heart causes absence of parasympathetic stimulation; therefore, patient has faster resting heart rate in the event that a patient develops bradycardia, give isoproterenol or epineperine, not atropine, which acts on parasympathetic nerves.

b. Denervation hearts are slower to respond to exercise, requiring longer warm-up and cool–down periods

c. Orthostatic changes are common secondary to venous pooling, causing a sudden loss of preload and the heart's inability to produce a compensatory tachycardia.

d. Denervated hearts not respond to Valsalva maneuvers such as carotid message

e. Orthotopic transplant patient often have two P waves, but conduction from the recipient's atria stop at the suture line.

Early complications

Acute rejection	Sign/symptoms
Treatment:	1. Fever
Immunosuppressive	2. Dysrhythmias
Therapy	3. Crackles auscultated in lungs
	4. Elevated jugular venous pulsations
	5. Increased pulmonary vascular resistance
	6. Elevated right atrial or pulmonary artery pressure: increased systemic vascular resisitance, low cardiac output
	7. Gallop, murmur, or muffled heart sounds

8. Peripheral oedema
9. Decreased urine output
10. Hypotension
11. Syncope
12. Decreased exercise intolerance
13. Malaise
14. Shortness of breath
15. Dyspnea

Decreased cardiac Output secondary to Transient myocardial

Sign/symptoms

1. Dysrhythmias
2. Signs and symptoms of inadequate cardiac output hypotension, oliguria, weak thready dysfunction and heart pulses, cool extremities, cyanosis, denervation dyspnea
3. Signs and symptoms of heart failure-dyspnea, crackles

Treatment:

fluid retention weight gain increase supportive therapy right, arterial pressure, increased pulmonary artery pressures decreased cardiac to enhance output increased jugular venous myocardial function hepatomegaly, gallops and murmurs on cardiac auscultation

Surgical Compilations Treatment:

Sign/symptoms

1. Cardiac tamponade
2. Coagulopathies

Symptomatic	3.	Intraoperative or postorative myocardial infarction
Support	4.	Low cardiac output shock
Contraindications	1.	Atherosclerotic heart disease
	2.	Irreversible renal or hepatic failure
	3.	Recent history (past 6 months) of current drug or alcohol
	4.	Insulin dependent diabetes with end-organ damage
	5.	Cigarette smoking within 6 months
	6.	Active human immunodeficiency virus infection or hepatitis B or hepatitis C infection
	7.	History of metastasizing malignancy
	8.	Prior thoracic surgery (some centers)
	9.	Severe pleural adhesions or fibrosis that would hinder lung secretion.

3.1.2 Lung Transplantation

Process	1.	Single lung transplant –chronic obstructive lung disease restrictive lung diseases pulmonary hypertension
		a. Double-lumen endotracheal tube is utilized for unilateral independent lung ventilation

b. Posterolateral thoracotomy incision is performed, and fifth rib is removed

2. Double-lung transplants- chronic obstructive lung disease septic lung disease, or generalized bronchiectasis (including cystic fibrosis), pulmonary hypertension

   a. Have evolved to be similar to single lung transplants using contralentent lung ventilation.

   b. Anterior transverse thoracostermotomy incision is performed.

3. Heart-lung transplant – in conditions where heart failure is not expected to resolve with transplantation of lungs only.

   a. Intussusception of donor bronchi into recipient, bronchi with overlap of one to two cartilaginous rings. This reduces ischemia of the anastamosis.

Early complications

Acute rejection	Signs/symptoms
Treatment	1. Low grade fever. (>99.4^{0}F)
Immunosuppressive	2. General Malaise
Therapy	3. Tachycardia

4. Shortness of breath, dyspnea on exertion
5. Cough
6. SaO_2 diminished from baseline, particularly with exercises (>3%)
7. Decreased $Pa0_2$ or increased $Pa0_2$
8. 10% decrease in FVC and FEV_1
9. Perihilar infiltrate on chest x-ray
10. Slight increase in WBC count

Surgical complications

Treatment: based on	Signs/symptoms
Presenting	1. Bleeding at anastomotic site
Complication	2. Pulmonary hypertension
	3. Atelectasis
	4. Pneumonia
Early complications (cont.)	Often the organ is transferred from virus infection is common in this infection of the graft transplant, if cytomegalo virus status
treatment: antimicrobia therapy	has not been used as transplant criteria; infection and rejection symptoms are difficult to distinguish in lung transplants signs/symptoms are difficult to distinguish in lung transplant

Sign/symptoms

1. Breath sounds on auscultation reveal coarse sounds gurgles, crackles, and wheezes.
2. Decrease Pa02 rspiratory acidosis
3. Persistent pulmonary edema
4. Fever
5. Decrease FVC FEV
6. increased pulmonary artery pressures
7. alteration in sputum quantity, color, or odor

Bleeding Signs/symptoms

Treatment: positive

Pressure ventilation,

Blood component

Therapy

1. Hemoptosis
2. Crackles on auscultaton
3. Patchy pulmonary infiltrates on x-ray
4. Hypoxemia

Late complications

Chronic rejection

Treatment:

Immunosuppression

Symptoms same as for acute rejection, but develop more

Bronchiolitis oliterations may occur as a late complication associated with chronic-characterized

by a fibrotic inflammatory process causing progressive reduction in pulmonary compliances and vital capacity.

Lymphoroliferative disease

Treatment

Antineoplatics therapy

discharge/home health

Signs/symptoms

1. Lymphademopathy
2. Extreme luekocytosis, including WBC blasts
3. Multisystem organ dysfunction

1. Large wound may require complex home care; surgical clips are removed about 4 week postop
2. Signs and symptoms of rejection should be reported to coordinator as early as possible
   a. Activity should be gradually increased
   b. Ambulation of approximately one mile/day, while maintaining an oxygen saturation above 90% is the goal for second to third postoperative week.
   c. Patient must use a hand hled spirometer to measure PVC and FEV result recorded daily, if pulmonary function decreases by >10%, the coordinator should be notified.
   d. Lung function is monitored periodically (about every 3 months) through pulmonary function laboratory spirometer tests.
   e. Periodic bronchial biopsies via

bronchoscopy to assess for rejection.

3. Patients are referred to a pulmonary rehabilitating program that requires gradual increase in aerobic exercise about three time a week for about 3 months after transplant, likely to include walking, bicycling, upper body emgometer, and physical therapy for strengthening

4. Follow-up laboratory testing includes, once, twice or thrice weekly chemistry and complete blood count.

3.1.3 Liver transplantation

Indication	end-stage liver disease, such as Budd-Chiari syndrome, primary biliary cirrhosis, sclerosing, cholangitis, alcohol-related cirrhosis, chronic active hepatitis, or isolated hepatoma
Eligibility	1. End-stage liver disease (alcohol related, metabolic disturbance, hepatitis) 2. < 1 year expected survival 3. Age 1-70 years 4. Hepatoma without metastas 5. Evidence of alcohol rehabilitation 6. Bilirubin concentrations > 10mg/dL, serum albumin <2.5 mg/dL, and prothronbin time. 5 second beyond control

7. Recurrent variceal bleeding despite sclerotherapy

8. Ascites refractory to medical therapy

Contraindications

1. Active infections such as human immunodeficiency virus

2. Severe cardiopulmonary dsfunction

3. Advanced chronic renal insufficiency due to hepatic disease

4. Any active extrahepatic malignancies.

Process

1. Orthotropic liver transplantation-diseased liver is removed and replaced with the donor liver

2. Heterotoic liver transplantation-disease liver remains in place and the donated liver is grafted in place (performed less often)

3. Two types of biliary anastomoses

   a. Choledochodedunotomy-prefered method of donor common duct anastomosis to recipient common duct.

   b. Roux-en Y choledochojejunostomy -used when the common bile ducts is diseased, involved donor common bile duct being

anastomosed to the recipient's jejunum.

4. Cadaver livers are partially resected for small-framed recipients and children

5. Living related donor "cut – down livers' are used to children or others as a last effort at transplantation.

Early complication

Acute rejection

Signs/symptoms

Treatment:

1. Hypotension after Immunosuppressive Diastolic and mean arterial pressures will be low

Agents

2 Fever or prolonged postoperative hypothermia

3. Decreased bile drainage or very light or dark muddy-colored bile drainage.

4. Serum albumin 2 mg/dL more than 72 hours postoperatively

5. Clay colored stools following T-tube internalization

6. Increased serum bilirubin and hepatic transaminases

7. Right upper quadrant tenderness or pain.

Early Complications

8. Dark tea-colored urine secondary to increased urinary bilirubin

9. Sudden, severe hyperglycemia or hypoglycemia more than 72 hours postoperatively

10. Fatigue

11. Uncorrectable coagulopathies (despite continuous replacement therapy, vitamin K supplementation) with or without overt bleeding

Surgical complications

Sign/symptoms

Treatment: correct

1. Hypothemia beyond

   Underlying cause actual signal rejection; may be related to transfunction therapy in operating room

2. Pulmonary insufficiency or difficulty in discontinuation of mechanical ventilation-problem worsened if liver tenderness, ascites, or other sign of acute rejection are present

Clothing abnormalities

Sign/symptoms

Treatment: support of

1. Over bleeding

Coagulation until normal clotting returns

2. Occult blood in stool, urine, emesis/nasogastric drainage

3. Petechiae

4. Easy bruising

5. Gum bleeding (oozing)

6. Inability to achieve hemostasis after injury or break in \ barrier (Eg, venipuncture)

7. Bleeding around existing lines or old puncture sites

	8.	Flank/back mottling and tightness signal bleeding from anastomosis
Electrolyte and acid	Sign/symptoms	
Base abnormalities	1.	Initial hyperglycemia should resolve within 72 hours
Treatment: parenteral	2	Early postoperative periods shows hypokalemia, but for electrolyte normalizes in 24-72 hours
Support		
Disturbance	3.	Alkalosis both respiratory and metabolic
Renal insufficiency	Sign/symptoms	
From increased	1.	Oliguria
Hepatorenal pressure	2.	Concentrated urine with elevated urinary biliruin
Treatment: maintain	3.	Increased blood urea nitrogen and creatinine
Renal perfusion and	4.	Altered clearance of medications-antibiotics, sedatives,
Minimize renal insults		narcotics, neuromuscular blocking agents
Hypotension from	Signs/symptoms	
Vasodilation related	1.	Low diastolic BP
to abnormal liver function	3.	Full, bounding pulses
Treatment: Provide IV		
Fluids and vasopressor		
Agents to support		
Perfusion pressure		

Infection of the graft	Sign/symptoms
Treatment:	1. Fever
Antimicrobial therapy	2. Worsening coagulopatheis
	3. Uncontrollable hypoglycemia or hyperglycemia
Late complications	
Chronic rejection	Sign/symptoms
Treatment:	1. Persistent Jaundice
Immunosuppressive	2. Somnolence, confusion, coma, seizures, asterixis, or other symptoms ammonia levels.
	3. Elevated serum ammmonial levels
	4. Fluid retention (especially ascites)
	5. Persistent leural effusions
	6. Hepatorenal syndrome is the progressive renal failure that occurs simultaneously with worsening hepatic function
	7. Persistent respiratory and metabolic alkalosis GVHD manifests as nausea, vomiting diarrhea.
GVHD	Donor immunocompetent T lymphocytes accompany the donor liver and recognize the recipients tissues as foreign
Immunosuppressive	These cells attempt to destroy the self tissues. Most frequently targeted organs in this syndrome of liver transplantation are the Gl tract, skin, and lungs

Sign/symptoms	1. Frequently watery diarrhea, clay colored foul odour of stools are common manifestations. 2. Enlarged and tender liver but may be mistaken for others complications. 3. Skin thickened, pruritic, loses ability to sweat, likely too become infected.
Lymphoroliferative Disorders Treatment: Antineopatics therapy	Sign/symptoms 1. Lymphadenopathy 2. Extreme leukocytosis, including WBC blasts 3. Multisystem organ dysfunction
Discharge/home health	1. Multiple wound sites may require Complex dressing changes 2. Arrange for home care nurses to assist wound care 3. Teach patient and family T-tube care until internalization completed 4. Alert patient and family to sign and symptom of rejection 5. Immunosuppressioin is for life

3.1.4 Kidney-Panereas Transplantation

Indications	1. End-stage pancreatic disease or trauma resulting in insulin-dependent diabetes

	2.	Chronic renal failure with evidence of others system involvement
Eligibility	1.	Insulin-dependent diabetes
	2.	Complications of diabetes are more serious than risk of surgery an immunosuppression
	3.	Nepropathy (for combined pancrease kidney transplant)
	4.	Uncontrolled hyperglycemia
	5.	Severe neuropathy.
Contraindication	1.	Presence of penetrating abdominal wounds
	2.	Burns > 15% of body
	3.	Hypertension (unless in the presence of end stage renal disease)
	4.	History of human immunodeficiency virus infections or metastasizing malignancy
	5.	Severe incapacitating neuropathesis (eg, especially autonomic neuropathies causing dysrhythmias)
	6.	Inoperable peripheral vascular or cardiovascular disease
Process	1.	Kidney-pancreases transplantation
		a. Most common type of pancreas transplant

b. Both organs come from the same donor, or a kidney is transplanted within 6 months to a year following the pancreas transplant

c. Islet cells are implanted through the portal vein of the patient.

d. Problems include isolation of enough islet cells and greater risk of infectious complications in patients receiving immunosuppressive therapy from an earlier kidney transplant.

3. Segmental pancreas transplantation

a. Living related donor provides the segmental pancreas

b. Remains under investigation regarding risk/benefit ratio

4. Whole-organ pancreas transplantation

a. Indicated for nouremic diabetes who have not peevishly received a kidney transplant

b. Remains under investigation regarding risk/benefit ratio

5. The donor kidney is transplanted into the left iliac

fossa and anastomosed to the recipient's bladder

6. The donor pancreas is transplanted into the right iliac fossa and anastomosed via the pancreaticoduodenocytotomy approach; therefore, the exocrine secretion drains through the bladder. The existing pancreas of the host continues other exocrine functions via the Gastro lntestinal Tract.

Early complications

Acute rejection

Treatment:

Immunosuppressive

Agents

Signs/symptoms: renal

1. Increased creatinine
2. Increased blood urea nitrogen
3. Decreased urinary output
4. Hypertension
5. Increased weight
6. Graft tenderness
7. Fever
8. Coagulopathesis

Signs/symptoms: pancreatic

i. Decreased urinary amylase (precedes glucose changes)

ii. Graft tenderness

iii. Hyperglycemia

iv. Fever

Surgical complications Treatment:	1.	Pancreatic due to surgical manipulation; manifested specific to by epigastric discomfort, increased serum amylase and lipase, problem clay-colored stools, fatty-food intolerances
	2.	Dehydration due to hyperglycemic osmotic diuresis postoperatively until glucose normalizes
Infection of the graft Treatment Antimicrobial therapy	1.	Nephritis heralded by flank or back discomfort, tenderness at incision site, fever
	2.	Urinary tract infection (eg, urethritis, cystitis) common occurrence with symptoms such as urinary urgency, urinary frequency, dysuria, hematuria

Graft thrombosis Occlusion of graft vessel leads to acute graft pain, signs
Treatment: increase and symptoms of acute abdominal event, oliguria circulating blood hematuria volume or administer renal dose dopamine to increase glomerualr filtration rate

Late complications

Chronic rejection	Signs/symptoms	
Treatment:	1.	Elevated temperature
Immunosuppressive	2.	Weight gain of 2-3 1b/d
Agents	3	Hypertension
	4.	Pain and tenderness over graft site
	5.	Hyperglycemia

lymphoroliferative disroder	Sign/symptoms
	1. Lymphadenopathy
treatment:	2. Extreme leukocytodid, including WBC blasts
antineoplastics agents	3. Multisystem organ dysfunction
discharge/home health	1. Return to normal diabetic precautions, because although hyperglycemia may be resolved with transplant, other effects of disease may still manifest.
	2. Advise patient to continue testing blood sugars several times a day for months after transplant; hyperglycemia may be an early symptoms of rejection. If blood sugars are > 200 mg/dL, patient is advised t call the health care team
	3. Immunsuppressive may be for life, although doses are tapered dramatically after several months without rejection symptoms
	4. Patient should self-monitor for fluid retention and limit fluid intake if necessary
	5. Advise patient to take bicarbonate tablets as ordered as replacement for normal kidney buffering.

3.1.5 Bone Marrow Transplantation

Definition	Administration of very high dose of Chemotherapy resulting in severe myelosuppression, which

requires bone marrow transplantation as a rescue measure

Types

1. Autologus
    a. Bone marrow that is ‘self donated”
    b. Only performed for malignant diseases while the patent is in remission
    c. Diseases include lymphomas and solid tumors such as Ewing’s sarcoma and Hodgkin’s disease
    d. Often performed with progenitor cells, which are generated by high dose chemotherapy and obtained from the patient via pheresis prior to the bone marrow transplant.
    e. some center purge the marrow, i.e. treat it with chemotherapy prior to retransplantation
    f. Dose not require HLA typng or mixed lymphocyte culture.
2. Alloferic-bone marrow that is donated from another living donor.
    a. requires HLA typing and mixed lymophcyte culture

b. Does not require ABO compatibility but is preferred

c. May be from either a related or unrelated donor

d. Performed for malignant and nonmalignant disorders such as acute myelogenous leukemia, acute lymphocytic leukemia, chronic myelogenous leukemia, aplastic anemia, myelodysplatic syndrome or multiple myoloma

3. Syngenei

a. bone marrow donated from a living identical twin

b. Usually allows for the closet match regarding HLA typing and mixed lymphocyte culture the type of bone marrow transplantation chosen depends on the type and extent of disease, HLA matching donation criteria availability, as well the donor meeting donations criteria

Indications

1. Hematologic malighancies-leukemai, lymphoma, multiple myloma, Ewing sarcoma

2. Nonhematologic malignant (solid tumors) such as breast,

	small cell lung cancer, ovarian and childhood brain tumor testicular. 3. Metabolic and genetic disorder such as severe combined immune deficiency syndrome, aplastic anemia
Eligibility	1. Defined indicator 2. Patient must be in remission 3. Adequate financial and social resources 4. Good organ function
Contraindication	1. Elevated creatinine 2. Decreased pulmonary function tests 3. Decreased myocardia ejection fraction 4. Age > 65years 5. Increased transaminases 6. Contraindications are variable secondary to research protocols.
Process	Autologus marrow transplantation for certain malignancies, a theorized dose responses relation states that very high dose therapy will ablate the malignancy. During the life threatening myeosuppress, the bone marrow is infused IV and seeds throughout the patient's body. This provides the patient with functioning bone marrow cells. The patient is required to be in remission for the bone marrow transplants. The most

frequent chemotherapeutic agents used are alkylating agents.

1. A double-lumen permanent venous access devices (VAD), eg. Hickman is placed

2. The patient receives high dose chemotherapy and marrow stimulating factors followed by pheresis of circulating marrow stem cells if indicated

3. Bone marrow harvest is performed

4. Bone marrow cells are purged and treated to destroy malignant cells if indicated.

5. High dose chemotherapy and or TBI are administered

6. On day 0 the patient is reinfused with the bone marrow

7. The patient waits for the WBC count to return (>1000) with an ANC > 500 cells/mm^3)

Allogenieic marrow transplant

This transplant requires total destruction of the host marrow with high dose chemotherapy and/or radiation therapy and is followed with infusion of marrow that has been harvested from another persons (the donor) during an operative procedure. The infused marrow migrates to the host bone marrow and engrafts

1. One marrow harvest and placement of a double lumen Hickman

2. High dose chemotherapy (TBI is indicated)

3. Bone marrow is purged from donor

4. High-dose chemotherapy is administered

5. On day 0 bone marrow reinfusion performed

6. Patient waits for the WBC count to return (> 1000 wit an ANC > 500 cells /mm^3). Rationale; During the bone marrow transplant, the primary concern is engraftment of the bone marrow cells and prevention of infection.

Early complications

Acute rejection: acute

GVHD

1. Occurs primarily in allogeneic transplant, especially unrelated transplant is minimal with syngenic transplant

Treatment:

2. Definition: T lymphocytes from donor bone marrow recognize nonself surface antigens on various organs (frequently skin), GL tract, liver in the recipient and mount an immune destruction of those organs. Acute GVHD occurs within the first 100 days following bone marrow transplant

3. Sign/symptoms

   a. Maculopapular rash varying in involvement from <25% of body to generalized erythroderma with bullous formation and desquasmation; rash often begins on soles of feet arms, shoulder, or trunk

   b. GVHD of the liver appears as an elevated alkaline phosphate, elevated bilirubin jaundice, hepatomegaly, right upper quadrant tenderness.

   c. GHVD of the intestinal tract usually include diarrhea >500 mL/d severe abdominal pain with or without paralytic ilues Gl bleeding, and negative stool cultures

4. Diagnosis-skin, liver, or Gl tract biopsy are definitive diagnostic tools

5. Treatment-immunosuppressives

1. Severe muscosa erosion is most severe on day 5-15 and is due to antineoplatic chemotherapy, radiotherapy, and some immunosuppressive regimens (antimetabolites) given to prevent rejection

2. Mucosal erosion may be severe (causing hemorrhage) and continuous within mouth to anus.

3. Oral superinfectios can occur unless meticulous mouth care practiced and prophylactic antimicrobials are given

hemorrhage

Treatment: blood components

1. Bone marrow suppression affects platelets almost immediately
2. Low platelet count exacerbates bleeding symptoms support tendency from mucositis or GVHD.
3. Hepatic disease (GHVD or VOD) exacerbates tendency to bleed.
4. Signs and symptoms occult or overt bleeding abnormal platelet count, and coagulation tests
5. Diagnosis: clinical symptoms and laboratory tests

hepatic VOD

1. Definition: fibrous granulation of vessels in the liver as a consequence of antieoplastic chemotherapy and radiation therapy causes comprised circulation through the liver and portal hypertension
2. Sign/symptoms
   a. Onset is between days 8 and 15 postranspalnt. May be later autologous bone transplant, and may earlier if patient heavily pretreated with alkalating agents

b. First symptoms usually right upper quadrant abdominal tenderness with hepatomegaly

c. Fluid retention and weight gain also occur early

d. Differentiated from GHVD of liver by the fact that isolated hyperbilirubinemia occurs first and transaminase elevation does not occur until later

3. Diagnosis: liver biopsy cofirm clinical suspicion

Failure to engraft

1. Definition: If engraftment with bone marrow recovery has not occurred by approximately 6-10 weeks depends on institutional norm that is based on conditioning drugs used and method of preparing marrow prior to reinfusion): failure to engraft bone marrow result in functional aplastic anemia

2. Sign/symptoms of anemia, bleeding and infections

3. Diagnosis-bone marrow biopsy

4. Treatment

a. Marrow stimulation with synthetic erythroprotein to enhance RBC growth; granulocyte colony stimulating factor (filgrastim) to hence

		WBC growth; and folate, B_{12}, steroids to enhance platelets growth
		b. Supportive care with blood component transfusions
		c. If autologus marrow transplant, a backup marrow has usually been frozen but not treated as extensively; reinfusion of back up marrow may have increased risk of malignancy recurrence d. Another matched transplant is performed as soon as possible; if none is available, HLA unmatched transplant may be performed.
Late complication	1.	Process similar to acute disease but produces collagen substance with fibrosis
Chronic GVHD	2.	Organs involved usually include skin, Gl tract, and liver
		a. Chronic thickened skin, poor sweating, tearing or other normal excretions
		b. Diarrhea with or without Gl bleeding may occur
		c. Elevated transaminases occur to signal liver involvement

3. Bronchiolitis obliterans if set in after transplantation is thought to be manifestation of chronic GVHD of lung

   a. Obstructive symptoms on pulmonary function test (decreed functional residual capacity, increased diffusion lung capacity of $C0_2$)

   b. Pulmonary hypertension may accompany respiratory symptoms

   c. Rapidly progressive lung failure occurs despite corticosteroid therapy

Discharge/home health Considerations

1. Most patients do not have normal immune function despite return of WBC count; infectious prevention precautions are essential

2. Blood product support is often required for several months after discharge

3. All immune memory is eliminated with allogeneic bone marrow transplant; patient must later (after 2 years) be reimmunized against childhood illness, hepatitis, and puenmoccus; therefore, patient should avoid exposure during that time period

4. After allergenic bone marrow transplant, a second drop in

blood count occurs between days 50 and 70

5. Immunosuppressive agents will be tapered and discontinued after several years without rejection symptoms

6. Frequent blood counts, chemistry test, and bone marrow biopsies are performed to evaluate success of the BMT and adequate of engrafted marrow

3.1.6 Immunosuppressive Agents

Agents	Actions	Nursing implications
Anti inflammatory drugs steroid: prednisone, predindolon methylpredindolone	Stabilizes cell membranes, suppressing monocytics activity, therapy decreasing sensisitivity of host to reducing lymphocyte sensitization slows T-lymphotic recognition of foreign tissue (e.g transplanted organ, malignant cells) used in prevention and treatment of rejection	General Infection prevention precautions special wound assessment and care with sterile dressing changes assessment for wound healing complications-poor approximation, dehiscence evisceration. Frequent temperature monitoring assesses blood glucose levels and administer insulin as ordered. Limit sodium and fluid intake, retention becomes problematic, frequent weight, central venous pressures, and intake/output measurements to detect fluid retention. Administer histamine H_2 blocker agents or sucralfat as ordered to prevent gastric ulceration. Administer oral doses with food or milk. Discuss possible increase in facial and body hair, advise patient that this may decrease as the dose is reduced Provide meticulous skin care, especially of the face; advise patient that acne occurs due to increased activity of the surface glands in the skin: common sites are the face and back. Provide frequent bathing if increased sweating occurs.

		Long-term use Advise patient of anticipated change in body image-hair growth, acne, sweating tendency, changes in fat distribution, edema Monitor appetite and dietary intake to avoid excessive weight gain from steroid use; referral to nutrition consult may be advisable Supplement calcium to counteract osteoporosis Encourage mobility to reduce long term risk of osteoporosis Assess visual acuity periodically for cataract formation.

4.0 CONCLUSION

A vast number of patients have benefitted from various organ transplations. All the health personnel involved must be keenly interested in what they are doing and be extremely skillful so that more successes can be achieved in this direction. No doubt organ transplantation is a breakthrough today in health sector.

5.0 SUMMARY

In this unit, we have studied some specific cases of organ transplantations such as heart, liver, lung, kidney, pancreas and bone marrow; we also looked at immunosuppressive agents that can either make or mar the success of organ transplantation if not used skillfully. I do hope that the knowledge acquired in the last two units will improve your nursing management of patients.

6.0 TUTOR-MARKED ASSIGNMENT

What is the relevance of immunosuppressive agents in the management of organ transplant patients?

7.0 REFERENCE/FURTHER READING

Danovitch G. (1992). *Handbook of Kidney Transplantation,* Boston: Little Brown,. P. 324.