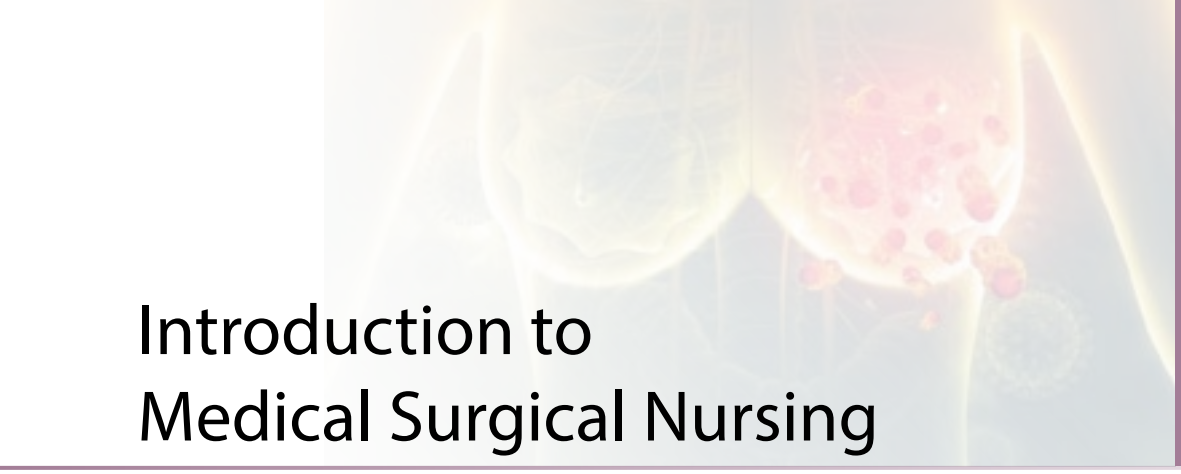


Introduction to Medical Surgical Nursing

1

CHAPTER

Learning Objectives

After studying this chapter, the students will be able to:

- Summarize the history of Medical Surgical Nursing.
- Discuss the trends in Medical Surgical Nursing.
- Describe the concepts of innate immunity and acquired immunity.
- Explain the differences between active and passive immunity.
- Discuss the concept and dimensions of health.
- Explain the theories related to disease condition.
- Integrate the levels of prevention.
- Enumerate the different health care models.
- Role of nurse in medical surgical settings.
- Elaborate the basics of medical surgical asepsis.
- Extend the concept of inflammation and infection.
- Classify wound healing and its phases.
- Focus on nursing action for wound care.
- Explain the nursing intervention in care of surgical patient.

Chapter Outline

- Introduction
- Evolution and Trends of Medical and Surgical Nursing
- Telehealth and Chatbot Facilities for Easy Access to Patient Care
- Concept of Health and Disease
- International Classification of Diseases (ICD)
- Concepts of Comprehensive Health Care in Medical Surgical Conditions
- Health Promotion, Wellness, and Illness Prevention
- Health Care Models
- Roles and Responsibilities of a Nurse in Medical Surgical Nursing Settings
- Medical Surgical Asepsis
- Control or Elimination of Infectious Agents
- Inflammation
- Infection
- Immunity
- Wound Healing
- Care of Surgical Patient

Key Terminology

Acute: It is characterized by having sudden onset with very serious effect.
Aging: It is the process of becoming older.
Amputation: Refers to the removal of an extremity or any other body part due to disease condition.
Anatomy: Refers to the science the deals with the structure of body.
Anesthetic: Refers to the medication used to relieve pain because of surgery or any other medical procedures. These drugs are known as anesthetic.
Arthritis: Inflammation of joints is known as arthritis.
Assertiveness: It is a quality of being confident and representing own views in honesty and respectful way.
Audit: It is an unbiased examination and evaluation of an organization.
Autonomous: Having the right to make decisions and being independent.
Cataract: An eye disorder in which the lens become opaque that end with the blurred vision.
Chest compression: Refers to the process of applying pressure in person's chest in order to promote blood flow to the brain (brain perfusion).
Chronic: It is characterized by constant or recurrent suffering having long lasting effect.
Civilization: It is an advancement, characterized with the development of social and cultural norms.
Communication: Refers to the exchange of information from one person to another person.

Competent: An individual with adequate qualities to meet the basic standards.
Comprehensive: It refers to discuss in a broad and detailed method.
Diabetes: Metabolic disorder when there is a high blood sugar level in the body.
Diagnosis: It is the process of determining the health of a person about the actual illness or the cause of problem.
Disability: It is the inability of a person to function efficiently due to any injury, illness or trauma.
Discharge: The process of being released or relieved from a place or person.
Disease: It is an abnormal condition that affects the functional and structural unit in an organism.
Dissection: It is the act of separating the body for the study of its anatomical structure.
Documentation: Any material that represents an information as an evidence.
Fistula: An abnormal connection between two body parts. This may occur due to surgery or disease condition.
Fomentation: The application of warmth or hot moist to the body to ease pain or injury.
Genetics: A science that deals with the study of genes and heredity.
Gynecology: Refers to the study of medicine that deals with disease conditions of girls and women especially those affecting the reproductive system.
Health promotion: World Health Organization's Ottawa Charter (1986): Health promotion is the process of enabling people to increase control over, and to improve their health.
Health: A state of complete physical, mental, social well-being, not merely the absence of disease and infirmity (According to WHO).
Hemorrhage: Refers to the loss of blood due to rupture of blood vessels.
Hernia: Defined as protrusion of an internal body organ due to increased pressure or heavy weight lifting.
Hostile: A strong opposing or an undesirable act.
Hyperglycemia: Refers to the increased blood sugar level, i.e., more than 200 mg/dL.
Hypertension: Defined as when blood pressure is too high, i.e., more than 140/90 mm Hg.
Hypoglycemia: Refers to the decreased blood sugar level, i.e., less than 70 mg/dL.
Illness: A subjective state of the person who feels aware of not being well.
Intrusion: The act of seizing into someones possession that interrupts privacy or peaceful situation.
Masseuses: It refers to a professional person that practices massage of the body to stimulate adequate circulation and promote relaxation.
Midwifery: A health science that deals with the pregnancy, childbirth and postpartum period.
Nomadic: It is a group of community without fixed abode and moves from one area to other.
Obstetrics: Refers to the study of medicine that deals with childbirth and midwifery.
Ophthalmology: Study of eye disorders and their treatment is known as ophthalmology.
Pathology: A scientific study of cause and effect of any disease or injury.
Pediatrics: Refers to the study of medicine that deals with children and their disease conditions.
Pharmaceutical: It denotes to the production and sales of drugs.
Pharmacodynamics: Refers what the drug does with the body.
Planning: It is a process of thinking to achieve the desired goal.
Postoperative: It is a phase in which care is given to the patient for recovery after the surgery.
Profession: It is a field of work that requires level of training and education.
Prosthetic: An artificial body part is known as prosthetics.
Psychiatric: Refers to the study of medicine that deals with the mental disorders.
Robotic nursing: Robot nurses to help with therapy, pills, logistics, telepresence and cleaning.
Social science: It is a branch of science that refers to study of relationships among an individuals within a society.
Stroke: A medical condition in which the blood supply to the brain becomes interrupted that means the brain is deprived of oxygen, glucose and blood.
Telecommunication: It refers to exchange of information over a distance by various mediums like wire, radio, telegraph or other electromagnetic circuit.
Telehealth: It is defined as facilitation of health-related services through telecommunication technologies.

INTRODUCTION

Medical surgical nursing is the health promotion, health care and illness care of adults based on knowledge derived from the art and science and shaped by knowledge (the science) of nursing. Medical surgical nursing focuses on the adult patient's response to actual or potential alterations in health. The wide range of ages and the variety of health care required by an individual patient is specific, which makes the medical surgical nursing ever changing and challenging area of nursing practice.

Nursing has and always will respond to the needs of its patients. In times of war, the responsibility of the nurses was to meet the needs of the wounded in combat zones. Our patients are most vulnerable when they are injured, sick or dying. Historically, nursing has made it a priority to meet the needs of patients and their communities. This commitment still continues.

However, nursing continuously responds and adapts to new challenges. The evolution of nursing brings the profession to one of the most challenging and exciting times in history. Nurses are in a unique position to refine and shape the future of health care. (Grindel 2006). Combination of knowledge from the physical sciences, humanities and social sciences along with clinical competencies needed to meet the individual needs of patients and their families in Nursing.

In this 21st century, nurses are assuming an increasingly significant role in health care industry, gaining power and influence and achieving greater control over their professional lines. This is the time for nurses to reaffirm their commitment to excellence in clinical area.

To keep a pace with growing demands made on health care system, nurse must develop new skills and refine the existing ones. Medical surgical nursing is one of many specialities in nursing, yet its scope is much broader than specialities as pediatrics, psychiatry, gynecology and obstetrics. The focus of medical surgical nursing is on adult patient (18–100 years and above) with acute or chronic illness as their health problems are usually complex. To care for the wide range of patients, medical surgical nurses need a broad knowledge of the biological, psychological and social science.

EVOLUTION AND TRENDS OF MEDICAL AND SURGICAL NURSING

It was believed in most early civilizations that illness had supernatural causes. Animism theory attempted to explain the cause of mysterious changes in bodily functions. According to this theory, everything in nature was alive with invisible forces and endowed with power. Health is brought by good spirits and evil spirits brought sickness and death. Ancient people led a nomadic life and believed that sickness comes due to the following reasons:

- Anger of the offended gods, devils or evil spirit
- Supernatural powers of the human enemy
- Displeasure of the dead
- Due to their own sin
- Sorcery
- Magic
- Breaking a taboo
- Intrusion of a diseased object
- Bodily invasion by a spirit
- Dreams, etc.

Treatment

The treatment was done by *Shaman*, medicine man or witch doctor or priest physician, by driving out evil spirit from person's body by using certain tricks and methods like startling evil spirit with a frightening mask, chants and mantras, jolting the person by shaking or beating, using noxious odors, plunging them in hot or cold water, pacifying the evil spirit by sacrifice and even trephining the skull with stone, if the other methods failed. The nurse usually was the mother who cared for her family during sickness by providing physical care and herbal remedies. This nurturing and caring role of the nurse has continued to the present.

Preventive Measures

Primitive man had skills in massage, fomentation, bone setting, amputation, hot and cold baths, abdominal sections and heat to control hemorrhage. Massage was practiced as a health measure in ancient times. There were masseuses to treat the male and female patients. The ancient Hindus laid more emphasis upon the prevention of disease than its cure.

During the same period, the ancient Hebrews developed rules through the ten commandments and the Mosaic Health Code for ethical human relationships, mental health and disease control. Nurses cared for the sick people at home and the community.

In the early Christian era, nursing began to have definite role with a view that love and caring for others were important. Women called deaconesses made the first organized visit to sick people. Hospitals were built for the enormous number of pilgrims requiring health care and nursing became a respected vocation. Although the early middle ages came to an end in chaos, nursing had developed purpose, direction and leadership.

Indian Medicine

The period from 500 BC to 300 AD was the rise and development of Buddhism. The practice of medicine rose to its height. Nalanda, the first medical school for *vedic* learning, was established during this period. Assistance to sick was a part of life of a Buddhist monk. The famous Buddhist King Ashoka was instrumental in the establishment of a large number of hospitals not only for humans but also for animals. Monastic universities were founded and became famous for their medical schools notably at Taxila and at Nalanda (Fig. 1.1) which had a hundred lecture rooms and some thousands of students. King Buddha Das even instituted a state medical system and appointed a doctor for every 10 villages aside the main roads of India. Pharmaceutical gardens were also maintained to supply herbs and drugs.

During this period, however, the practice of surgery declined because the law of Buddha forbade dissection of animals and thus discouraged the study of anatomy; but other branches of medicine made great advances. Many hostels were built for housing the sick, blind and deformed.

The most advanced period of medicine in India was from 250 BC to 750 AD after which deterioration set in and the practice of medicine fell into a decline from which it has taken centuries to recover. However, medical systems that are truly Indian in origin are the *Ayurveda* and *Siddha* systems. *Ayurveda* was practiced throughout India, but *Siddha* is practised only in Tamil speaking areas of south India. Its origin is traced back to the *vedic* times, about 5000 BC.

The celebrated authorities in Ayurvedic medicine were Atreya, Charaka (Fig. 1.2) and Vagbhata. The laws of Manu were a code of personal hygiene, which was very well maintained through their knowledge of sanitation, water supply and engineering in Indus Valley Civilization.

Fig. 1.1: Monastic University at Nalanda

Fig. 1.2: Charaka, the principal contributor to Ayurveda

With the decline of Buddhism and the re-establishment of Brahmin influence, Buddhist hospitals disappeared. As the Hindu caste system became more rigid, they grew up an aversion on religious grounds, the medicines still remained in the hands of the priest physicians who refused to touch blood or pathological tissues. This was the chief cause of decline of medicine as a profession and nursing due to religious and other restrictions.

Thereafter, Unani- tibb and homeopathy were introduced by the Greeks who came to India through Muslim rulers during 6th century AD. In 13th century, Unani system of medication was entrenched in certain towns and cities like New Delhi, Lucknow and Aligarh.

In the 18th century, homeopathy which was propounded by Samuel Hahnemann of Germany, introduced the pharmacodynamics based on the treatment of disease by the use of small amount of drug in healthy person, which produces symptoms similar to those of the disease being treated.

Modern medicine was introduced in India by the Portuguese in the AD 1600 when Albuquerque conquered Goa and established the Royal Hospital. Although, the Portuguese are the first to bring modern medicine including nursing to India, it was the French and the British who later established and consolidated the modern medical and nursing services in India.

At Madras Crawford, the East India Company opened its first civil hospital for soldiers in 1664 which was named Government General Hospital in 1871. In 1859, a scheme for the training of nurses was sanctioned by the Government of Bengal and a nursing training center was opened at Calcutta (now Kolkata).

History of Surgical Nursing

Between 700 BC and 600 BC, "halls of healing" (hospitals) were founded. It is about this time that *Sushruta* brought the practice of surgery to a very high standard. *Sushruta*, the

Fig. 1.3: Sushruta's medical practice

father of Indian surgery, compiled the surgical knowledge of his time in his *Sushruta Samhita* which includes medicine, pathology, anatomy, midwifery, ophthalmology, hygiene and bedside manners (Fig. 1.3). Sushruta performed surgeries on nose, ears, bladder, cataract, fistula, joints, hemorrhage, etc. more than 2600 years ago with surgical instruments. The first known surgery performed on human body was mentioned in Rig-Veda (composed around), where a Prosthetic leg was attached to a queen's leg, so that she could walk normal and even participate in war (Fig. 1.4) depicts various surgical instruments used by Sushruta. The early Indians had set fractures, performed amputation, excised tumors and repaired hernias. In the mid-19th century, surgery became a medical specialty. The year of 1840s made it possible for surgeons to operate on a patient who was free of pain. He and Charaka were the famous Physicians and the leading authorities on the ancient Hindu system known as *Ayurveda* (the science of life).

In 1876, in Massachusetts, general hospital was the first to provide operating room education for nurses. In 1956, the association of operating room nurses was formed to gain knowledge of surgical principles and explore the methods to improve nursing care of surgical patients. In 1970s, a change occurred in nursing education with a focus on the importance of nurses acquiring a broad knowledge base, resulting in less emphasis on the operating room techniques. In 1995, 60% of all surgeries were conducted on ambulatory basis as discovery of anesthetic drugs that metabolize rapidly with a few after

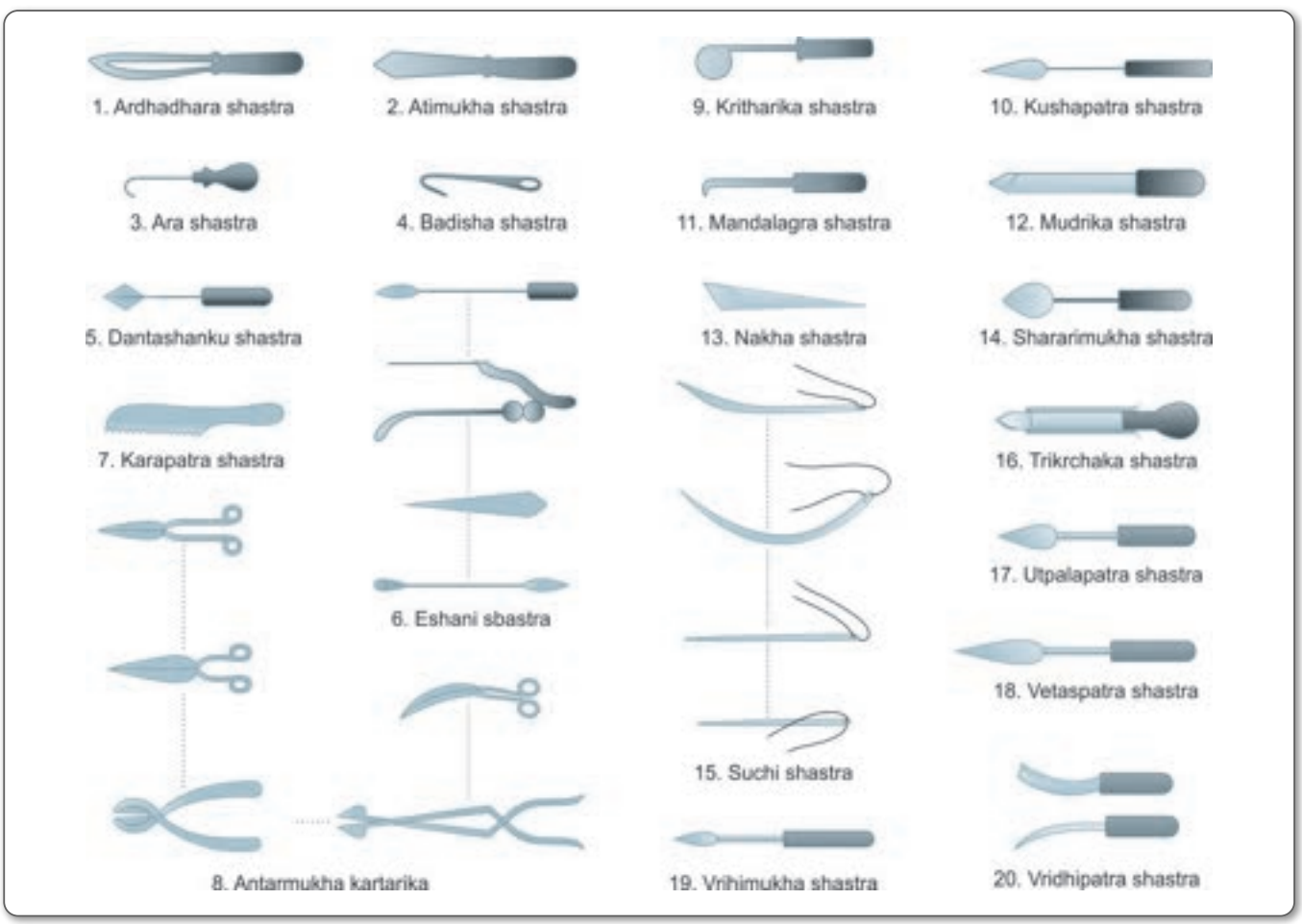


Fig. 1.4: Surgical instruments used by Sushruta

effects allow shorter operative times. Nurses recognized the benefit of early postoperative ambulation and encouraged the patient to assume an active role in recovery.

Social Trends Influencing Development of Nursing

For the past few decades, social factors have greatly influenced the trends in nursing. These are as follows:

- **In depth efforts of government to meet the health needs of people:** The National Rural Health Mission (NRHM) launched by the Government of India is a breakthrough in establishing effective integration and coherence of health care services and affecting architectural correction in the health care delivery system in India. A good network of regulation is fundamental to successful public health outcomes. It reduces exposure to disease through administration of sanitary codes, e.g., water quality monitoring, slaughterhouse hygiene and food safety.
- **Gradual improved literacy level of the people with the growing awareness of health needs:** Health literacy involves one's ability to seek existing functional literacy skills toward learning and communicating effectively in the context of health care. Within a clinical confront, the physician seeks to elicit information, answer questions, explain diagnoses, provide anticipatory guidance, and offer instructions for possible medical or behavioral intervention.
- **Advanced scientific technology:** Technological enforcement occur at an all time increasing rate thus revolutionizing human health and wellness care. Technological advancements have changed the structure and organization of the health care industry drastically. Nurses should be involved in deciding which aspects of their practice can be delegated to technology. Nurses should overlook the introduction of automated technology and artificial intelligence ensuring their practice to be more about the standard aspects of human care continuing under a novel system.
- **Enhancing the role of women:** Nursing profession and academic discipline of nursing have been made up with large majority of women. Women's nursing roles include both caring for patients and educating the patient. According to the data in 2005, "women comprised 92.3% of Registered Nurses (RNs). Also registered nurses jobs are considered the largest number of jobs among all occupations between 2004 and 2014. The role of the nurses is providing direct patient care following doctor's orders, checking vital signs, obtaining daily weights, providing prescribed medication, recording both input and output, obtaining various lab samples, administering medications and documentation.
- **Continuing growth of population:** The aging of the population affects the demand for all health care services, including hospitals, and long-term care. Elderly people use more health services than youngsters because they have more health problems. They are also hospitalized more often and have longer lengths of stay than youngsters.

Evolution of Medical Surgical Nursing in 17th, 18th and 20th Centuries

In ancient times, the sick were usually cared in the temples with good or evil spirits. At that time, those women who took care of people had no real medical or nursing training, but their everyday experience taught them valuable skills, especially in the use of herbs and drugs, and some gained fame as the physicians of their era. In the 17th century, St. Vincent de Paul started training for women for their work, but there was no real hospital training school for nurses until one was established in Kaiserwerth, Germany, in 1846. Florence Nightingale received the training that later enabled her to establish at St. Thomas's Hospital in London, the first school designed primarily to train nurses. The nursing modernized rapidly during the late 19th and early 20th centuries. The number of hospitals grew drastically and with this growth, new positions and job roles for nurses developed, and nursing profession gained respectable social status. Nursing became one of the most important professions open to women until the social changes brought by the revival of the feminist movement that began in the 1960s. During the late 19th and early 20th centuries in the United States of America, adult patients admitted in larger hospitals were typically assigned to separate medical, surgical, and obstetrical wards. This, division of patients into different wards helped the nursing education in hospital training schools where nurses get training to work in these units. Early National League of Nursing Education (NLNE) curriculum guides for the treatment in medical nursing, surgical nursing, and disease prevention. By the 1930s, however, it was recommended that medical and surgical nursing be taught in a single, interdisciplinary course. Surgical nursing is the care of the medical patients who were being treated surgically. Students were expected to learn the theory (signs and symptoms and causes of disease condition) and treatment of abnormal physiological conditions, and also to provide total care of the patient by understanding the role of health promotion and the psychological, social, and physical aspects that affected a patient's health. In 1960s, nursing schools started the interdisciplinary study and practice of medical and surgical nursing in nursing training curriculum. In 1960s and 1970s, standards were developed for medical-surgical nursing. Standards: In 1974, Medical-Surgical Nursing Practice, was written and published by a committee of the Division on Medical-Surgical Nursing of the American

Nurses' Association (ANA). It focused on the collection of patient history, development of nursing diagnoses and goals for nursing, and development, implementation, and evaluation of plans of care. A Statement on the Scope of Medical-Surgical Nursing Practice followed in 1980. In 1991, the Academy of Medical-Surgical Nurses (AMSN) was formed to provide an independent specialty professional organization for medical-surgical and adult health nurses. In 1996, the AMSN published standards of Medical-Surgical Nursing Practice and its second edition appeared in 2000. Both the ANA and AMSN documents stated that while clinical nurse specialists were expected to participate in research, all medical-surgical nurses must incorporate research findings in their practice as an evidence-based practice. Recent trends in nursing and medical profession have affected medical-surgical nurses, such as:

- The increasing use of nursing case management
- The expansion of advanced practice nursing
- Total quality improvement
- Development of clinical pathways
- Changes in the professional practice model
- Health care reform

The trend toward increased acuity of patients, that began in the 1980s, has become a fact of life.

Women's

- Margaret Sanger role in public health
- Margaret Sanger was a public health nurse in New York who opened the first birth control clinic in US because of large number of unwanted pregnancies.
- Lavina Dock was a writer, who political activist and early feminist devoted to women's franchise who participated in protest and demonstrations until passage of the 19th Amendment in 1920, women's right to vote. Cultural Factors was first major professional group to integrate black and white members.

American Red Cross

In the Crimean war, mortality rate dropped from 60% to 2% as a result of the environmental changes implemented by Florence Nightingale. Clara Barton organized nurses to provide care in the American Civil War and established the American Red Cross that serves in war and peace time. American Red Cross was responsible for recruiting women for the Army Nurse Corp during the first World War. Their motto was–American Nurses for American Men.

- **Economic factors:** Like insurance, fee for service, managed care and cost of health care are rising faster than inflation.
- **Educational factors:** 1893 Dock with Isabel Hampton Robb and Mary Nutting founded the American Society of Superintendents of Training Schools for Nurses of the US and Canada.
- This organization was very politically active and became the National League for nursing which promotes quality nursing education to this day.

Political Factors

- **Florence nightingale:** Nightingale was a political influencer, she was the first nurse to exert political pressure on government, influential in reforming hospitals and implementing public health policies in Britain. Clara Barton convinced Congress in 1882 to ratify the Treaty of Geneva so the Red Cross could perform in peace time impacted on national and international policies. Lillian Wald's political pressure lead to the creation of the US.
- **Children's bureau:** Children's Bureau established by congress in 1912 to oversee child labor laws. Nursing represents 67% of health care providers in the US. Few nurses are in positions where they can influence health care policy making. Nurses became involved in politics at the local, state and national level. Eddie Bernice Johnson, was first RN elected into US. House of Representatives from Texas Ada Sue Hinshaw directed the NIH Center for Nursing Research. Nurses in all practice areas are affected by public policy on a daily basis, this demands that all nurses to be proactive in policy development. Nursing's Agenda for Health Care Reform developed in 1991. Nurses can use this agenda to unite and become a political force in health care delivery.

Social Trends Influencing the Development of Nursing

- Groups of practitioners who band together to perform social or political functions because they could not do alone
- Define and regulate the profession.
- Development of a knowledge base for practice
- Research
- Transmit norms, values, knowledge, and skills
- Communicate/advocate contributions of the profession
- Address members social and general welfare needs.

Trends in Medical Surgical Nursing

The entire field of health care is changing and nowhere are these changes occurring at a more rapid rate than in acute care arena. Here, nurses offer direct assistance to both patients and families who are dealing with illness or injury. This provides a tremendously exciting challenge for the nurses. The responsibility for coordinating this care requires planning and documentation that clearly identifies problems and interventions as well as short and long range health care planning for individuals and families.

Major Trends

In this changing arena, the major trends that will have lasting impact on nursing and patient care are:

- Quantification of nursing care cost
- Reduced length of stay
- Increasing reliance on high technology
- Requirement for advanced nursing knowledge
- Need for collaboration and communication
- Innovations in care planning through computerization
- Care of aging population.

Quantification of Care Cost

The profession's attention is thus focused on the cost of providing nursing care to patients within the setting of prospective reimbursement, less amount and reduced beds and staff. Quantification of nursing contribution to patient care is used to determine the cost of providing care to specific patients. Quantifying nursing time requires the identification of the level of nursing care necessary for each patient, which can be used for direct "billing" of services rendered. In, those hospitals, already billing for nursing services, the patient's plan of care is an integral part of the justification of nursing care costs.

Reduced Length of Stay

Many patients who leave the hospital earlier are still in need of health care. Hospitals are responding to this need by creating their own health agencies. Nurses are assuming a larger portion of responsibility for ensuring the patients to be discharged on time according to their diagnosis-related group classification. To facilitate early but safe discharge and to ensure continuity of care, many traditional boundaries are loosening. Nursing-care managers follow patient from admission to the general care unit through discharge into the community in an effort to achieve optimal outcome. An effectively coordinated plan of care can help in ensuring continuity of care between the health care system and the home or agency accepting transfer.

Increasing Reliance on High Technology

In the hostile environment of a litigious society, the practice of defensive medicine has resulted in increased dependency on sophisticated diagnostic technology and treatment interventions. Years ago, before "high tech/high touch" became a trendy phase, nurses expressed concern that the patient was in danger of being lost among tubes, monitors and machines as complex technology became an increasingly larger part of health care. This led nurses to advocate for patient individuality, the holistic concept of "mind-body-soul" interaction, and the heightened awareness of ethical issues such as quality of life/right to die dilemma.

Requirement for Advanced Nursing Knowledge

Intensive nursing interventions are required to deal with increased patient acuity in the face of shorter lengths of stay within the medical surgical environment. The nurse needs greater clinical expertise, maturity, critical thinking ability, assertiveness and patient management skills to handle these increased responsibilities. Nursing specialized with certification programs attains importance in this cost effective era as managers seek to hire competent professionals.

Need for Collaboration and Communication

As health care delivery becomes more complex and more economically centered, the need for communication and collaboration among health care professionals is intensified. Only through collaboration between department, services and facilities, medical professionals can deliver the most efficient and comprehensive care. The nurse works as liaison between health care providers and incorporates information obtained into the overall plan of care. Patients and families, assuming responsibility for them, are also participating in more decisions concerning the level and amount of health care they deserve.

Innovations in Planning Care through Computerization

Many nurses believe that their limited time can be better spent at the bedside giving patient care rather than filling out paperwork. Nowadays, institutions are using computer to generate reports and number of plans of care being generated and maintained. Earlier it was done manually. Nurses now may quickly enter, display, update, evaluate, and print a plan of care, thus improving the quality of record keeping.

Care of Aging Population

The percentage of elderly patients with disabilities is declining, partly due to the decline in diseases that cause disability in the elderly, such as stroke or heart disease. Despite this decline, however, aged patients constitute a major section of people in the society. They commonly have multiple chronic diseases like hypertension, arthritis, hearing disorder, cataract, orthopedic disorder and diabetes and so nurses have a key role in caring for this weaker section of society.

Rapid changes in the health care environment, with continuous technological advancements, increasing severity of illness, budget constraints and expanding nursing knowledge, have greatly increased the responsibilities faced by the nurses today. To fulfill these responsibilities, planning and

documentation of care are essential to satisfy patient's needs and meet legal obligations.

Use of Computers for Patient Care Management

Patient care instructions, recording, reporting, information, stock monitoring, releasing, and auditing are some of the works which have replaced human effort. Good and effective use of computers is an important prerequisite for nurses now.

Advancements in Communication and Technology

Looking at the present scenario, telecommunication has been made easy with the help of mobiles, video conferences, webinars and many other devices. It's now possible to reach to the patients, doctors and other health care professionals whenever one is in need of it. Spot consultation, counseling, and treatment all is possible now. Along with verbal and non-verbal communication skills, nurses should be competent enough to use different information technologies available.

Integration of Robotics Technology with Nursing Care

Robotic nursing is the use of autonomous mobile robots mainly designed and programmed for performing different tasks related to nursing, aiming to assist the nurses but not to replace them. Better health care facilities at hospitals or even at home, prevention and rapid treatment and medical care specialy to elderly and physically disabled can be of great help with robotic nursing. Robot nurses can perform several tasks like:

- Monitoring of vital signs
- Taking blood samples
- Range of motion exercises
- Helping the patients to ambulate with the help of wheelchair robot
- Act as a reminder to take the medications on due time
- Offering chest compressions
- Applies different distraction techniques like games, video, music, etc.
- Updation of information or data into IT system
- Performing the work with ease and accuracy

Wireless Patient Monitoring

Wireless patient monitoring was designed to facilitate long-term remote monitoring of vital signs and activity metrics within the hospital environment as well as in the post discharge period (Martin et al., 2016).

In Egypt, a study conducted by Abo Zahhad M et al., (2014) reported that nurses and doctors can monitor patient's vital signs using wireless system for early treatment during hospitalization (Figs 1.5 to 1.7).

Non-Invasive Glucose Monitoring

The finger-prick glucose meter is a discrete glucose measurement device that is not practical for continuous monitoring of blood glucose. Some incidences of hyperglycemia or hypoglycemia between measurements may not be recorded. Thus, the resultant monitoring cannot fully represent the blood glucose pattern. Noninvasive glucose measurement eliminates the painful pricking experience, risk of infection, and damage to finger tissue (Chi-Fuk So, 2012) (Figs 1.8 and 1.9).

Advantages of Non-invasive Glucose Monitoring

- It displays blood sugar level every few minutes.
- Can trigger alarm if the blood sugar level is above or below a normal level.

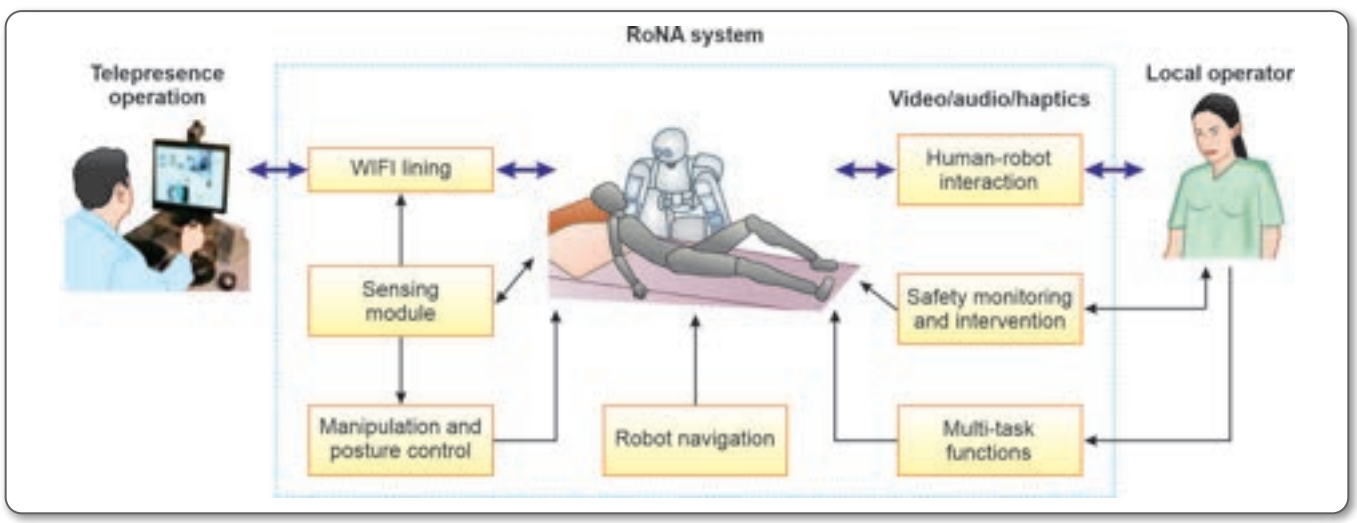


Fig. 1.5: A system framework for telepresence and direct nurse-robot interaction (Idir M, 2014)

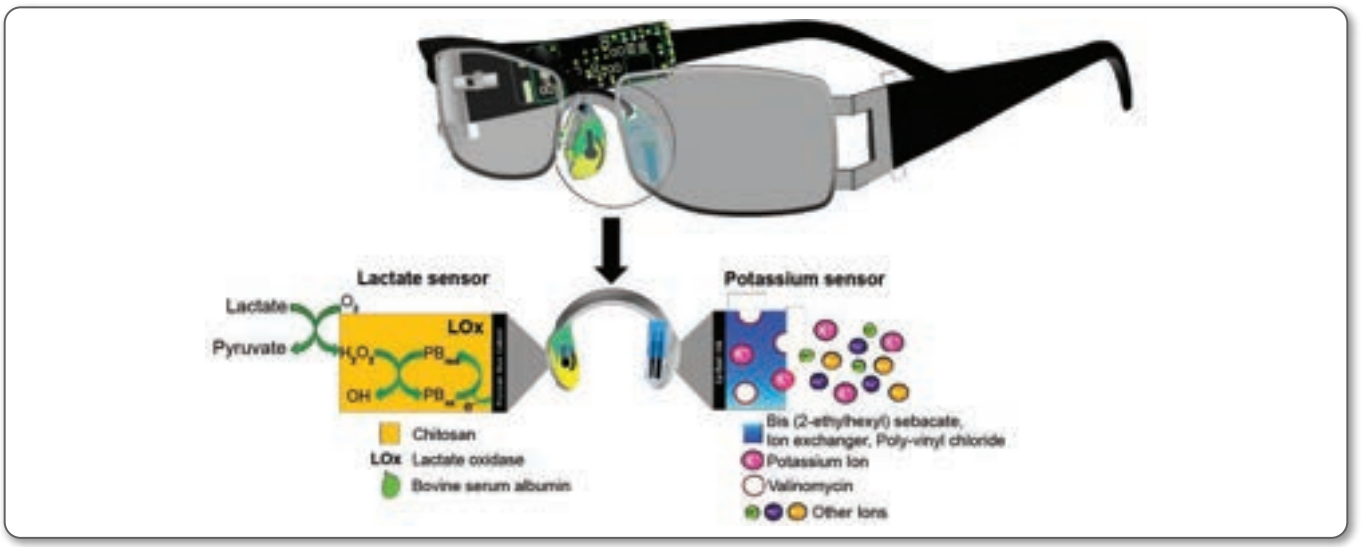


Fig. 1.6: Eyeglasses biosensor system which integrates a wireless circuit board

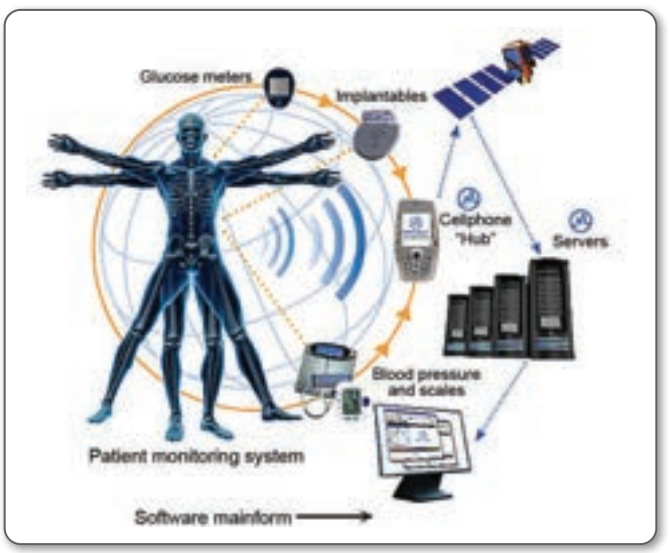


Fig. 1.7: Wireless patient monitoring system

- Blood glucose results can be downloaded to computer or smart phone, allowing nurse and patients to see blood sugar trends over time.
- Reduces the long-term complications.
- Provides long-term valuable and enables immediate feedback regarding glycemic control that reveals hypo- or hyperglycemia.

Cancer Genetics and Genomics

Genetics and genomics are important aspects in nursing fields. An in-depth genetic knowledge and skills in oncology settings is therefore, equally important for nurses. (Umberger et al., 2013).

Clinical application of cancer genetics and genomics requires extensive **educational preparation,** working in **multidisciplinary** team, identify is patient at risk through assessing family history, facilitating genetic testing and counseling services. (Boucher, Habin, and Underhill, 2018).

A thorough knowledge with Genetic testing, Genetic counseling, cancer risk assessment, Targeted therapy and comprehensive physical examination is required.

Oncology nurses should include genetics/genomics in their practice in order to impart quality patient care in the present and for the future. Clinical integration of genetic or genomic information has the potential to promote and maintain the health and prolong patients' lives. Nurses must understand that the basic principles of the biology of cancer to be competent in utilizing genetics and genomics in oncology nursing practice (Fig. 1.10).

TELEHEALTH AND CHATBOT FACILITIES FOR EASY ACCESS TO PATIENT CARE

Telehealth visits during Covid era has increased by 154% year over year and has proved to be the need of the hour. Therefore, telehealth and chatbot services will continue to be the norm emphasizing the nurse's role in 2021. With telehealth, patients can manage their health related issues online like booking an appointment, accessing lab test results, request for prescription and so on. Virtual appointments help them to see their health care personnels live. Chatbot services like Florence health chatbot nurse is a platform that monitors the patient's health status, helps him to remind about taking medications and locating the nearest available doctor and pharmacy. It proves to be a perfect health assistant that helps the patients for a better living.

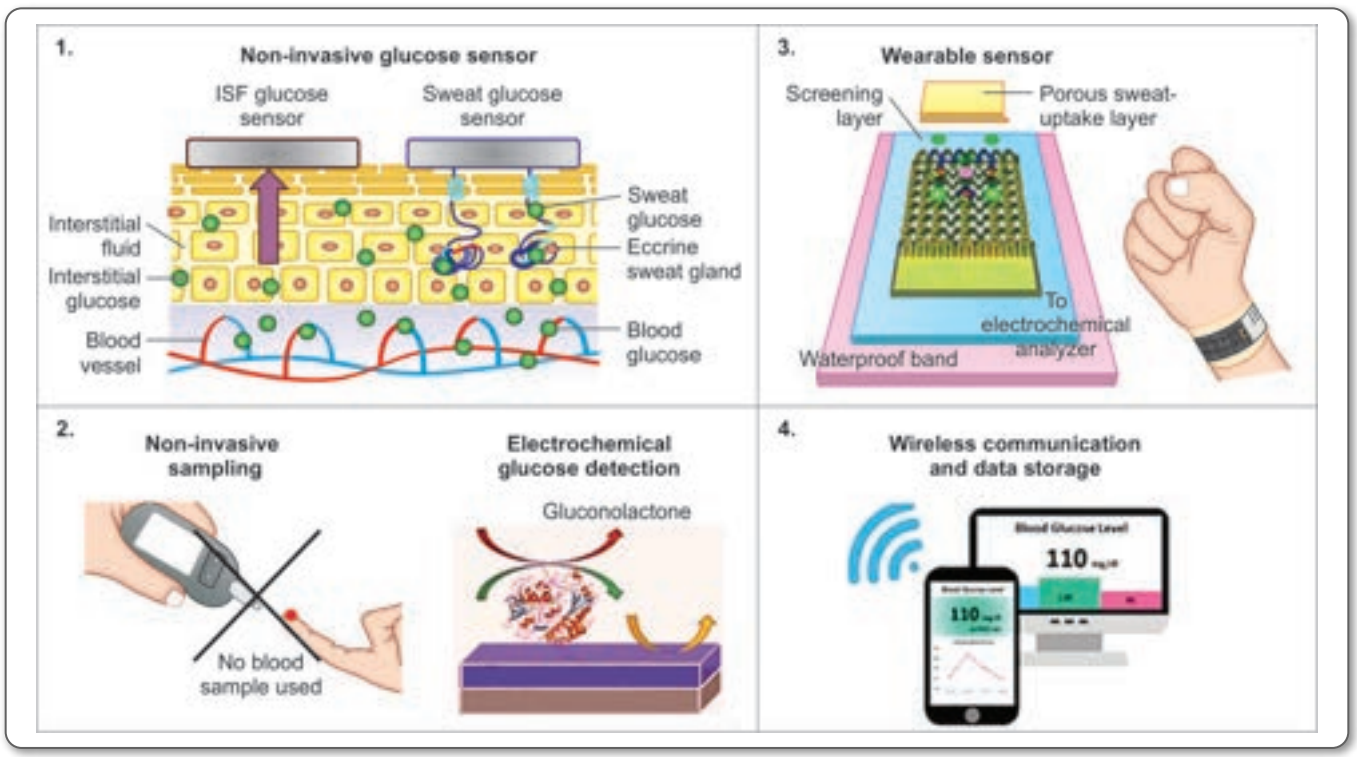


Fig. 1.8: Wearable and non-invasive epidermal glucose sensors

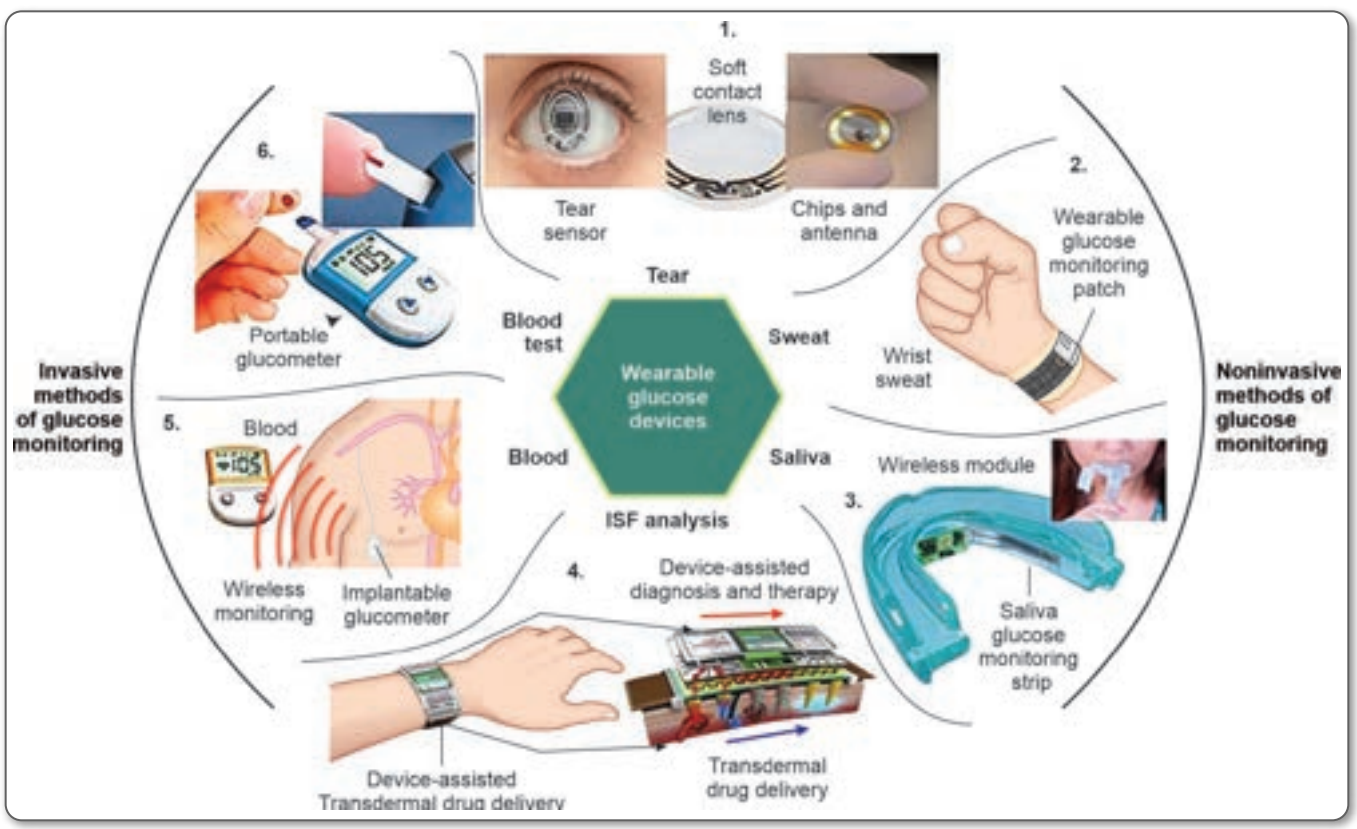


Fig. 1.9: Invasive and non-invasive methods of glucose monitoring

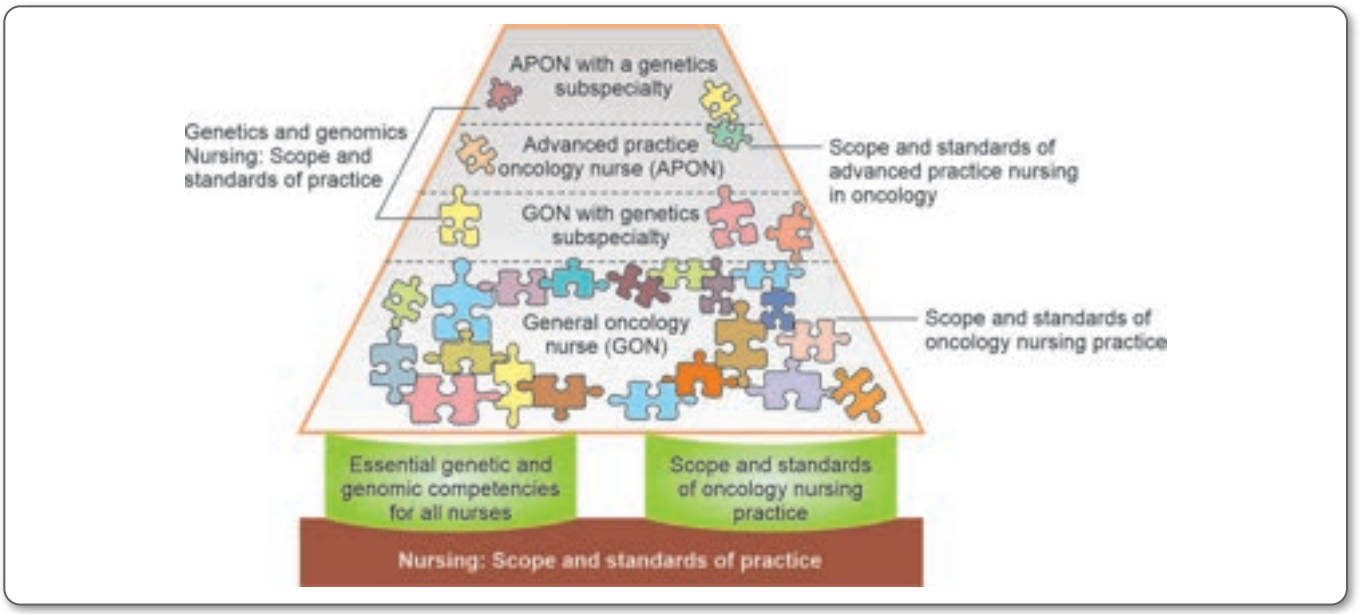


Fig. 1.10: Genetics and genomic nursing

Nursing Precision

Precision health includes the data related to context of lifestyle, social, economic, cultural and environmental influences to help individuals achieve holistic optimal health. Nursing has made many contributions to precision health through symptom science on manifestation and management of symptoms of disease, nursing management and treatment.

Nurses are experts for the routine collection of family history risk assessments that is the most accessible way to guide precision health. It is the responsibility of nurses to make strategic plans that promote precision health in nursing research, education, clinical practice, and administrative and health policy arenas. Nurses lead the implementation of precision health through inter-professional collaboration, community outreach efforts, and coordination of patient care.

CONCEPT OF HEALTH AND DISEASE

Definitions of Health

"The condition of being sound in body, mind or spirit especially freedom from physical disease or pain." **—Webster**

"Soundness of body or mind, that condition in which its duties are efficiently discharged." **—Oxford English Dictionary**

"Health is a state of complete physical, mental, social well-being and not merely the absence of disease or infirmity."

—World Health Organization

In recent years, this definition has been modified to include "the ability to lead socially and economically productive life."

Concept of Health

Health is evolved over the centuries as a concept from individual concern to worldwide social goal and encompasses the whole quality of life. Changing concept of health till now are:

- Biomedical concept
- Ecological concept
- Psychosocial concept
- Holistic concept

Biomedical Concept

Traditionally, health has been viewed as an, "absence of disease," and if one was free from disease, then the person is considered healthy. This concept has the basis in "germ theory of disease." The medical profession viewed the human body as a machine, disease as a result of the breakdown of the machine and one of the tasks as repair of the machine.

Ecological Concept

From ecological point of view; health is viewed as a dynamic equilibrium between environment and human being, and disease as a maladjustment of the human organism to environment. According to Dubos, "Health implies the absence of pain and discomfort and a continuous adaptation and adjustment to the environment to ensure optimal function." Thus the ecological concept raises two issues, viz. imperfect man and imperfect environment.

Psychosocial Concept

According to psychosocial concept, "health is not only biomedical phenomenon, but also influenced by social, psychological, cultural, economic and political factors of the people concerned."

Psychosocial concept views health as both biological and social phenomenon.

Holistic Concept

This concept is the synthesis of biomedical, ecological and psychosocial concept. It recognizes the strength of social, economic, political and environmental influences on health. It describes health as a unified or multidimensional process involving the well-being of whole person in context of his environment. It views that health implies a sound mind in a sound body, in a sound family in a sound environment.

Dimensions of Health

Health is multidimensional. World Health Organization (WHO) explained health in four dimensional perspectives: physical, mental, social and spiritual. Besides these, many more perspectives may be cited, e.g., emotional, vocational, political, philosophical, cultural, socioeconomic, environmental, educational, nutritional, curative and preventive.

Physical Dimension

Physical dimension views health from physiological perspective. It conceptualizes health as a biological state in which each and every organ, even a cell does its function at its optimum capacity and in perfect harmony with the rest of the body. Physical health can be assessed at community level by the measurement of morbidity and mortality rates.

Mental Dimension

Mental dimension is the ability to think clearly and coherently. This deals with sound socialization in communities. Mental health is a state of balance between the individual and the surrounding world, a state of harmony between self and others, coexistence between the relatives of the self and of other people and that of the environment. Mental health is not merely an absence of mental illness.

Features of a Mentally Healthy Person

- Free from internal conflicts
- Well–adjusted in the external environment
- Searches for one's identity
- Strong sense of self-esteem
- Knows his mind, his problems and goals
- Has good self-controls-balances
- Faces problems and tries to solve them intellectually.

Social Dimension

Social dimension refers the ability to make and maintain relationships with other people or communities. It states harmony and integration within and between each individual and other members of the society. Social dimension of health includes levels of social skills one possesses, social functioning and the ability to see oneself as a member of a larger society.

Spiritual Dimension

Spiritual health is all about religious beliefs and practices. Personal creeds, principles of behavior and ways of achieving peace of mind and being at peace with oneself is also included. It is intangible "something" that transcends physiology and psychology. It includes integrity, principle and ethics, the purpose of life, commitment to some higher being, belief in the concepts that are not subject to "state of art" explanation.

Vocational Dimension

The vocational dimension of life is a new dimension. It is a part of human existence. Work often plays a role in promoting both physical and mental health when work is fully adapted to human goals, capacities and limitations.

Physical work is associated with an improvement in physical capacity, while goal achievement and self-realization in work are a source of satisfaction and enhanced self-esteem.

The importance of this dimension is highlighted when individuals suddenly lose their jobs or are faced with mandatory retirement. For many individuals, the vocational dimension may be merely a source of income but to others this dimension, represents the culmination of the efforts of the other dimensions as they function together to produce what the individual considers life, "success."

Health Promotion

As defined by World Health Organization's Ottawa Charter for Health Promotion, it is the process of enabling people to increase control over and improve their health (Fig. 1.11).

It involves the population as a whole in the context of their everyday lives, rather than focusing on people at risk for specific diseases and is directed toward action on determinants or causes of health. It is the process of activating communities, policy makers, professionals and the public in favor of health supportive policies, systems and ways of living.

Health Promotion Through Action

Health promotion is carried out through acts of advocacy, empowerment of people and building social support system that enable people to make healthy choices and live healthy lives.

Strategies Adopted

The basic strategies for health promotion identified in the Ottawa Charter were:

- Advocate (to boost the factors which encourage health)
- Enable (allowing all people to achieve health equity)
- Mediate (through collaboration across all sectors)

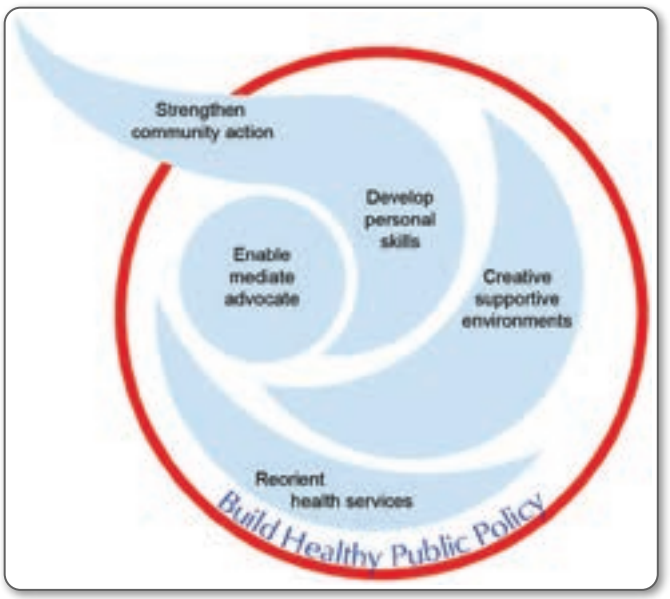


Fig. 1.11: The Ottawa Charter to H will be in lower caps Health

Key Elements of Health Promotion (As per WHO)

Good Governance

Strengthen governance and policies to make healthy choices accessible and affordable to all, and create sustainable systems that make whole-of-society collaboration real. This approach is based on the rationale that health is determined by multiple factors outside the direct control of the health sector (e.g., education, income, and individual living conditions) and that decisions made in other sectors can affect the health of individuals and shape patterns of disease distribution and mortality.

Health Literacy

Improving health literacy in populations provides the foundation on which citizens are enabled to play an active role in improving their own health, engage successfully with community action for health, and push governments to meet their responsibilities in addressing health and health equity.

Healthy Settings

The settings approach has roots in the WHO Health for All strategy and, more specifically, the Ottawa Charter for Health Promotion. Healthy Settings key principles include community participation, partnership, empowerment and equity. The Healthy Cities programme is the best-known example of a successful Healthy Settings programme.

Social Mobilization

Bringing together all societal and personal influences to raise awareness of and demand for health care, assist in the delivery of resources and services, and cultivate sustainable individual and community involvement.

(Adopted by WHO, Retrieved from https://www.who.int/health-topics/health-promotion)

Health Prevention

Health prevention approaches described by Ewles and Simnett are enlisted in Table 1.1.

TABLE 1.1: Health prevention approaches described by Ewles and Simnett

Medical approach
The medical approach aims to enable people to be free from medically defined disease and disability, such as infectious diseases, cancer and heart disease. The approach involves medical interventions to prevent or ameliorate ill health. Possibly using a persuasive paternalistic method, persuading for example middle age people to be screened for high blood pressure. This approach values preventive medical procedures and the medical profession's responsibility to ensure that patients comply with recommended procedures
Behavioral change approach
The behavioral change approach is based upon changing people's individual attitudes and behaviors so that they adopt a "healthy lifestyle". Examples include teaching people how to stop smoking, look after their teeth, eat the "right food", and so on. In this approach, it is argued that a healthy lifestyle is in the best interest of individuals and health professionals promoting this approach will see it as their responsibility to encourage as many people as possible to adopt the healthy lifestyle they advocate
Educational approach
The aim of the education approach is to provide individuals with information, ensure knowledge and understanding of health issues, and to enable well-informed decisions to be made. Information about health is presented, and people are helped to explore their values and attitudes and to make their own decisions. Help in carrying out those decisions and adopting new health practices may also be offered. The educational approach encourages individuals to make their own decisions and at the same time health professionals will see it as their responsibility to raise with clients the health issues which they think will be in the client's best interests
Client centered approach
Within the client centered approach, the health professional works with clients to help them identify what they want to know about and take action on, and make their own decisions and choices according to their own interests and values. The role of the health professional is to act as a facilitator. They help people to identify their concerns and gain the knowledge and skills they require making changes happen. Self-empowerment of the client is seen as central. Clients are valued as equals. They have knowledge, skills and abilities to contribute, and they have an absolute right to control their own health destinies

Contd...

Societal change approach

Rather than changing the behavior of individuals, the societal change approach modifies the physical and social environment in order to make it more conducive to good health. Those using this approach will value their democratic right to change society, and will be committed to putting health on the political agenda at all levels and to the importance of shaping the health environment instead of shaping the individual lives of people who live in it.

Ewles L, Simnett I. *Promoting health; a practical guide.* 5. London: Bailliere Tindall Elsevier Limited; 2003. [Google Scholar]

Determinants of Health

Health is determined by multiple factors. The health of an individual and community is influenced by—individual (biological or internal) and external factors. The individual factors include own genetic factors and external factors include environmental factors. These factors interact with each other and these interactions may be health promoting or deleterious. Thus, the health of individuals and communities may be considered to be the result of many interactions.

Biological Determinants

The health of an individual partially depends on the genetic constitutions. A number of diseases like chromosomal anomalies, inborn error of metabolism, mental retardation and some types of diabetes are to some extent due to genetic origin.

Environmental Factors

- **Biological:** Disease-producing agents (e.g., bacteria, virus, fungi), intermediate host (e.g., mosquito, sandfly), vector (e.g., house fly), reservoir (e.g., pig in Japanese encephalitis (JE).
- **Physical:** Air, water, light, noise, soil, climate, altitude, radiation housing, waste, etc.
- **Psychosocial:** Psychological makeup of an individual and structure and functioning of society, e.g., habit, beliefs, culture, custom, religion, etc.

Lifestyle

Behavioral pattern includes lifelong habits, e.g., smoking and alcohol consumption, food habit, personal hygiene, rest and physical exercise, bowel and sleeping patterns and sexual behavior.

Socioeconomic Conditions

Socioeconomic conditions consist of education, occupation and income. The world map of illiteracy closely coincides with the rates of poverty, malnutrition, ill health, high infant and child mortality rates. The very state of being employed in productive work promotes health, because the unemployed usually shows a higher incidence of ill-health and related deaths. There is no doubt that economic progress has positive impact factor in reducing morbidity, increasing life expectancy and improving the quality of life.

Availability of Health and Family Welfare Services

Health and family welfare services cover a wide spectrum of personal and community services for treatment of diseases, prevention of disease and promotion of health. The purpose of health service is to improve the health status of the population. For example, immunization of children can influence the incidence/prevalence of a particular disease. Provision of safe water will prevent mortality and morbidity from water-borne diseases.

Aging of the Population

Even aging acts as an important determinant of health.

Other Health Determinants

- Science and technology
- Information and communication
- Gender
- Equity and social justice
- Human rights

It was estimated that by the year 2020, the world will have more than one billion people aged 60 and more than two-thirds of them will be living in developing countries.

A major concern of rapid population aging is the increased prevalence of chronic diseases and disabilities both being the conditions that tend to accompany the aging process and deserve special attention.

Concepts of Well-being

Well-being of an individual or group of individuals has several components and has been explained in various ways, such as "standard of living" or "level of living" and "quality of life."

Standard of Living

Income and occupation, standards of housing, the level of provision of health, educational, recreational and other services, sanitation and nutrition all can be used individually as measures of socioeconomic status, and collectively as an index of the standard of living.

Level of Living

Level of living consists of nine components: health, food consumption, education, occupation and working conditions, housing, social security, clothing, recreation and leisure, and human rights.

These objective characteristics influence human well-being. It is considered that health is the most important component of the level of living because its impairment always means impairment of the level of living.

Quality of Life

The condition of life as a result of the combination of the effects of the complete range of factors such as those determining health, happiness (including comfort in physical environment and a satisfying occupation), education, social and intellectual attainments, freedom of action, justice and freedom of expression.

—WHO (1976)

A composite measure of physical, mental as well as social well-being as perceived by each individual or by group of individuals that is to say, happiness, satisfaction and gratification as it is expressed in such life concerns like health, marriage, family work, financial situation, educational opportunities, self-esteem, creativity, belongingness, and trust in others.

Well-being

Well-being of an individual or group of individuals have objective (standard of living or level of living) as well as subjective (quality of life) components.

Thus, a distinction is drawn between the concept of "level of living" consisting of objective criteria and of "quality of life" comprising the individual's own subjective evaluation.

Two Aspects of Health

- **Subjective:** It is formed by sensations and feelings of a person suffering from disease.
- **Objective:** Its basis is formed by objective parameters obtained by measurement of structures and functions of a person during disease.

The quality of life can be evaluated by assessing the person's feeling of happiness or unhappiness about the various life concerns.

Responsibility for Health

- **Individual responsibility:** Self-care for maintaining self-health.
- **Community responsibility:** Health care for the people and by the people.
- **State responsibility:** Constitutional rights.
- **International responsibility:** Health for All through primary health care (PHC).

Indicators of Health

A variable which helps to measure changes, directly or indirectly

—(WHO, 1981).

A statistic of direct normative interest which facilitates concise, comprehensive, and balanced judgment about conditions of major aspects of the society.

—(HEW/USA, 1969)

The health indicators are defined as those variables which measures the health status of an individual and community.

- **Mortality indicators:** Crude death rate, life expectancy, infant mortality rate, child mortality rate, under-five mortality rate, maternal mortality ratio, disease specific mortality and proportional mortality rate, etc.
- **Morbidity indicators:** Incidence and prevalence rate, disease notification rate, outpatient department (OPD) attendance rate, admission, readmission, discharge rate, duration of stay in hospital and spells of sickness or absence from work or school.
- **Disability indicators:** Sullivan's index, health adjusted life expectancy (HALE), disability adjusted life year (DALY).

High Yield Points

- Sullivan's index is an expectation of life free of disability.
- HALE is the equivalent number of years in full health that a newborn can be expected to live based on the current rates of ill health and mortality.
- DALY expresses the years of life lost to premature death and years lived with disability adjusted for the severity of disability.

- **Nutritional status indicators:** Anthropometric measurement of preschool children, prevalence of low birthweight, etc.
- **Health care delivery indicators:** Doctor-population ratio, bed-nurse ratio, population-bed ratio and Population per health facility, etc.
- **Utilization rates:** Immunization coverage, antenatal care (ANC) coverage, % of hospital delivery, contraceptives prevalence rate, bed occupancy rate, average length of stay in hospital and bed turnover rate, etc.
- **Indicators of social and mental health:** Rates of suicides, homicides, violence, crimes, road traffic accident (RTAs), drug abuse, smoking and alcohol consumption and so on.
- **Environmental indicators:** Proportion of population having access to safe drinking water and improved sanitation facility, level of air pollution, water pollution, noise pollution and so on.
- **Socioeconomic indicators:** Rate of population increase, per capita, gross national product (GNP), dependency ratio, level of unemployment, literacy rate, family size and so on.
- **Health policy indicators:** Proportion of GNP spent on health services, proportion of GNP spent on health-related activities including safe water supply, sanitation, housing, nutrition, etc. and proportion of total health resources devoted to primary health care.
- **Indicators of quality of life:** Physical quality life index (PQLI), infant mortality rate (IMR), literacy rate, life expectancy at age one, etc.

The **PQLI** is an attempt to measure the quality of life or well-being of a country. The value is the average of three statistics. They are— basic literacy rate, infant mortality, and life expectancy at age one, all equally weighted on a 0 to 100 scale.

Concept of Disease

Disease is a dynamic process like health but sets to be its opposite. Health denotes a state of complete well-being whereas disease on the other hand suggests unconventionality from the normal functioning of different body parts. The disharmony and alterations vary from chemical disturbances to severe disability ending to death. There are many factors associated, which lead to disease causation relating to human beings and environment.

The concept of disease causation differed from time to time with the progress of civilization. It changed from supernatural causes during primitive period to multifactorial causes of modern time. It becomes very important to understand the concept of disease so as to take preventive measures to overcome it. Therefore, currently many public and private health organizations are upcoming with preventive strategies to hinder the progress and incidences of various diseases which are increasing steadily.

According to Webster, disease is a condition in which body health is impaired, a departure from a state of health, an alteration of the human body interrupting the performance of vital functions".

The term disease means "without ease" (uneasiness), when something is wrong with bodily function. Disease is a physiological or psychological dysfunction.

Illness refers to the presence of a specific disease, and also to the individual's perceptions and behavior in response to the disease, as well as the impact of that disease on the psychosocial environment. Illness is a subjective state of the person who feels aware of not being well. Sickness refers to a state of social dysfunction, i.e., a role that the individual assumes when ill (sickness role).

Theories of Disease Causation

Several theories have been put forward which explain the causes of diseases.

Old Theories

These concepts were prevailing before Louis Pasteur (1822–1895).

- **Supernatural theory of disease:** Disease was believed to be caused due to super power, e.g., Gods, evil spirits.
- **Miasmatic theory:** Here the disease was often attributed to various physical forces, such as miasma or mists. Disease is due to noxious air and vapors.
- **Environmental theory:** About 400 BC, this theory came into being by Hippocrates, which believed that diseases are caused due to certain harmful substances present in the environment.
- ***Tridosha* theory of disease:** The *doshas* or humors are: *Vaat*, *Pitta*, and *Kapha*. It was known that perfect balance of *tridosha* is healthy and disturbance in balance is disease.
- **Theory of contagion:** Spreading of disease by being close to or touching other people.

Modern Theories

Germ Theory of Disease

In 1860, Louis Pasteur demonstrated the presence of bacteria in air. His theory emphasized that the sole cause of disease is microbes. The theory is generally referred to as one-to-one relationship between disease agent and disease.

For example: Tuberculosis due to *Mycobacterium tuberculosis*, cholera due to *Vibrio cholerae.*

Epidemiological Triad Concept

The germ theory of disease has many limitations. Like, it is well known that not all exposed to *tuberculosis bacillus* develop tuberculosis, the same condition in an undernourished person may result in clinical manifestations. Thus it was found that it is not only the agent causing disease but other factors related to man and environment which led to the existence of a disease.

The above model is also known as ecological model, which constitutes three important elements namely agent, host and environment (Fig. 1.12). Agent is the key factor due to which disease is caused. This includes bacteria, virus,

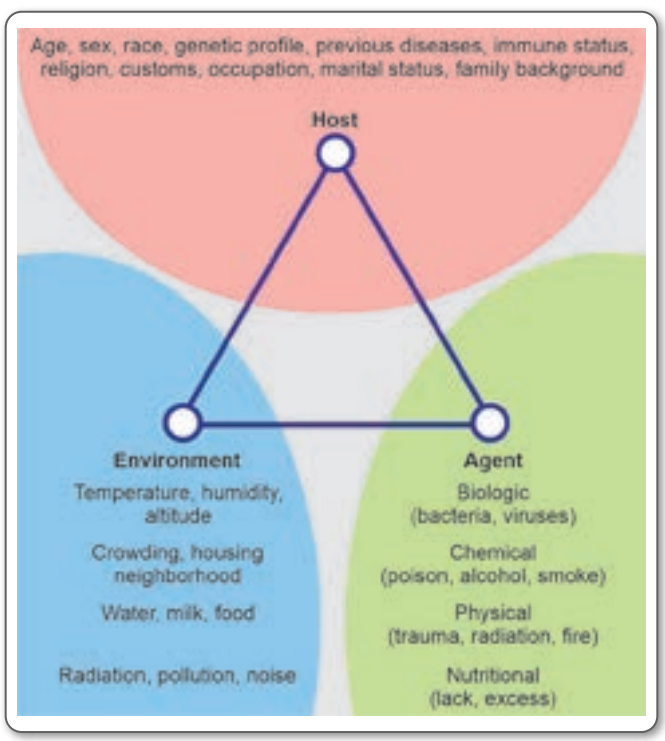


Fig. 1.12: Epidemiological triad

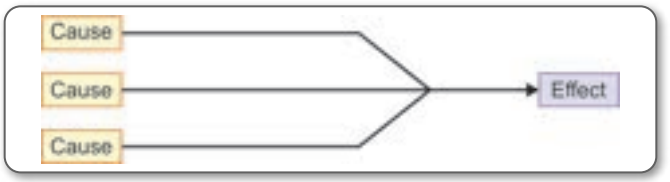


Fig. 1.13: Multifactorial causation theory

chemical exposure, etc. Host involves the background factors related to human beings like age, sex, religion, immune status, occupation, etc. Lastly, the environment which plays an indirect role between agent and host in causing the disease and includes temperature, housing conditions pollution, noise, etc. Thus, it signifies that disease is caused if the imbalance between these three factors occurs.

Multifactorial Etiology

The germ theory of disease or single cause of disease was overshadowed by multi-factorial etiology theory given in the 19th century (Fig. 1.13). As a result of advances in health care sector, communicable diseases began to decline and are replaced by new type of diseases which are so called modern disease of civilization.

Examples: Types of cancer, renal and cardiac diseases, mental illness, etc. could not be explained on the basis of germ theory of disease and could not be controlled or prevented on that basis. It is concluded that multiple factors are responsible for disease causation and there is no clear single agent. The reason of knowing multiple factors of disease is to quantify and arrange them in sequence of priority for modification to prevent or treat particular disease.

This can be understood as Chronic kidney disease which occurs as a result of multiple factors such as overuse of certain medications, infection to kidneys, toxic substances or direct injury to kidneys. This signifies multifactorial causation theory (Fig. 1.14).

Web of Causation

This model of disease causation was given by Mc Mohan and Pugh. This model is ideally suited in the study of chronic disease where the disease agent is often not known, but is the result of interaction of multiple factors. The web of causation considers all the predisposing factors and their complex interaction with each other (Fig. 1.15). The basic tenets of epidemiology is to study the clusters of causes and combinations of efforts and

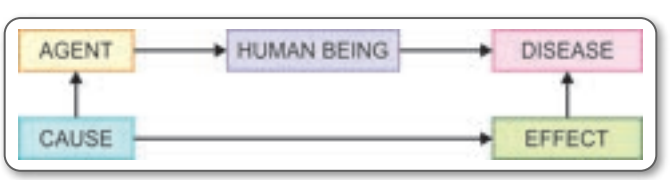


Fig. 1.14: Single cause theory

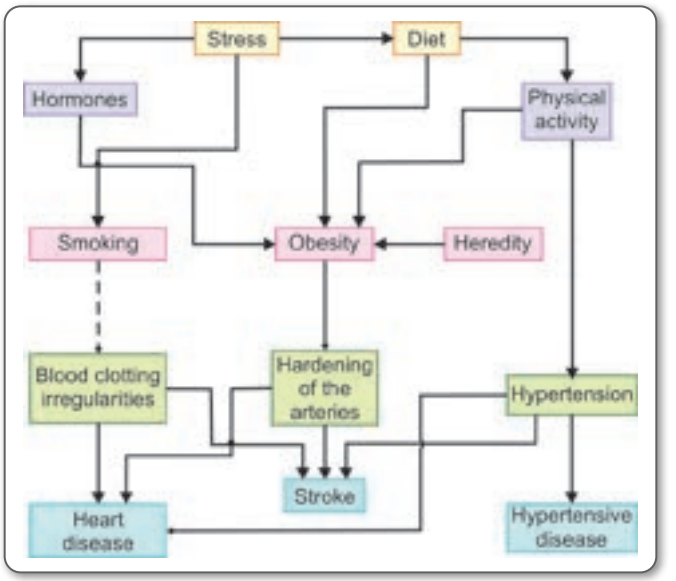


Fig. 1.15: Web of causation in case of stroke

how they relate to each other. The web of causation does not imply that the disease cannot be controlled until and unless all the multiple causes or chain of causation or at least a number of them are appropriately controlled. Sometimes, removal of one link may be sufficient to control disease.

Natural History and Spectrum of Disease

This theory refers to the development of a disease process in an individual gradually in the absence of treatment. For example, untreated human immunodeficiency virus (HIV) infection causes a range of clinical problems and terminates with acquired immune deficiency syndrome (AIDS) and then death. Many diseases have a characteristic natural history, but incubation period and clinical features may differ from person to person, as it may be affected by preventive and therapeutic measures.

Leavells Model

The cycle begins with the exposure of factors to a susceptible host. Microorganism may also be an exposure or cause for an infection. The exposure for cancer may be a factor like asbestos fibers or tobacco smoke (for lung cancer), or one that promotes the process, such as estrogen (for endometrial cancer) (Table 1.2).

Once the disease process has been activated, pathological changes occur without the individual being aware of them. This stage of subclinical disease is usually called the **incubation period** for infectious diseases, and the **latency period** for chronic diseases that extends from the time of exposure to onset of disease symptoms. During this stage, the individual remains asymptomatic. There is an incubation period for each specific disease. For example, the typical incubation period for hepatitis A is as long as 7 weeks.

TABLE 1.2: Leavells model of natural history of disease

Stimulus to the host	Host reaction		Recovery
Interconnection of agent, host and environment	Latent period (pre-symptomatic)	Symptoms, signs (clinical)	With or without defect, disability
Prepathogenesis	Period of pathogenesis		
Health promotion specific protection	Early diagnosis and treatment	Disability limitation rehabilitation	
Primary prevention	Secondary prevention	Treatment	Tertiary prevention

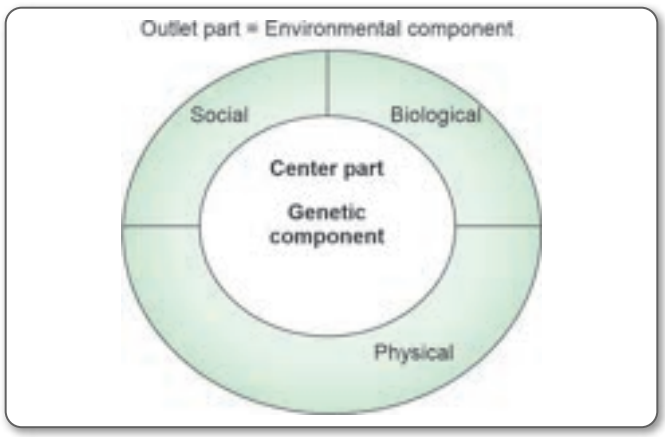


Fig. 1.16: Wheel theory

Wheel Theory

The disease occurring in human body is depicted as a wheel, which has a center hub that represents the genetic components and the outer portion (outlet) is the environmental component which has three subdivisions representing the spokes of the wheel that are social, biological and physical components of the environment (Fig. 1.16).

Concepts of Disease Control

The term disease control refers to ongoing operation aimed at reducing:

- The incidence of disease
- The duration of disease and the consequently the risk of transmission
- The effect of infection including physical and psychological complication
- The financial burden to the community

In control of disease, the disease agent is permitted to persist in the community at a level where it ceases to be a public health problem according to the tolerance of local community. An example is malaria control program. Disease control activities are focused on primary prevention.

Elimination

Reduction of transmission of diseases to a predetermined low level or number of disease cases reduce in transmission, e.g., measles, polio, leprosy.

Eradication

Termination of all transmission of infection and no such infectious agent found on extermination through surveillance and containment. "All or none phenomenon". e.g., smallpox

Monitoring

Detecting changes in the environment or health status of population with methods of routine measurement. e.g., growth monitoring of a child, monitoring of air pollution, monitoring of water quality, etc. It also measures the performance of health services and the compliance of patients.

Surveillance

Defined as, "the continuous scrutiny of the factors that determine the occurrence and distribution of disease and other conditions of ill health. e.g., Poliomyelitis surveillance program of WHO.

Surveillance includes three primary activities:

1. Collection of relevant data for a specified population, time period and/or geographic area
2. Meaningful analysis of the data
3. Routine dissemination of the data with accompanying interpretation.

Types of Surveillance

- **Active surveillance:** It depends on public health legislation. Daily, weekly or monthly contact to physicians, hospitals, laboratories, schools or others to "actively" search for cases is the required activity.
- **Passive surveillance:** Gathering the reports of infections/disease from physicians, laboratories and other health care professionals as per public health legislation.

Responsibilities of Health Care Professional in Surveillance

- Surveillance reports should be prepared and distributed to health care professionals participating in disease prevention and control activities
- Identify populations that are experiencing or might experience, an increased frequency of infection. Specify the frequency of occurrence of infection in population groups at risk by person, place and time
- Identify exposed individuals to whom the infection may have been transmitted
- Determine the source of infection
- Identify and describe each individual having an infection as quickly as possible after exposure.

Concept of Disease Prevention

The main aims of health care services are to promote and protect health, alleviate sufferings and disabilities and to recover health so as to lead socially and economically productive life.

Disease prevention can be defined as activities designed to protect patients and other members of the public from actual or potential health threats and their harmful consequences. **Mosby's Medical Dictionary, 2009.**

The concept of prevention came into being when Leavell and Clark in 1953 defined levels of application for disease prevention. These are five:

1. Health promotion
2. Specific protection
3. Early recognition and prompt treatment
4. Disability limitation
5. Rehabilitation.

The Commission on chronic illness in 1957 used the words Primary and Secondary prevention where Primary Prevention referred to prevent the occurrence of disease and secondary prevention meant to halt the progression of disease from its actual state to more severe form.

Again in 1958, Leavell and Clark concised the five levels of prevention into three categories as discussed below.

1. **Primary Prevention**
   - Health promotion (improving general health and wellness)
   - Specific protection (measures relevant to specific diseases taken before they involve the human beings)
2. **Secondary Prevention**
   - Early recognition and prompt treatment (prevention from spreading to others)
3. **Tertiary Prevention**
   - Disability limitation (delaying of the consequences of clinically advance disease)
   - Rehabilitation (prevention of complete disability after structural changes get stabilized)

Thereafter, again in 1965, some modifications were adopted where Levels of Prevention were termed as Phases of Prevention and disability limitation was transferred to secondary phase prevention.

Later on in 1983, Gordon limited the use of word prevention to persons who have not yet suffered any discomfort or disability due to the disease.

Classification was based on the following features:

- Universal measures for everyone
- Selective measures for above–risk demographies
- Indicated measures for persons at risk

Tannahill, in 1985, reviewed the usages of primary, secondary and tertiary prevention and came up with a new classification:

High Yield Point

Focus of Prevention

- Prevention of the first occurrence of an illness or unwanted phenomenon
- Prevention of consequences that can be avoided of illness or other unwanted state through early detection when this favorably affects the outcome
- Prevention of avoidable complications of established disease or other unwanted state
- Prevention of recurrence.

Froom and Benbassat in 2001, classified further the categories of prevention as:

- **Level 1:** Reducing exposure to an etiologic agent
- **Level 2:** Increasing resistance to the disease
- **Level 3:** Screening for risk factors for disease (in asymptomatic individuals) in order to reduce them.
- **Level 4:** Prevention of recurrence (in asymptomatic individuals after a disease-related event)
- **Level 5:** Treatment aims at prevention of complications (in asymptomatic individuals after a disease-related event)
- **Level 6:** Treatment of symptomatic patients for cure, palliation, or reduction of mortality
- **Level 7:** Rehabilitation of "adjustment to irremediable conditions

From 2008 to 2009, Ronald Hattis classified stages of prevention according to stages of disease (Table 1.3).

Traditionally, concept of prevention is best defined in terms of levels of prevention:

- Primordial prevention
- Primary prevention
- Secondary prevention
- Tertiary prevention

Primordial Prevention

- Risk factors prevention
- Prevention from emergence or development of Risk Factors
- Discouraging harmful lifestyles
- Encouraging or promoting healthy eating habits

TABLE 1.3: Stages of disease development and corresponding stages of prevention

Stages of disease development	Corresponding stages of prevention
Exposure	Avoidance of exposure
Acquisition	Reduction of Acquisition
Advancement/Progression	Interruption of progression
Complications	Avoidance of complications
Death/Disability	Delay of mortality Rehabilitation of disability Palliative care for inevitable death

- Examples include to promote National Programs and policies

Primary Prevention

Primary prevention is true prevention. It precedes disease or dysfunction and is applied to patients considered physically and emotionally healthy. It is not therapeutic, and does not involve symptom identification.

- The purpose is to decrease the vulnerability of the individual or population to an illness or dysfunction
- Primary prevention includes passive and active strategies of health promotion.
- It can be provided to an individual or to a general population.
- Pre-pathogenesis phase of a disease
- Action taken prior to the onset of the disease
- Approached through population strategy mainly, i.e., directed at whole population irrespective of individual risk levels
- Immunization and chemoprophylaxis.

Secondary Prevention

Focuses on persons who are experiencing health problems or illness and who are at risk for developing complications and worsening conditions. Activities are directed at diagnosing and prompt intervention, thereby reducing severity and enabling the patient to return to a normal level of health as early as possible.

A large population of secondary level nursing care is delivered to homes, hospitals or skilled nursing facilities. It includes increasing techniques and treating early stages of disease to limit disability by displaying the consequences of advanced disease.

- Halt the progress of a disease at its early phase
- Early diagnosis and adequate medical treatment
- Seeks out unrecognized disease
- Protects community

Tertiary Prevention

Tertiary prevention occurs when a defect or disability is permanent and irreversible. It involves minimizing the effects of a long-term disease or disability by interventions detected for preventing complications and deterioration.

- Activities are directed toward rehabilitation rather than diagnosis and treatment. Care at this level aims to help the patients to achieve as high a level of functioning as possible. This level of care is called preventive care because it involves preventing further disability as reduced functioning.
- Intervention in the late pathogenesis phase.
- Reduce impairments, minimize disabilities and suffering.
- Promote the patients' adjustment toward unalterable conditions.

Modes of Intervention

Intervention is a process to intervene the usual sequence in the development of disease. There are five modes of intervention which corresponds to the natural history of any disease are:

1. Health promotion
2. Specific protection
3. Early diagnosis and adequate treatment
4. Disability limitation
5. Rehabilitation

Health promotion: Health promotion is the process to increase control over diseases, and to improve patient health. Health promotion is not only directed against any particular disease but is intended to strengthen the host through the various approaches:

- Health education
- Environmental modifications
- Nutritional interventions
- Lifestyle and behavioral change.

Specific protection: Some of the disease specific precautions are taken which aim at specific protection are:

- Immunization
- Use of specific nutrients
- Chemoprophylaxis
- Protection against occupational hazards
- Avoidance of allergens
- Control of specific hazards in general environment
- Control of consumer product quality and safety

Early diagnosis and adequate treatment: "Primary prevention" which is also known as early detection and treatment are the important interventions of disease control, and help in reducing the high morbidity and mortality in certain diseases like hypertension, cancer of cervix, and breast cancer. The earlier the disease is diagnosed, prevented and treated is better from the point of view of prognosis occurrence of further cases (secondary cases) or long term disabilities.

Disability limitations: The objective of disability limitation is to control the spread of the disease process from impairment to handicap. The chain of events leading to disability and handicap are:

Disease → Impairment → Disability → Handicap

- **Impairment:** Loss or dysfunction of psychological, physiological/anatomical structure or function of any organ of the body.
- **Disability:** Lack of ability to perform activity of any part of the body in a manner considered normal.
- **Handicap:** Any disability that prevents one from fulfilling normal role.

Rehabilitation: Rehabilitation has been defined as the, "regular practice and exercise of medical, social, educational and vocational measures for training and retraining the individual to the highest possible level of functional ability." Rehabilitation is a care that supports patient to get back or improve abilities for daily living. These abilities can be physical, mental, and/or cognitive. Patient may lose those activities due to a disease condition or injury, or as a side effect from any medical or surgical treatment.

Types of Rehabilitation

- **Medical rehabilitation:** Restoration of function
- **Vocational rehabilitation:** Restoration of ability to earn a livelihood
- **Social rehabilitation:** Restoration of family and social relationships
- **Psychological rehabilitation:** Restoring back self-esteem and assurance.

Common Causes for Rehabilitation Care

- Injuries and trauma
- Stroke
- Severe infections
- Major surgery (Spinal injury)
- Side effects from treatments, such as from cancer treatments
- Birth defect
- Developmental Disabilities

Types of Treatments in Rehabilitation Care

- Assistive devices
- Cognitive rehabilitation therapy (thinking, learning, memory and decision making)
- Mental health counseling
- Music or art therapy
- Nutritional counseling
- Occupational therapy
- Physical therapy
- Recreational therapy
- Speech-language therapy
- Treatment for pain
- Vocational rehabilitation

INTERNATIONAL CLASSIFICATION OF DISEASES (ICD)

ICD Purpose and uses

The purpose of ICD is the identification of health trends and statistics globally, and keep the international standard for reporting diseases and health conditions. It is the diagnostic classification standard is which used for all research purposes. ICD defines all the diseases, disorders, injuries and other related health conditions, listed in a comprehensive and hierarchical fashion that allows for:

- Easy storage
- Analysis of health information
- Evidence-based decision-making
- Comparison of health information between hospitals, regions, settings and countries
- Data comparisons in the same location across different time periods

History of ICD

The first international classification edition, known as the International List of Causes of Death, was adopted by the International Statistical Institute in 1893.

In 1948, WHO was entrusted with the ICD at its creation and published the 6th version, Morbidity is incorporated for the first time in ICD-6. In 1967, WHO has adopted Nomenclature Regulations and use the most current ICD revision for mortality and morbidity statistics. The ICD has been revised timely and published in a series of various editions to reflect advances in health sector over time.

The Forty-third World Health Assembly endorsed ICD-10 in May 1990. It is published in more than 20,000 scientific articles and used by more than 100 countries.

On 18 June 2018, an ICD-11 was released to allow Member States to prepare for implementation, and also translating ICD into their national languages. ICD-11 have been submitted to the 144th Executive Board Meeting in January 2019 and the Seventy-second World Health Assembly in May 2019 and, following endorsement, Member States have started using ICD-11 on January 1, 2022.

ICD-11 will be presented at the World Health Assembly in May 2019 for adoption by Member States, and will come into effect on 1 January 2022. This release is an advance preview that will allow countries to plan how to use the new version, prepare translations, and train health professionals all over the country.

The ICD is also used by health insurers whose reimbursements depend on ICD coding; national health programme managers; data collection specialists; and others who track progress in global health and determine the allocation of health resources.

The new ICD-11 also reflects progress in medicine and advances in scientific understanding. For example, the codes relating to antimicrobial resistance are more closely in line with the Global Antimicrobial Resistance Surveillance System (GLASS). ICD-11 is also able to better capture data regarding safety in health care, which means that unnecessary events that may harm health—such as unsafe workflows in hospitals can be identified and reduced.

The new ICD also includes new chapters, one on traditional medicine: Although millions of people use traditional medicine worldwide, it has never been classified in this system. Another new chapter on sexual health brings together conditions that were previously categorized in other ways (e.g., gender incongruence was listed under mental health conditions) or described differently. Gaming disorder has been added to the section on addictive disorders.

Uses include monitoring of the incidence and prevalence of diseases, observing reimbursements and resource allocation trends, and keeping track of safety and quality guidelines. They also include the counting of deaths as well as diseases, injuries, symptoms, reasons for encounter, factors that influence health status, and external causes of disease (Table 1.4).

CONCEPTS OF COMPREHENSIVE HEALTH CARE IN MEDICAL SURGICAL CONDITIONS

According to WHO, "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."

TABLE 1.4: Mortality and morbidity statistics

ICD-11 – Mortality and Morbidity Statistics
• Certain infectious or parasitic diseases
• Neoplasms
• Diseases of the blood or blood-forming organs
• Diseases of the immune system
• Endocrine, nutritional or metabolic diseases
• Mental, behavioral or neuro developmental disorders
• Sleep-wake disorders
• Diseases of the nervous system
• Diseases of the visual system
• Diseases of the ear or mastoid process
• Diseases of the circulatory system
• Diseases of the respiratory system
• Diseases of the digestive system
• Diseases of the skin
• Diseases of the musculoskeletal system or connective tissue
• Diseases of the genitourinary system
• Conditions related to sexual health
• Pregnancy, childbirth or the puerperium
• Certain conditions originating in the perinatal period
• Developmental anomalies
• Symptoms, signs or clinical findings, not elsewhere classified
• Injury, poisoning or certain other consequences of external causes
• External causes of morbidity or mortality
• Factors influencing health status or contact with health services
• Codes for special purposes
• Traditional Medicine conditions — Module I
• Supplementary section for functioning assessment
• Extension Codes

Health is derived from an old English word "Health" meaning the condition of being "Safe and Sound" or "Whole." The concept of health as defined by WHO is comprehensive and positive. It is comprehensive because it refers to well-being of all the dimensions of life, i.e., physical, mental and social.

A fourth dimension, i.e., spiritual dimension is also present which is positive because it is not just the absence of disease but it refers to complete state of well-being and reflects holistic nature of the human beings. Thus, it denotes a perfect health which is an ideal goal.

HEALTH PROMOTION, WELLNESS, AND ILLNESS PREVENTION

Health promotion methods can be active or passive.

The passive promotion of health means when the individuals gain good health from the activities of others (other people/company/institutions, etc.) without acting themselves. For example, the cleaning and supplying clean drinking water for an individual by municipal and the fortification of homogenized milk with Vitamin D are examples of passive health promotion strategies.

- With active methods of health promotion, individuals are encouraged to adopt specific health programs. For example, weight reduction exercise programs and smoking cessation programs which require patients to be involved in measures to improve their present health and decreasing the risk of disease in future.
  - **Wellness education** teaches people how to care themselves in a healthy way and includes topic such as stress management, physical awareness and self-responsibility.
  - **Illness prevention** activities such as immunization programs protects patients from actual or potential threats to health.

HEALTH CARE MODELS

Holistic Health Model

Holistic health is a comprehensive view of the person as a biopsychosocial and spiritual being.

The intent of the holistic health model is to empower patients to engage in their own healing process. The model involves the techniques as "experimental" or "alternative". The personal health choices have a powerful impact on an individual's health.

Holistic nurses are integrating these therapies into practice to treat physiological, psychological and spiritual patient needs, and to complement conventional medical therapies. The nursing knowledge, theories, expertise and

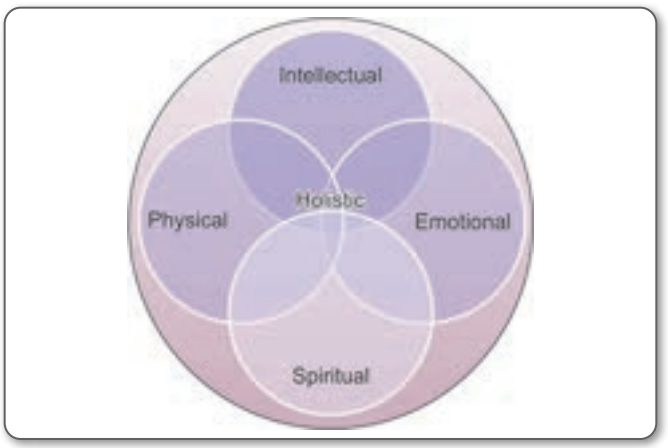


Fig. 1.17: Holistic health model

intuition guide us to work with patients and strengthen their response to the healing process (Fig. 1.17).

Some of the widely used holistic intervention includes aroma therapy, biofeedback, breathing exercise, massage therapy, meditation, music therapy, relaxation therapy, therapeutic touch and guide imagery. It is easily learn and can be applied to any nursing setting and to all stages of health and illness.

Health Belief Model

- Health beliefs are a person's ideas, convictions and attitudes about health and illness. They may be based on common sense or myths, factual information or misinformation. Because health belief usually influences health behavior, they can positively or negatively affect a patient's level of health.
- Positive health behaviors are activities related to maintaining, attaining or regaining good health and preventing illness. Common positive health beliefs include immunization, proper sleep pattern, adequate exercise and good nutrition.
- Negative health behaviors are activities actually or potentially harmful to health, such as smoking, drug or alcohol abuse, poor diet and refusal to take necessary medication.
- The first component of this model involves the individual's perception of susceptibility to an illness (Fig. 1.18).

  For example, a patient needs to recognize the familial link for coronary artery disease. After this link is recognized, the patient may perceive a personal risk of heart disease.
- The second component is the individual's perception of the seriousness of the illness. This perception is influenced and modified by demographic variables, perceived threats of illness and cues to action (e.g., mass media campaigns and advice from family, friends and medical professionals).
- The third component, the likelihood that a person will take preventive action results from the person's perception of the benefits of and barrier to take action. Preventive action may include lifestyle changes, increased participation in recommended medical therapies, or a search for medical advice or treatment.

  Thus, the health belief model helps us to understand factors influencing patient's perception, beliefs and behavior and to plan care that will most effectively assist patients in maintaining or restoring health and preventing illness.

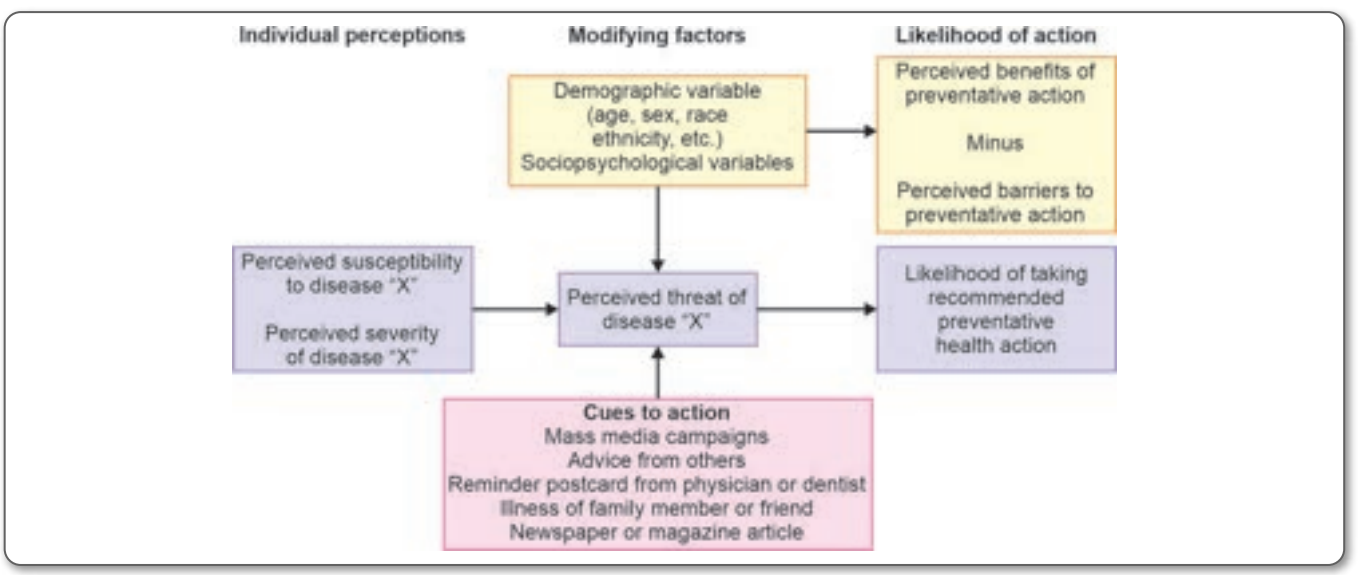


Fig. 1.18: Health belief model

Variables Influencing Health Beliefs and Health Practices

Person's beliefs about their own health, as well as their health practices and the manner, in which they care for themselves, ultimately influence their health status.

- **Health beliefs** are a person's ideas and attitude about health.
- **Health practices** are those activities that individuals do to care for themselves. It includes activities of daily living such as bathing, brushing teeth and taking medication and visiting the doctor for routine checkups.

Many variables can influence patient's health beliefs, health practices and self-care. Internal and external variables can influence how a person thinks and acts and how a person will deal with an illness.

Internal Variables

Developmental stage: A person's concept of illness is dependent on the person's developmental stage. Knowledge of the stages of growth and development will help to predict the patient's response to the present illness or the threat of the future illness. The educational interventions need to be age appropriate to be effective.

For example, use of different techniques of teaching about contraception to an adolescent and to an adult.

Intellectual background: The cognitive abilities shape the way a person thinks, including the ability to understand the factors involved in illness and to apply knowledge of health and illness to personal health practices.

Emotional factors: A person's degree of calmness and stress can influence health beliefs and practices.

The manner in which a person handles stress throughout each phase of life will influence the way a person reacts to illness. A person who is generally very calm may have little emotional response during illness, whereas a person normally unable to cope with stress may either over react to illness or may deny the presence of symptoms and not take the therapeutic action.

Spiritual factors: Spirituality is reflected in how a person lives his or her own life, including the values and beliefs exercised, the relationship established with family and friends and the ability to find a hope and meaning in life. Religious practices are one way people exercise spirituality. To understand patient's spiritual dimension is important to involve them effectively in nursing care.

External Variables

Family practices: The way of perception of the seriousness of the disease and the history of preventive care behavior can influence on how patients think about health. A person is raised in a family who believes in the importance of preventive care.

For example, dental health checkup twice a year, is more likely to continue those health practices as an adult.

Socioeconomic factors: Social and economic factors can increase the risk for illness and influence the way that a person defines and reacts to illness.

A person's participation in the treatment that is designed to maintain or improve health is affected by economic status. A person who has high utility bills, large family and a low income tends to give a higher priority to food and shelter than to costly drugs or expensive foods.

Cultural background: It influences beliefs, values and customs; the approach to health care system, personal health practices and the nurse patient relationship. We need to recognize and understand the cultural patterns of behavior and beliefs to interact with the patient.

Thus, nursing incorporates health promotion; wellness and illness prevention activities rather than simply treating illness and, therefore, comprehensive nursing interventions can be used to complement standard medical therapy.

ROLES AND RESPONSIBILITIES OF A NURSE IN MEDICAL SURGICAL NURSING SETTINGS

Medical surgical nurses offer direct care to adult patients in various settings. They recognize that the patient is the central focus in the delivery of nursing care services. The main aim of the medical surgical nursing is to promote, restore and maintain the health of the patient.

Medical surgical nurses carry out their tasks at hospitals, inpatient care units, outpatient departments, clinics, ambulatory care centers, nursing homes, surgical centers, community health centers. The patient is the recipient of nursing actions and can be an adult, a family, a group, or a community. For an adult patient, the focus is on the health state, their problems or needs throughout their lifetime. For a family or group, the joint effects of an individual's health state on the other members of the unit or the health state of the unit as a whole matters. The nurses working under these different settings are committed to assist the patient in achieving the optimal level of health. Nursing actions are aimed at prevention of disease, alleviation of further disease and dysfunction, assisting with rehabilitation process and supporting through a comfortable death journey.

A medical surgical nurse manages care for adult patients with acute and chronic conditions apart from surgical care. For example, a patient awaiting an appendectomy might also be under treatment for a cardiac disorder. Medical surgical nurses ought to coordinate, organize and prioritize complex

patient care assignments; guide patients and their families through complex health care systems; advocate for patient rights; use current research to provide care for diverse needs; and utilize nursing best practices in diverse situations. They must have an understanding of the intricate medications and how they interact with each other in patient's body. They also must be competent enough about new technologies used in patient care (Fig. 1.19).

Roles of a Nurse in an Inpatient Unit

- Medical surgical nurse plans and gives direct nursing care to each patient according to the plan of medical and nursing care
- Medical surgical nurse becomes acquainted with the history and background of the patient assigned to him/her, and observes and meets the physical, emotional, mental, socioeconomic and spiritual needs of the patient
- Applies knowledge of scientific principles in observing the patient and in performing nursing procedures and techniques
- Reports observations and symptoms to the doctors and carries out his orders
- Records the observations and nursing procedures in the nurse's chart
- Safeguards the privacy of patients
- Teaches the patient self-care and rehabilitation physically mentally and socially
- Health guidance is given to patient and their relatives
- Teaches and guides members of his/her team, for whom he/she has responsibility. Provides with opportunity for giving cooperation in the planning of patient
- Maintains nurse–patient relationship
- Makes appropriate changes in the physical environment

Fig. 1.19: Different roles of a nurse

- Reports needed changes in physical environment to the head nurse
- Utilizes available hospital resources to meet the needs of patients
- Establishes good interpersonal relationship with patients and ward staff
- Contributes to the establishment and maintains a good ward management
- Participates in revising procedures and techniques
- Recognizes and coordinates and interprets the philosophy and functions of nursing services
- A nurse, investigates nursing problems to improve the patient's care and community health in general.

Roles of a Nurse in an Outpatient Unit

Those who require health care but do not need to stay in the facility. Individuals who do not require inpatient care can receive treatment, care and education on an outpatient basis. Examples of outpatient services include surgical procedures, diagnostic counseling and health education. A form of outpatient care provided by hospitals occurs in short stay unit, whose patients having diagnostic tests or surgery enter the hospital, have the procedure and then return to the hospital room for a brief (1–6 hours) recovery period before going home. Patients may also be categorized as outpatients when they are admitted, treated, and discharged within 23 hours period of time.

- Makes assessments of health status of patients
- Assists the primary care provider
- Assists the doctors for noninvasive procedure
- Provides direct patient care
- Coordinates care provided by the others
- Teaches patients and family
- Plans, implements and evaluates the plan of care
- Serves as patient advocate
- Coordinates discharge planning to ensure continuity of care
- Makes referrals
- Referrals for rehabilitation and physical therapy
- Takes the valid consent for different procedures in OPD.

Roles of the Nurse In an Intensive Care Unit

Intensive care unit (ICU) is equipped with sophisticated monitoring of emergency equipment, which is readily available and staffed by qualified and experienced personnel and with access to all support departments.

The critically ill patient has life-threatening or potentially life-threatening health problems that require continuous monitoring and intervention to prevent complication and

to restore health. Thus continuous patient surveillance and interventions are needed to tackle and prevent complication along with participating in the treatment and care. This is the major role of the nurse in the ICU. The nurses are required to have a first hand assessment of the patient's condition to deliver high intensive therapies and interventions and therefore, must acquire expert guidance and knowledge.

- Specific critical care nurse duties and responsibilities include the following:
  - Assessing a patient's condition and planning and implementing patient care plans
  - Treating wounds and providing advanced life support
  - Assisting physicians in performing procedures
  - Observing and recording patient vital signs
  - Ensuring that ventilators, monitors and other types of medical equipment function properly
  - Administering intravenous fluids and medications
  - Ordering diagnostic tests
  - Collaborating with fellow members of the critical care team
  - Responding to life-saving situations, using nursing standards and protocols for treatment
  - Acting as patient's advocate
  - Providing education and support to patient families

Role of nurse can be broadly classified into extended and expanded roles.

Extended Nursing Roles

Assisting the patients in their daily activities is the role played by nurses working in the extended care facilities. She provides care in emergency and also manages rehabilitative services. They have a great autonomy but increased responsibilities and provide patient care in different settings like hospital and community.

Extended role of nurse are activities concerned with the patient either in hospital or community that are appropriate for delegation by doctors to nurses.

Extended role of nurses are as follows:

- **Care giver:** Care giving role is primary role of nurse. Nurse provides the holistic care to the client, including measures to restore emotional, spiritual and social well being.
- **Manager:** Nurse as manager coordinates activities with other health care team. A manager should have skills such as decision making and critical thinking.
- **Protector and advocator:** As protector, nurse helps to maintain a safe environment for the client and take preventive steps to injury and protect client from possible adverse effects of diagnostic or treatment measures. - Conforming that a client does not have an allergy to a medication and providing immunization
- **Counselor:** The role of a counselor, nurse helps the client and family memebers to explore feelings and attitude about wellness and illness. It involves providing emotional, intellectual and psychological support. Counseling requires therapeutic communication skills.
- **Communicator:** The role of communicator is central to all nursing roles and activities. Nursing involves communication with client, families, other nurses and health care professional and the community. Quality of communication is to meet the needs of individual, families and communities.
- **Rehabilitator:** Rehabilitation is the recovery process by which individual returns to maximum level of functioning after illness, accidents or other disability events. When client experiences physical or emotional impairment that changes their lives, during that time the nurse helps them to adapt as fully as possible by using her knowledge and skills and engage him or her in daily activities.
- **Collaborator:** Many professions build up the team involved in the care of each patient and these professionals are responsible for their own task. Besides nurse, the other professionals are physical therapist, occupational therapist, social workers and nutrionists. The nurse is responsible to collaborate with other team members to providing care to patient. This helps the patient in their complete recovery.

Expanded Nursing Roles

An expanded role of nurse means when a nurse has expanded or increased responsibilities in a practice area with greater autonomy.

Professional nursing is adapting to meet new changes and technology in health needs and expectations. The expanded role of a nurse is one such type of adaptation in response to the need to improve the distribution of health care services and to decrease the cost of health care. The nurse-practioner, clinical nurse specialists, certified nurse-midwives, and certified registered nurse anesthetists, are identified as advanced practice nurses.

The nurse who works as advanced nurse practitioner provides direct care to patients through independent practice inside the hospital, or collaboration with a physician. With the recent technology and advancement in health care, the nursing specialization has evolved within the expanded roles of nursing. Nurses take advance specialty education and training in the areas of family, critical care, coronary care, respiratory care, oncologic care, maternal and child health care, neonatal intensive care, rehabilitation, trauma, rural health, and gerontologic nursing, to name just a few.

With the expanded role of the nurse, the various titles have come up to specify the functions as well as the educational preparation of nurses. In medical-surgical nursing, the most significant of these titles are nurse practitioner and clinical nurse specialist, and advanced practice nurse.

Pertaining to Medical Surgical areas, various nurses are as follows:

- **Advanced nurse practitioner:** A Registered Nurse who has an advanced nursing education or graduate of a nurse practitioner program working in health care agencies or in the community settings and deals with chronic illness and provides primary ambulatory care to the patient.
- **Clinical nurse specialist:** The clinical nurse specialist has a master's degree in nursing with the super specialization in an area of practice. The clinical nurse specialist can also work in primary care, acute care, rehabilitative care and community based settings.
- **Nurse anesthetist:** Provides pre-operative, intra operative and post-operative care to the patient and assists to anesthetist and surgeon during surgery.
- **Acute care nurse practitioner:** An acute care nurse practitioner provides care to the critically ill patients in critical care units, this type of nurses provide special expertise.
- **Operating room nurse:** The nurse monitors the patients before and after surgery from the time of entry in the operating room until he/she is hands over the patient to the attending staff nurse.
- **Professional nurse care manager:** The nurse case manager assesses the patients and develops care plan according to expected outcomes in terms of cost and quality of care.
- **Nurse oncologist:** A nurse who cares for cancer patients.
- **Hospice nurse:** A nurse who cares for terminally ill patient. The care includes physical, psychological, emotional and spiritual care to the patient and their families to promote quality of life.
- **Telenursing:** Whenever nurse cannot visit the patient physically to provide his/her services then the nurse provides nursing services with the use of tele-communication and information technology.
- **Disaster/bioterrorism nurse:** A nurse works in bio terrorist attack or in situation caused by natural or man-made disaster.
- **Epidemiology nurse:** The nurse epidemiologist investigates disease occurrence in particular area, identifies the population at risk, monitors the progress of disease, special areas of health care need and identifies priorities.
- **Occupational health nurse:** Specialty area that provides delivery of health and safety programs to workers, organizations, employees and communities with the aim to protect work related and environmental hazards.
- **Infection control nurse:** The ICN monitors the standards and procedures for the prevention and control of infectious diseases, communicable diseases and nosocomial infections. They conduct regular monitoring of infection control policies followed in the hospital, give recommendations for isolated infections, determines risk factors leading to infection.
- **Forensic nurse:** The forensic nursing is a domain wherein the nurse is expected to be acquainted with the basics of forensic medicine so as to handle and preserve the evidentiary materials.
- **Infusion nurse:** She is a registered nurse specialized in the administration of medications and fluids through an intravenous line, central line or venous access device.

Nurse as a Care Coordinator

Critical care nurse is one member of the team who is involved in the care of critically ill patient. The nurse provides round the clock care in continuity while other health professionals visit the patient. She delivers care with a holistic approach.

Must Know

Nurse Physician Collaboration

There is no other area where a collaborative effort by the nurse and physician is required than in critical care unit and the primary focus remains the patient. Nurses appreciate and value a physician for:

- Staying near when a patient's condition deteriorates
- Keeping the family informed of patient's condition
- Teaching nurses about new therapy and intervention
- Recognizing the maximum efforts of nurse and assisting her in emergency situation
- Establishing a sense of team spirit is highly rewarding.

Nurse as a Manager

The essential leadership skills required for a nurse manager in the unit are:

- Creation of a vision
- The building of trust and maintenance of motivation
- Facilitating of change and creation of work environment, which is conducive to patient welfare and staff's learning.

The Nurse Manager in the unit is responsible for managerial functions of:

- Planning
- Organizing
- Staffing
- Leading
- Controlling
- She functions as a clinical expert as well.

Nurse as a Caregiver

- Critical care nurse is a qualified nurse by virtue of experience or specialized training responsible to provide direct patient care to all patients admitted to the ICU. She uses sound scientific knowledge in using processes while delivering nursing care to the patients.
- She needs to ensure adequate supplies of equipment in optimal working condition and be available to meet all the emergencies that may occur in the unit.
- She is also responsible to maintain the records and reports, which are used in the unit.
- She forms a liaison between the patient, family and other members of the team.

Functions of a Community Health Nurse

The community health nurse has a much wider role than is offered by her work in hospitals. The elements of job roles of community health nurse are decision-making, management skills, administration of programs, teaching and acting as a team leader, as well as a member of a health team to implement health programs. The most important requirement for community health nurse is that she must be prepared to learn from the people, and share leadership with them when it is necessary and to plan with them. The following are the role and responsibilities of a community health nurse.

Care Provider

The usual perception is that a nurse cares for a person when he/she is sick. This perception places her in better position because she gets accepted by the individual and his/her family. She is also able to gain their trust and confidence because she helps when it is required. But in community health nursing, the care is not limited to individual alone. The community health nurse provides care to the entire family, group of people and even the community at large. She provides comprehensive care to the person. The nature of care is continuous in nursing and not episodic.

- The community health nurse approaches the patient for providing promotive of preventing services
- In providing such care, the community health nurse requires additional skill such as:
  - Functioning with the family, groups and community to plan and work together to achieve the nursing goal and objectives.
  - Functioning with other members of health team to achieve the health goals and objectives.
  - Planning and organizing health education for family, groups and community at large, making assessment, planning and implementation of intervention, evaluation of health care at family, group and community levels.
  - Processing and utilization of vital health statistics, problem solving epidemiological approaches and principles.
  - The care is provided in the clinic, home, school and at work place depending upon health problems/ medical conditions, medical prescription, nursing needs/nursing problems, competence of individual family members, etc.

Sensitive Observer

It is very essential for a community health nurse to observe, react and take action with respect to determinants of health of individual, family and community at large. It includes the following:

- Observation of people with respect to any evidence of ill health, abnormal behavior, poor growth and development, response to treatment, etc. and to take necessary action including giving information to medical officer.
- Observation of lifestyle of the people with respect to any evidence of poor health knowledge, health attitude, health behavior and practices which effect their health and to take necessary actions which can help improve their lifestyle and health.
- Observation of environment conditions with respect to physical and psychosocial aspects, which affect health and welfare of the family and community at large. Any condition which threatens the outbreak of any diseases must be reported to the authority and the concerned health worker to take actions.
- Observation of resources available as to help family and community people to use them intelligently in meeting their health needs.

Educator

Teaching and training is the basic function of a nurse. For a community health nurse, teaching is the important and key function to teach rural population about health care and safety. The community health nurse teaches individuals, families and community not only when they are sick or have any health problem but also when they are well to promote health and prevent illness. The aim of community health nursing is to:

- Provide health knowledge to community people
- Modify health attitude, health behavior toward self-reliant in dealing their health matter, etc.

The health education can be done in the clinics, home, school, work place, etc. There is a wide range of topics which are taught. The major emphasis is on health promotion and disease prevention, e.g., teaching a school child about care of dirty nails.

Advocate

As an advocate, the community health nurse stands between the individual, family/community and serious specialized services. There are situations when they are ignorant about the various services which are available. She explains them about the services available and guides them how to use these services. As an effective advocate, the community health nurse needs to possess certain qualities which are as follows:

- Willingness to take risk
- Assertiveness
- Communicability
- Resourcefulness

Concerned Advisor

The community health nurse acts as an advisor. She gives suggestions and advice on practical situations which require immediate action and where there is no scope of health education, for example, an antenatal mother having threatened abortion or child with acute pneumonia.

Agent of Change

The community health nurse acts as a change agent, i.e., she serves as a potentiator or catalyst. It means that she is able to make others more effective by increasing their capabilities to: (i) cope up with their health problems, (ii) provide care to them whose family members and community people are not able to solve their health problem, then she helps them to solve their problems. In doing so, she again teaches them to develop their capabilities and to effect change in their attitude and health behavior.

Manager

Community health nurses are expected to function as manager of family health care, school health care, community care, any specific program or project, etc. It involves the management of care in the home, clinic, school, other community settings, etc. She may be expected to manage by herself or together with medical officer and other personnel. As a manager, she plans, organizes, coordinates, supervises, guides, directs, reports and evaluates.

Planner

Planning is the foremost function of community health nurse. Planner's role will depend upon her role as a manager. If she is the manager of family health care, then she does planning of family health care by making health assessment, setting up goals and objectives, identifying alternative action, implementing and evaluating the care given.

Organizer

Organizing is the second function of management. Once a community health nurse plans any care/service/program, she has to organize the structure for the people to perform the task to achieve the set objectives, i.e., she has to decide who will do what, who will report to whom, where and how decisions will be made. She makes arrangement for equipment and supplies, etc. for the work to be performed. She also assigns the task to be performed by the health worker. In this way, she ensures smooth functioning to achieve the objectives of program. Thus as an organizer, she tries to provide infrastructure for people to function to achieve the desired objectives.

Director and Coordinator

Community health nurse not only has to organize but has to make sure that the work is done as planned. This means she has to communicate to the personnel about jobs to be performed, direct and motivate them to do their jobs, supervise and guide them to perform various activities to reach the intended objectives. Once she identifies the difficulties, she takes corrective measures according to the situations so that intended objectives are attained.

Finally, the community health nurse acts as Evaluator and judges the outcome of performance against the intended goals and objectives.

Leadership Role

Community health nurse functions as a leader when she performs the role of nurse manager. She leads the group by giving them directions, ensuring two-way communication, providing supervision and guidance and by coordinating their activities and infrastructure, etc.

Collaborator

Community health problems cannot be solved by single health worker. It involves many people who work together in a team. The team includes health personnel working in an agency, outside the agency, personnel from other sectors, voluntary organization and community people. The community health nurse collaborates with them, i.e she works jointly with them in helping families and community people to meet their health needs.

Researcher

The community health nurse does get involved in formal-basic as well as applied research studies done in community. The participation may vary. She may do joint studies in which she actively participates in all stages of research process, (i.e., planning, implementation, analysis and reporting) She may

even conduct independent studies to improve community health nursing practice. She may participate in collection of data because she is better placed to have on tact with people. She may help in generation and collection and community at large.

The community health nurse makes use of investigative approach in giving to individual, family and people at large, i.e., she identifies health problems, gathers information, identifies nursing needs and possible interventions, implements, analyzes and evaluates to get the feedback though this may not be formal research but she makes use of the steps of research process but not in a very restrictive sense. Community health nursing is a problem solving process. The practice of community health implies involving epidemiological approach to deal with problems. It may range from the simplest inquiry to most complex epidemiological studies. Therefore, community does perform a researcher role in community health nursing practice.

MEDICAL SURGICAL ASEPSIS

Introduction

The nurse's efforts to minimize the onset and spread of infection are based on the principles of aseptic technique. Aseptic technique is an effort to keep the patient as free from exposure to infection-causing pathogens as possible.

Aseptic technique is an effort taken to keep the patient free from hospital microorganisms as possible. It is a method used to prevent contamination of wounds and other susceptible sites by organisms that can later cause infection. This can be achieved by ensuring that only sterile equipments and fluids are used during invasive medical and nursing procedures.

Types of Asepsis Technique

- Medical Asepsis which is also known as clean asepsis reduces the number of microorganisms and prevents their spread.
- Surgical Asepsis which is also known as sterile asepsis includes various procedures used to eliminate microorganisms from an area such as sterilization, autoclaving, scrubbing and is practiced by nurses in operation theaters, labor rooms and delivery areas and major diagnostic areas.

Medical Asepsis

During daily patient care, the nurse uses medical aseptic techniques to prevent the infection. Medical asepsis includes changing patient's bed linen daily, regular hand-washing, barrier techniques, and routine environmental cleaning. The nurse must follow isolation technique as appropriate according to the patient diagnosis. Patients with high susceptibility to infections and low immunity require special precautions to prevent the exposure to pathogens. In medical asepsis, an area or object is considered contaminated only when it is visible and suspected of containing pathogens (e.g., used bedpans, floor, a wet piece of gauze, etc).

Basic Principles

The basic principles of medical asepsis include:

- Wash hands frequently and thoroughly-before handling foods, before eating, after using a handkerchief, after using the toilet, before and after each patient contact, and after removing gloves.
- Avoid soiled items and equipment from touching own clothings
- Do not place soiled items onto the floor
- Educate patient not to cough, sneeze, or breath directly on others
- Move equipment away from you when cleaning and dusting articles
- Avoid raising dust
- Clean from the least soiled areas to more soiled ones
- Dispose of soiled or used items directly into appropriate bins
- Pour liquids directly into the drain to avoid splattering in the sink
- Avoid leaning against sinks, supplies or equipment
- Avoid touching eyes, face, nose or mouth, especially with dirty hands or with gloved hands
- Use practice of wearing personal protective equipment to prevent spreading microorganisms
- Follow SOP for isolation or barrier techniques as prescribed by health care institute.

Surgical Asepsis

Method of sterilization is used to destroy all microorganisms and their spores. Principle of surgical asepsis is to maintain the highest level of aseptic technique and requires that all areas to be kept as free as possible of infectious microorganisms. The surgical asepsis must be practiced by nurses in the operation theater during surgery and also at the bedside (e.g., inserting IV or urinary catheter and reapplying sterile dressings) where sterile instruments and supplies are used. In surgical asepsis, any area or any object may be considered contaminated if touched by an object which is not sterile.

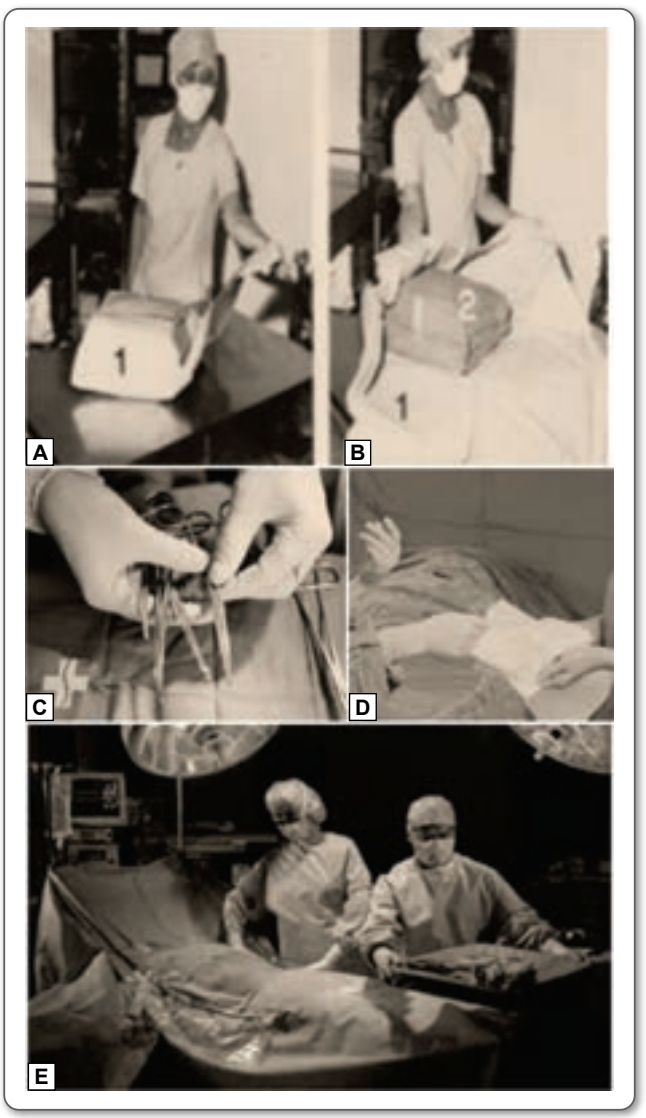
The nurse working with a sterile field or with sterile equipment must understand that the slightest break in technique results in contamination. A nurse in an operating room follows a series of steps to maintain sterile techniques,

including applying a mask, protective eyewear, and a cap; performing surgical hand washing; and applying a sterile gown and gloves. Effectiveness of aseptic practices depends on the nurse's preciseness and consistency in using effective aseptic techniques (Figs 1.20A to E).

Basic Principles

Surgical asepsis also known as sterile technique requires strict adherence to ordered and specific procedures which render an area free from all microorganisms including spores. An object or area is described as being sterile or not sterile. Basic principles of surgical asepsis include:

- Only a sterile object can touch another sterile object in sterile environment
- Open sterile packages from first edge of the wrapper to avoid the possibility of a sterile wrapper touching unsterile clothing



Figs 1.20A to E: Aseptic practices in OT room

TABLE 1.5: Differences between medical and surgical asepsis

Medical asepsis	Surgical asepsis
It refers to cleaning of one's own environment that helps to reduce the number of pathogens and their growth. **Example:** Hand washing, wearing gloves, gowns, cap and masks.	It refers to eliminating pathogens and spores completely from a surface like during surgery blood vessels and internal organs are exposed to number of micro-organisms that cause infection. **Example:** Autoclave of surgical instruments, sterile gloves
This is a clean technique.	In surgical asepsis, sterile techniques are used.
This can be used during administration of enema, medications, tube feedings, etc.	Sterile techniques are followed during surgeries, wound dressings, catheterization.

- Avoiding spill of any fluid or solution on a field for a sterile set-up
- Always hold sterile objects above the level of the waist
- Never talk, cough, sneeze, or reach over a sterile field or object
- Never turn your back on a sterile field
- Only sterile items should be used for repairing broken skin or used to penetrate the skin in order to inject substances into the body, or to enter normally sterile body cavities.
- Consider the outer 1 inch edge of a sterile field to be contaminated
- Don't use an object if you have any doubt as to its sterility
- Surgical asepsis is used in the operating room, labor room, during any surgical procedures, catheterization, and during dressing changes.

See Table 1.5 to differentiate between medical asepsis and surgical asepsis.

CONTROL OR ELIMINATION OF INFECTIOUS AGENTS

Cleansing

Cleansing is the method of removal of all foreign materials such as soil and organic material from objects. Cleansing involves use of water and mechanical action with or without soap or solution.

- Disposable object has to be discarded in the bin
- Reusable objects must be cleansed thoroughly with water and detergent before disinfection and sterilization.

Nurse must wear mask, protective eye wear and waterproof gloves while cleaning equipment that is soiled by organic materials such as blood, fecal matter, mucus or pus. These personal protective barriers provide protection from

infectious organisms. A brush, detergent, liquid and soap are required for cleaning.

Disinfection

Disinfection is the process of eliminating the pathogens from inanimate objects with the exception of bacterial spores. During disinfection, noninfectious microorganisms may or may not be killed. The principle of disinfection is denaturation of the bacterial cell protein. Disinfection process can be carried out by two methods:

1. **Physical:** Boiling
2. **Chemical:** Disinfectant

Choice of method depends on:

- **Types of microorganisms:** Certain types of strains of bacteria are more resistant to destruction.
- **Number of microorganisms present on articles:** The heavy contaminated articles are harder to disinfect. Essential factors for effectiveness of disinfection are:
  - Type of cleanliness
  - Type of items
  - Unlocking or dissembling of all locked instruments
  - Complete immersion of articles

Chemical disinfectants

- **Phenolics**
  - Clear soluble fluids, e.g., 2% Printol, 1% Sudol
  - Hexachlorophene, e.g., Phisohex, Gamaphene for wide range of antibacterial activity.
  - 70–75% Ethyl or isopropyl alcohol –for wide range of antibacterial activity, most active against TB.
- **Halogens:** For inactivation of viruses and antibacterial activity except TB.
  - Chlorine (hypochlorites), e.g., Milton, Eusol
  - Iodine
- **Glutaraldehyde**, e.g., Cidex–used for wide range of antibacterial activity and is very effective against Hepatitis B virus and is best suited for heat sensitive instruments.
- **Quaternary ammonium compounds,** e.g., Cetrimide (Cetavlon) - good detergent (more active against Gram +ve organisms).
- **Diguanides**, e.g., Chlorhexidine (Hibitane)

Use of Disinfectants in a Hospital

- Disinfection of body tissues and fluids
- Disinfection of articles and instruments
- Decontamination of the contaminated environment

Must Know

Chlorhexidine + detergent (Hibiscrub, Savlon): useful skin 'disinfectant'. Very active against Gram +ve organisms.

Sterilization

Sterilization is the process of eliminating and destroying all microorganisms, including spores and viruses. Sterilization this process can be carried out by 4 methods discussed ahead.

- **Chemical**
  - Liquid-Ethicon fluid, glutaraldehyde
  - Vapor-Formaldehyde
  - Gas-Ethylene oxide
- **Heat**
  - Moist heat (autoclave)
  - Dry heat (hot air oven)
- **Irradiation**
  - Ultra violet light
  - Gamma rays/cobalt 60
- **Filtration:** This method is used in pharmaceutical laboratory in combination with ultra violet light.

Infection Prevention Measures in Hospital

- **Body Substance Isolation System (BSIS)**
  - **Hand washing/hand scrub:** Hand washing is must before touching patients, before scrubbing and any time when hands have been soiled **(Fig. 1.21)**.
  - **PPE:** Donning and doffing of PPE **(Fig. 1.22)**
    - **Gloves:** Nurse must wear gloves before contact with mucous membranes and non-intact skin
      - Wear gloves every time when have contact with moist body substances
      - Remove gloves immediately after procedure is completed
    - **Gowns or plastic aprons:** Wear any time, if the clothing or skin is likely to be soiled
    - **Masks:** Wear in OT/sterile area
      - Wear when working directly over large areas of open skin
      - Wear when the nasal and oral mucous membranes will be spattered with moist body substances
- **Needles and Sharps**
  - Discard in rigid, puncture-resistant containers (Fig. 1.23)
  - Do not recap used needles by hand
  - Be particularly careful when manipulating small devices such as heparin locks
- **Room Selection**
  - Assign patient with infectious disease to an individual OR last on surgical list
- **Trash and Linen**
  - Bag all soiled trashes and linens securely
  - Discard according to facility policy
  - Wear gloves and protective garments when handling soiled linen and trash

Fig. 1.21: Hand washing/hand scrub

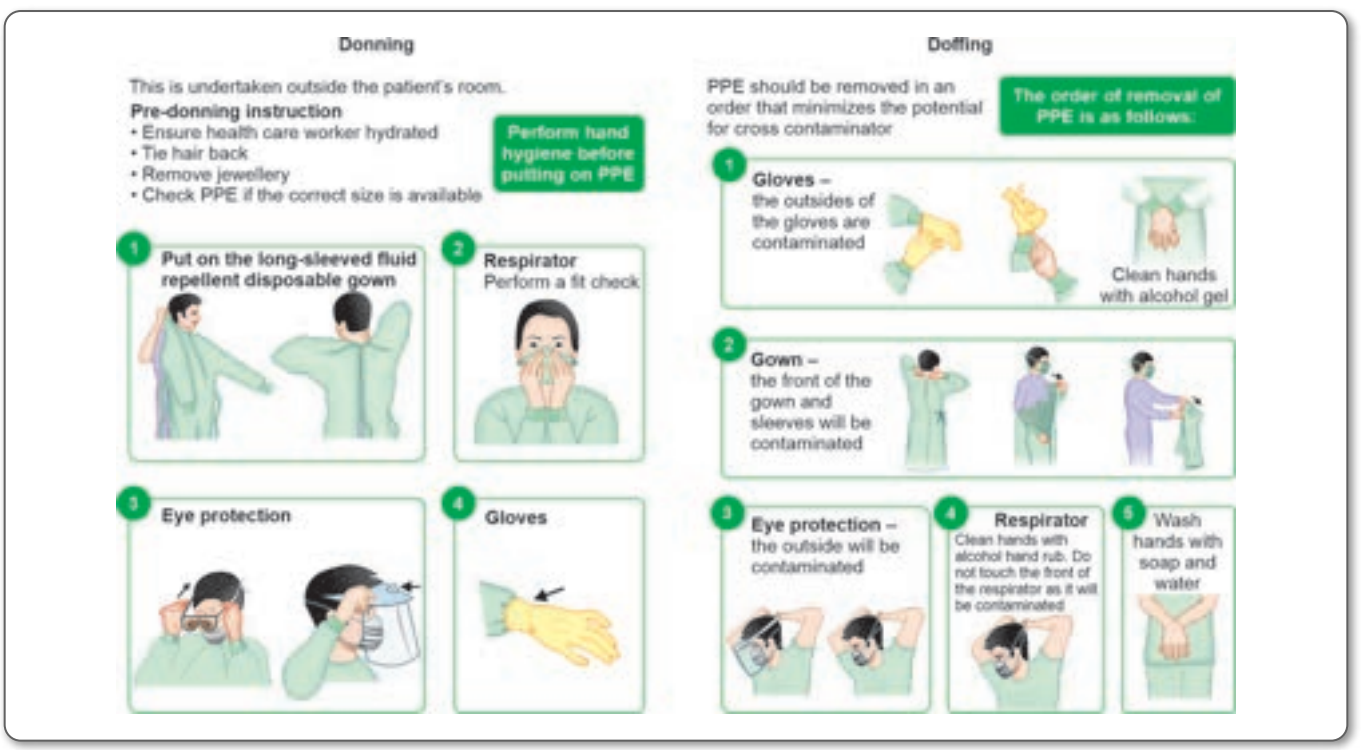


Fig. 1.22: Donning and doffing of PPE

Fig. 1.23: Sharp container

High Yield Point

Blood Transmissible Diseases and Sexually Transmitted Diseases (STDs)

- HIV infection/AIDS
- Hepatitis B (HBV)
- Hepatitis C (HCV)
- Chlamydia
- Herpes simplex
- Cytomegalovirus
- Syphilis
- Gonorrhea

- **Housekeeping**
  - Clean all patient's rooms on regular schedule
  - Clean articles, equipment and furniture soiled with any body fluid or blood immediately.
  - Wear gloves while cleaning patient area and articles
- **Laboratory specimens:**
  - Handle all laboratory specimens carefully and put precautionary labels

Compliance of Care Providers

Health care workers must comply with the infection precautions system and should have proper knowledge of infection prevention and control protocols. The nurse is responsible for providing care in safe environment to do no harm. Nurse should maintain aseptic technique during each procedure to reduce patients' risk of developing a hospital acquired infection. The nurse should prevent the transmission of microorganisms between health care professional and patients when undertaking any procedure.

Hospital Acquired Infection Care Bundle

Care "bundles" are sets of evidence-based measures in infection prevention and safety to reduce rate of hospital acquired infection and improve patient outcomes. The specific bundles are used at health care facilities for infection prevention, reduce unnecessary antibiotic prescribing.

Bundles for the prevention of central line-associated bloodstream infections (CLABSI)

- Bundle Implementation Elements
  - Use sterile barrier precautions while performing procedure on central line
  - Skin cleaning with alcohol-based solution
  - Prefer Subclavian and Jugular veins for central venous access in adults; Avoidance of the femoral vein
  - Skilled and competent staff for central line insertion, and competency training/assessment
  - Standardized insertion packs
  - Availability of insertion guidelines
  - Use of ultrasound guidance for insertion of internal jugular lines
- Bundle Maintenance Elements
  - Daily review and observation for central line necessity
  - Immediate removal of unnecessary lines
  - Disinfection prior to manipulation of the line
  - Daily chlorhexidine washes
  - Disinfect catheter hubs, ports, connectors before using the catheter
  - Change dressings and disinfect site with alcohol-based solution every 5–7 days (change earlier if soiled)

Bundle for the prevention of catheter-associated urinary tract infections (CAUTI)

- Bundle Implementation Elements
  - Prefer to use alternative methods of urine collection such as condom catheters, intermittent catheterization or use of nappies
  - Apply an aseptic technique for insertion and proper maintenance
  - Assess daily for the need for indwelling urinary catheters

Bundle for the prevention of ventilator associated pneumonia (VAP)

- Bundle Implementation Elements
  - Head of bed elevation to between 30 and 45 degrees
  - Daily "sedation interruption" and daily assessment of readiness to extubate
  - Daily oral care with chlorhexidine every four hourly
  - Prophylaxis for peptic ulcer disease
  - Prophylaxis for deep venous thrombosis
  - Subglottic secretion drainage

Bundle for the prevention of surgical site infection (SSI)

- Bundle Implementation Elements
  - Administration of antibiotic prophylaxis before surgery
  - Patients should be washed with soap or an antiseptic agent within a night prior to surgery
  - Avoid hair removal, use electric clippers if necessary
  - Use alcohol-based disinfectant for skin preparation in the operating room
  - Maintain intraoperative glycemic control with target blood glucose levels <200 mg/dL (in patients with and without diabetes)
  - Maintain perioperative normothermia

INFLAMMATION

Inflammation is the local response of body's process of fighting against things which damage cells, like infections, tissue

injuries, and toxins, in an attempt to heal itself. It is the body's defense reaction to eliminate the spread of injurious agent and to remove the consequent necrosed cells and tissues.

Causes of Inflammation

- Physical agents—mechanical trauma, road traffic accident, open wounds, injuries, radiation
- Chemical agents—chemical poisons, organic poisons
- Infective agents—bacteria, viruses, parasites, toxins
- Immunological agents—antigen-antibody reaction, cell-mediated reaction

Types of Inflammation (Table 1.6)

- **Acute inflammation:** Acute inflammation persists for short duration and represents the early body reaction. The main features are:
  - Accumulation of fluid at the wound site
  - Intravascular activation of platelets at affected site
  - Presence of polymorphonuclear neutrophils as inflammatory cells
- **Chronic inflammation:** For longer duration and occurs either:
  - Long time stay of a causative agent of acute inflammation
  - Stay of stimulus since beginning that induces chronic inflammation.
  - Main features of chronic inflammation are presence of chronic inflammatory cells- lymphocytes, plasma cells and macrophages

TABLE 1.6: Acute verses chronic inflammation

Characteristics	Acute	Chronic
Cause	Single injury	Causative agent/bacteria are present permanently
Duration	Hours, days	Weeks, months, years; depends upon the causative agent
Presentative symptoms	Increased permeability exudation	Proliferative fibroblasts, no exudation
Main components involved	Liquid proteins/ proteases and antiproteases/ PMN leukocytes, macrophages	Macrophage, lymphocytes, eosinophil granulocytes, connective tissue hyperplasia
Reaction	Thrombosis	Immune response

Phases of Inflammation

There are eight phases of inflammation (Fig. 1.24):

1. **Injury:** Any event that impairs tissue structure like trauma (most sports injuries).
2. **Ultrastructural changes:** Disruption of the cell membrane caused by trauma hypoxia. Contents of cell spill into extracellular spaces.
3. **Metabolic (hypoxic) changes:** Cells become deprived of oxygen and Sodium pump fails and as a result, cell membrane disruption occurs and contents are spilled out.

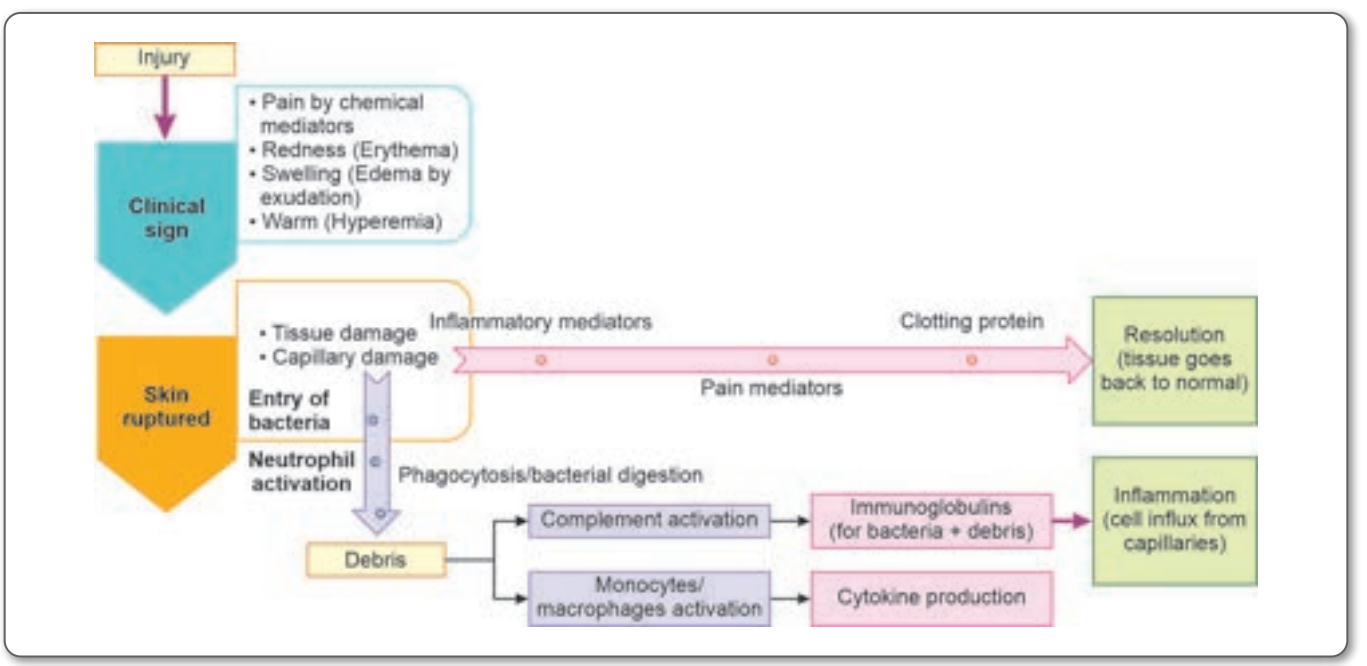


Fig. 1.24: Phases of inflammation

4. **Activation of chemical mediators:** Chemical mediators like histamine and bradykinin spill out of the cell and notify body that cells have been damaged and mobilize the body resources to handle the situation. Chemical mediators regulate the rest of the inflammatory response.
5. **Hemodynamic changes:** As the arteries get dilated, the blood flow increases and inactive capillaries and venules open up. When the blood flow increases, then leukocytes fall out of streamline and adhere to vessel wall.
6. **Permeability changes:** Sizable gaps develop in the vessel walls from where leukocytes escape to injury site.
7. **Leukocyte migration:** Leukocytes migrate in concentration-limited fashion with more chemical mediators, more leukocytes. There are two types of leukocytes:
   (i) **Neutrophils:** They travel fast, arrive first and are the temporary first line of defense and live for 7 hours.
   (ii) **Macrophages:** Are the second line of defense and live for months.
8. **Phagocytosis (Fig. 1.25):** Process of digesting cellular debris into pieces small enough to be removed by the lymph vessels.

Initial physiological response to tissue damage caused by mechanical, thermal, electrical, irradiation, chemical or infection is termed as inflammation. It can be acute or chronic in nature.

High Yield Point

Acute inflammation begins within seconds to minutes following injury to tissues. The cardinal signs of inflammation are as follows:

- **Rubor (redness):** Occurs secondary to vasodilation and increased blood flow
- **Calor (heat):** Localized increase in temperature due to increased blood flow
- **Tumor (swelling):** Occurs as a result of increased vascular permeability allowing fluid loss into interstitial space.
- **Dolor (pain):** Caused by stimulation of the local nerve endings from mechanical and chemical mediators.
- **Functio laesa (loss of function):** Pain occurs, results due to disruption of tissue structure

Treatment of Inflammation

- Nonsteroidal anti-inflammatory drugs (NSAIDS)
- Corticosteroids
- Antihistamines
- Hot and cold therapy.

Treatment often depends on the cause and severity. If the inflammation is due to a bacterial or fungal infection, antibiotics or antifungal medicines are usually prescribed.

- **Analgesic:** Acetaminophen can relieve pain but does not reduce inflammation. It allows the inflammation to continue its role in healing.
- **Nonsteroidal anti-inflammatory drugs:** The NSAIDS does not remove the cause of inflammation, but helps to relieve pain, swelling, fever, and other symptoms. It acts by countering the enzyme that contributes to inflammation. For example, naproxen, ibuprofen.
- **Corticosteroids:** Corticosteroids, such as cortisol, are steroid hormones and affect various mechanisms involved in inflammation. In conditions like SLE, Asthma, Dermatitis and Arthritis, corticosteroids play a vital role.
- **Heat therapy:** Heat increases blood flow and makes connective tissue more flexible. It temporarily decreases joint stiffness, pain, and muscle spasms. Heat also helps to reduce inflammation and the buildup of fluid in tissue. Heat therapy is used to treat inflammation (including various forms of arthritis), muscle spasm, and injuries such as sprains and strains. Hot packs, infrared heat, paraffin (heated wax) baths, and hydrotherapy provide

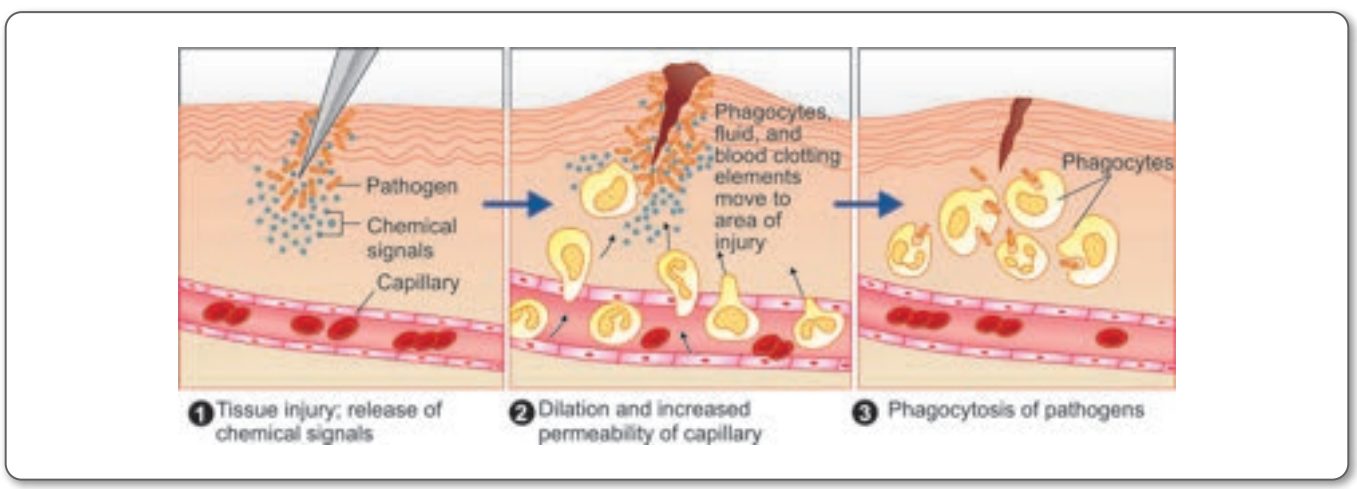


Fig. 1.25: Phagocytes are attracted to site of infection by Chemotaxis

surface heat. Heat may be generated in deep tissues by high-frequency sound waves (ultrasound).

- **Cold therapy:** Cold therapy can be applied using an ice bag, a cold pack, or fluids (such as ethyl chloride) that cool by evaporation. The time and amount of cold exposure is avoided as it causes damage tissues and reduces body temperature. Applying cold may help numb tissues and relieve muscle spasms, pain due to injuries, and low back pain or inflammation that has recently developed.
- **Electrical stimulation:** This can be achieved through Transcutaneous Electrical Nerve Stimulation (TENS) where low form of current is used which is produced with a battery powered device. It is applied on the skin with the help of electrodes and produces a tingling sensation. This device can be beneficial for patients suffering with RA, chronic back pain, sprain or pain at local areas. Electrical stimulation by electrodes placed on the skin causes the muscles to contract, providing a form of exercise that helps prevent atrophy and spasticity.
- **Traction:** Traction is usually referred to slowly and gently pulling on fractured bone or a dislocated body part with the help of ropes, pulleys and weight. Traction can be helpful in treating chronic pain because of degeneration of bones in the neck, a ruptured disk, or may be sometimes spasm of the neck muscles.
- **Massage:** Massage is a soothing and relaxing technique applied by an expert in order to reduce swelling and pain. It helps to loosen tight or contracted tissue.
- **Acupuncture:** This is an alternative therapy used to relieve pain and many other diseases. Here the thin needles are inserted through skin triggering specific points of the body. This helps to release the flow of the body's vital energy known as "chi" by stimulating points along 14 energy pathways. But there is also a belief that needles cause the brain to get stimulated and release endorphins that block pain sensation and in turn reduce inflammation.

INFECTION

Infection is the invasion to a host organism's bodily tissues by disease-causing organisms, their multiplication, and the reaction of host tissues to these organisms and the toxins they produce. Infections are caused by microorganisms such as viruses, bacteria, prions, and viroids, and larger organisms like parasites and fungi. (Table 1.7)

Dictionary meaning of infection is invasion by and multiplication of pathogenic microorganisms in a body part or tissue, which can produce subsequent tissue injury and progress to overt disease through a variety of cellular or toxic mechanisms.

TABLE 1.7: Microbiological classification of infectious diseases

Bacterial	Gram-negative Gram-positive
Viral	DNA virus RNA virus Enveloped vs nonenveloped
Fungal	Disseminated Localized
Parasitic	Protozoa Helminthes

TABLE 1.8: Means of transmission of infectious diseases

Contact	Requires direct or indirect contact (fomite, blood or body fluid)
Food or Water	Ingestion of contaminated food or water
Airborne	Inhalation of contaminated air
Vector-borne	Dependent on biology of vector as well as the organisms infectivity
Perinatal Sexual	Similar to contact infection, however, the contact may occur in utero or during delivery or transmission by sexual intercourse.

It is a complex process of interaction between pathogen and human body (Table 1.8).

Classification of Infection

- **Acute infection versus chronic infection (Fig. 1.26)**
  - **Acute infection:** An infection characterized by rapid progression, sudden onset, and often with severe symptoms.
  - **Chronic infection:** An infection characterized by delayed onset and slow progression.
- **Primary versus secondary infection**
  - **Primary infection:** Initial infection that develops in an healthy individual. Common sites of primary and secondary infection have been depicted in (Fig. 1.27).
  - **Secondary infection:** An infection that develops in an individual who is already infected with a different pathogen.
- **Reinfection:** Subsequent infection with the same pathogen in same host.
- **Localized versus systemic infection (Figs 1.28A and B)**
  - **Localized infection (focal):** An infection that is restricted to a specific region within the body of the host.
  - **Systemic infection:** An infection that has spread to several regions or areas in the body of the host.

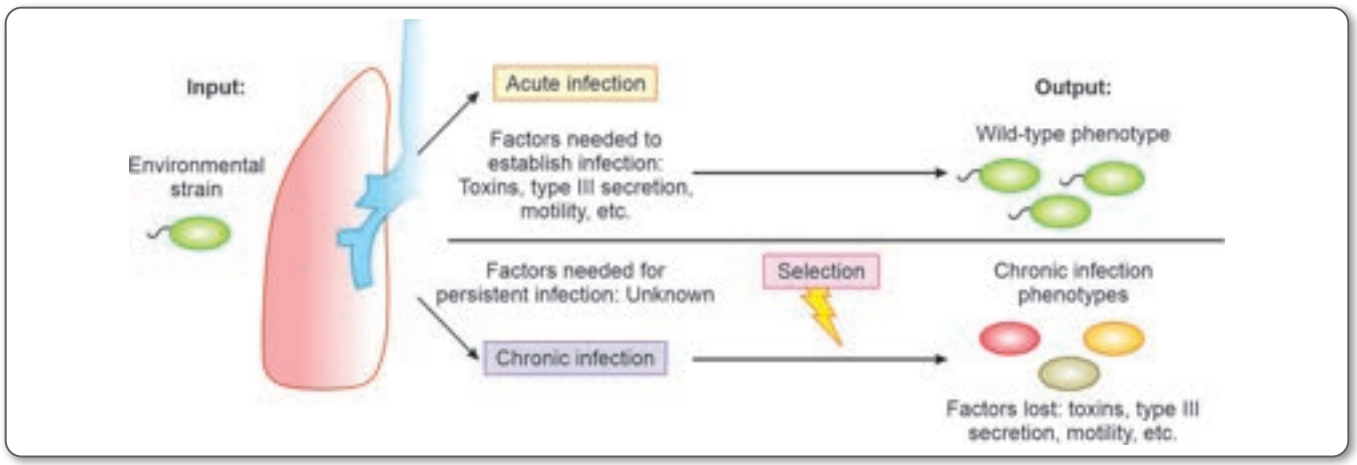


Fig. 1.26: Factors of acute and chronic infection

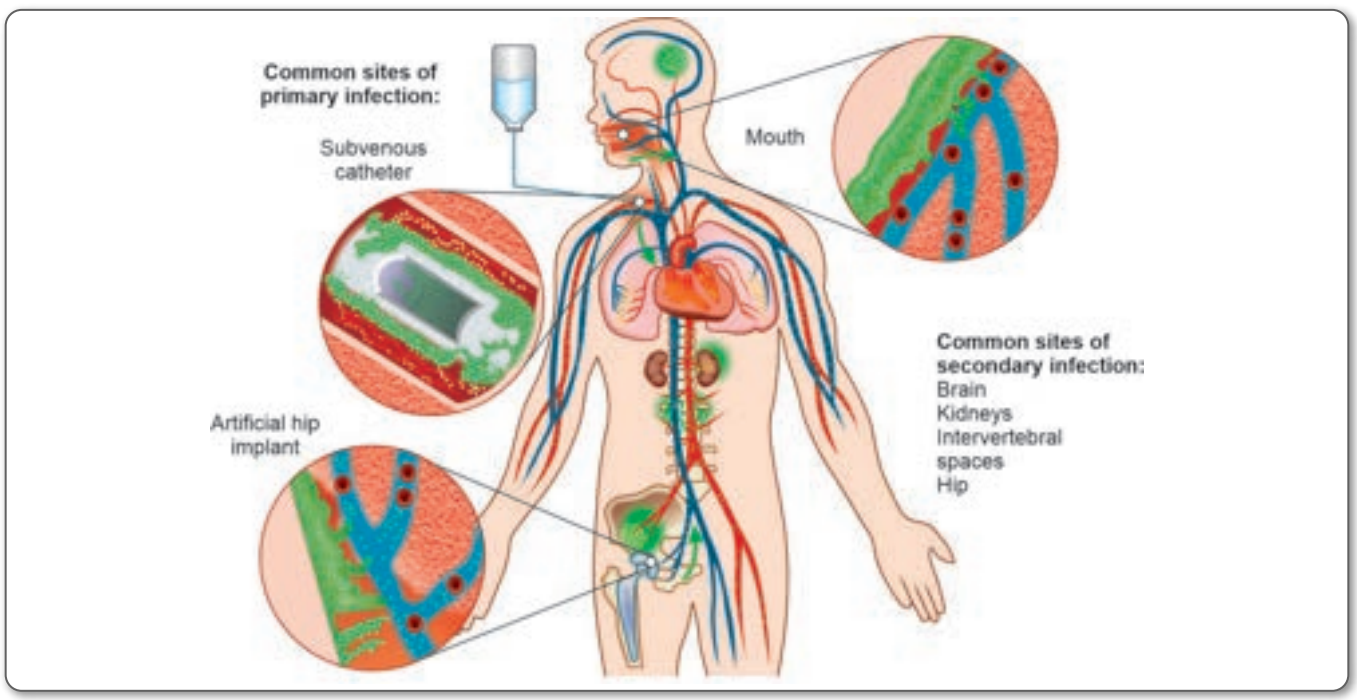
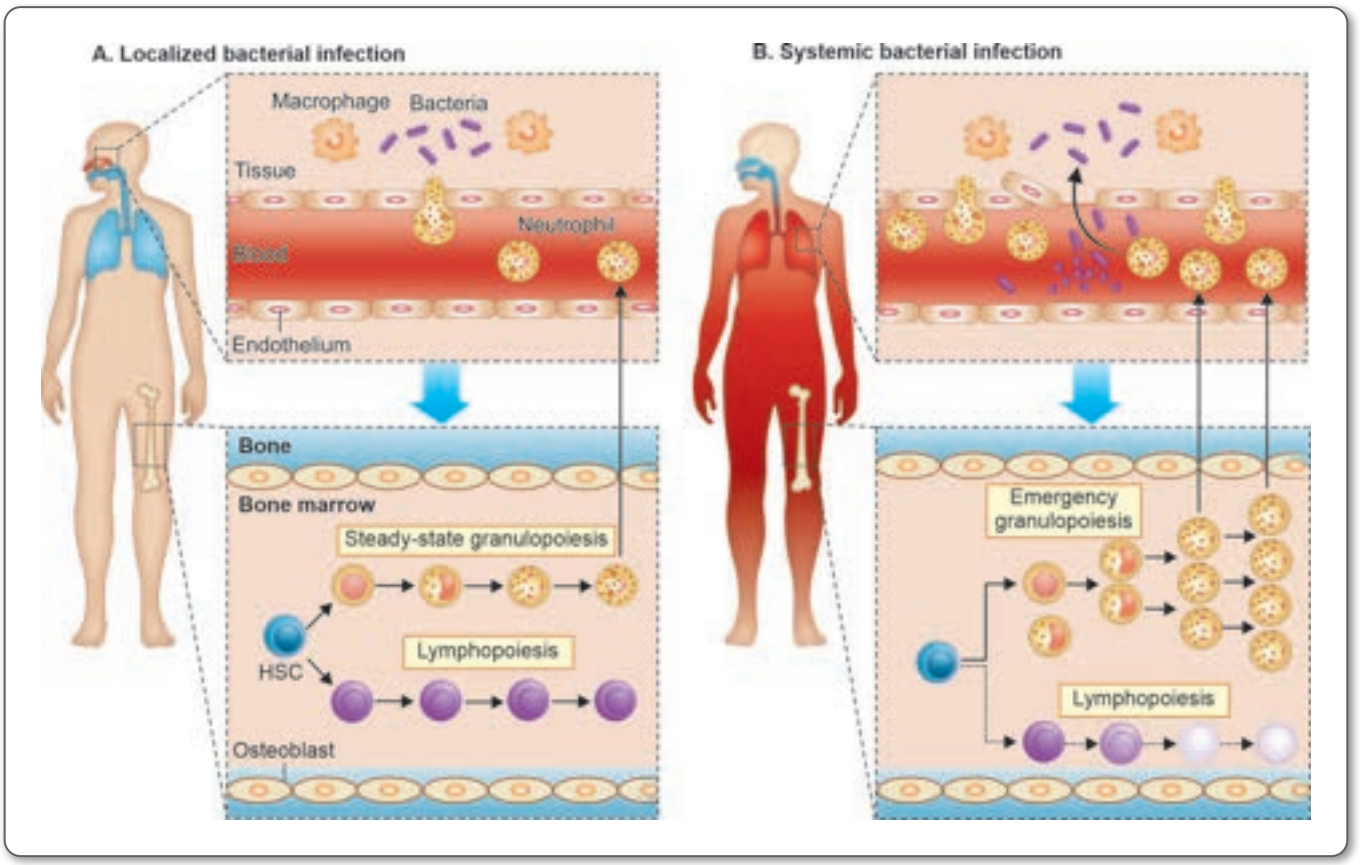


Fig. 1.27: Common sites of primary and secondary infection

- **Clinical versus subclinical infection**
  - **Clinical infection:** An infection with obvious observable or detectable symptoms.
  - **Subclinical infection:** An infection with few or no obvious symptoms. Pathway of invasion of pathogen have been depicted in (Fig. 1.29).
- **Atypical infection:** Typical clinical features of particular infection is not present. For example, pneumonia (Fig. 1.30).
- **Endo versus Exo (Fig. 1.31)**
  - **Endogenous:** Disease originates within the body. For example, Metabolic disorders, congenital abnormalities, tumors.
  - **Exogenous:** Diseases originate **outside the body**, For example, chemical agents, electrical shock and trauma.



Figs 1.28A and B: Localized and systemic infection. **A.** Local bacterial infection; **B.** Systemic bacterial infection

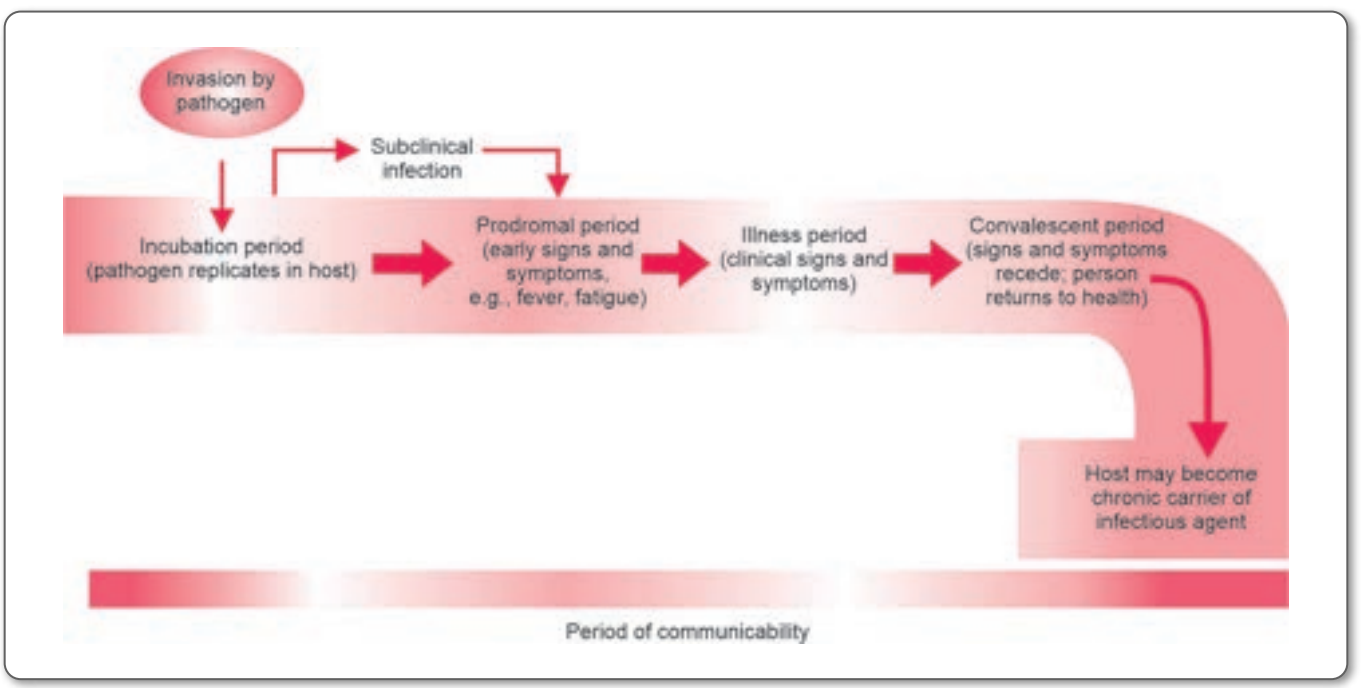


Fig. 1.29: Invasion by pathogen

Fig. 1.30: Types of pneumonia

- **Cross infection:** Suffers already from disease and acquires new disease from another host or other external sources (Fig. 1.32).
- **Nosocomial infection:** Infection acquired from the hospital or hospital acquired infection (Fig. 1.33).
- **Iatrogenic infection:** Infection induced by physician during therapeutic or investigative procedures (Fig. 1.34).
- **Latent and opportunistic infection:**
  - **Latent infection:** After following an infection, the pathogen remains in tissues in a hidden form which produces clinical disease when the host resistance is lowered (Fig. 1.35).
  - **Opportunistic infection:** An infection caused by microorganisms that are commonly found in the host's environment. Often referred to infections caused by organisms in the normal flora.

Chain of Infection

For a microbe to cause infection, certain situations must be met in order to spread the infection. The spread within a community is referred to as chain where several steps are linked to describe the disease/infectious process.

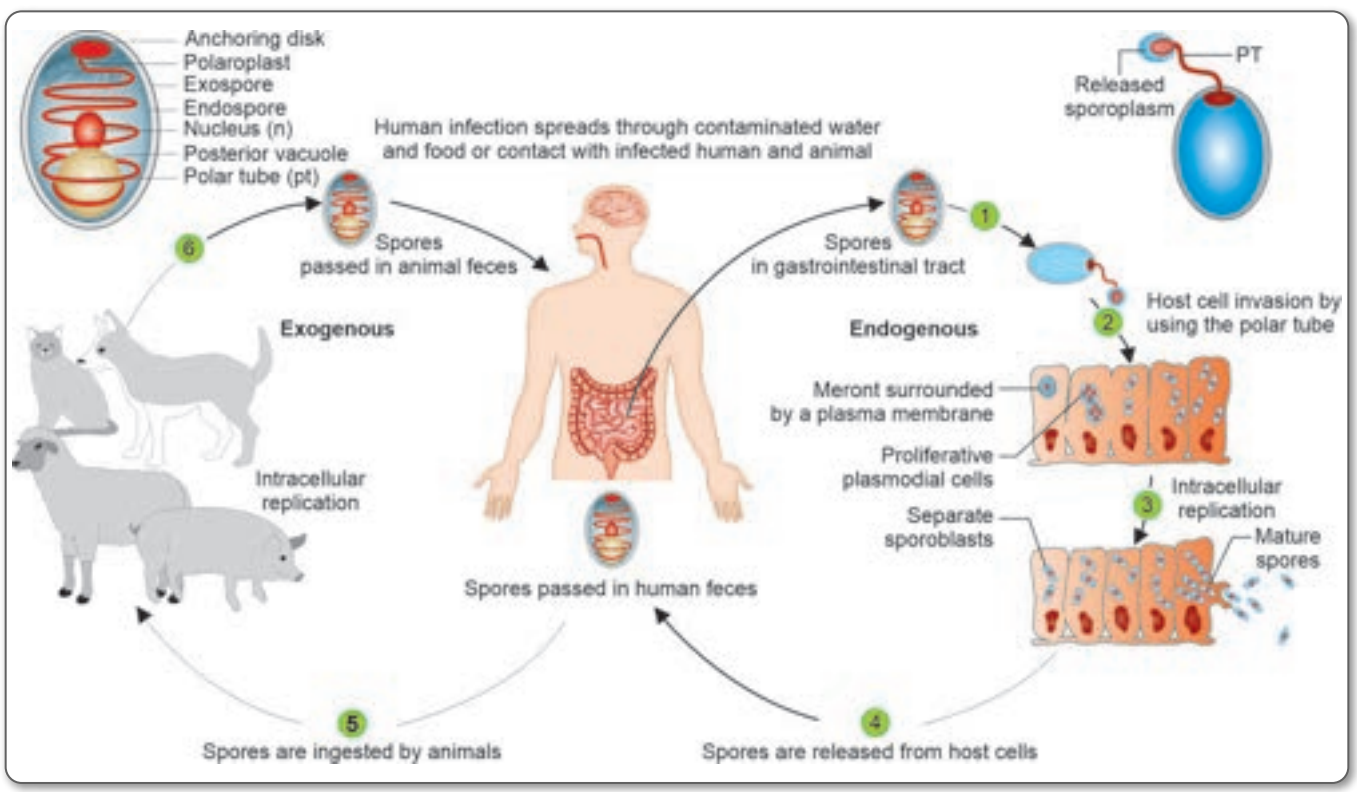


Fig. 1.31: Human infection: Exogenous versus endogenous

Fig. 1.32: Cross infection

Fig. 1.33: Nosocomial infection

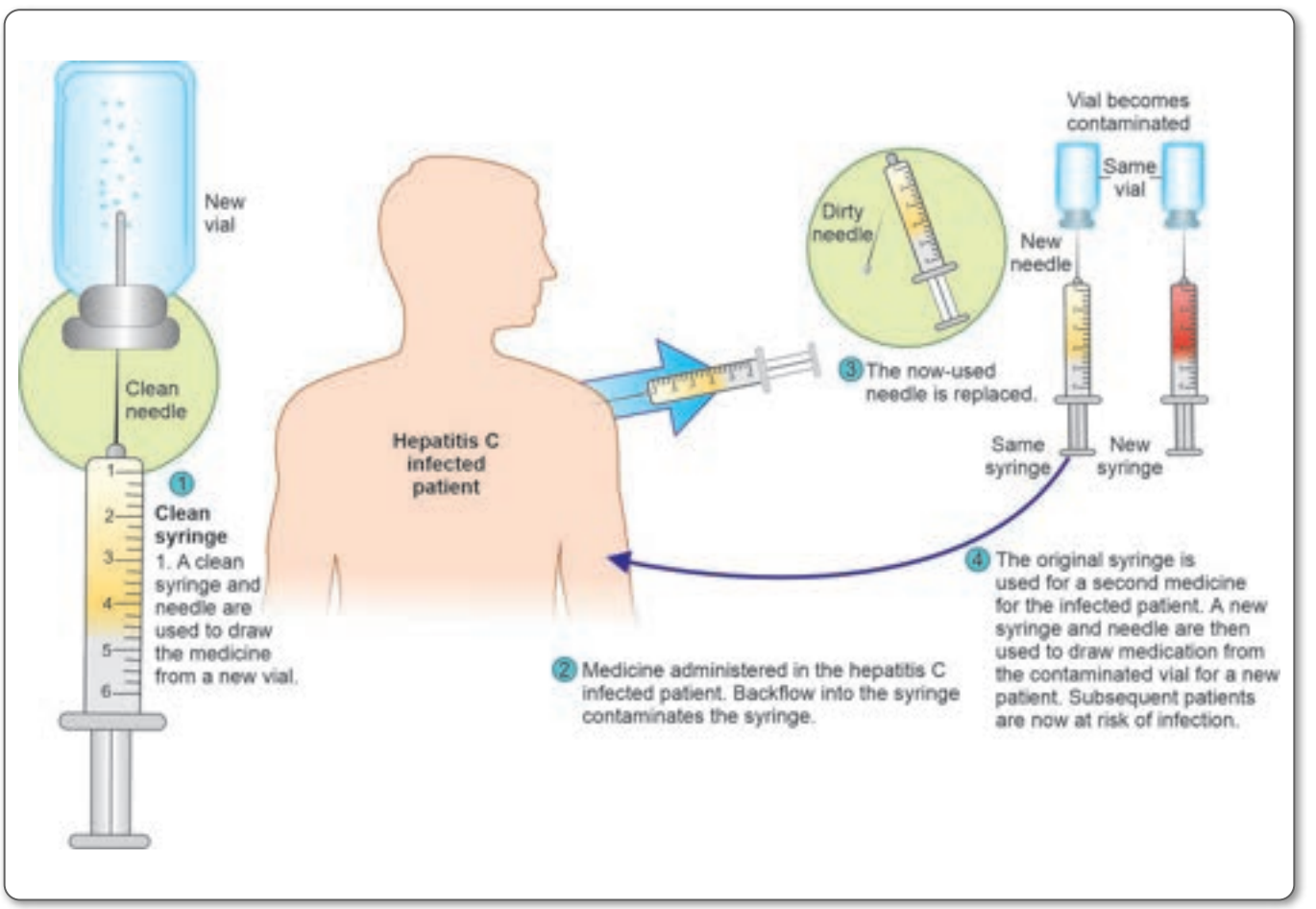


Fig. 1.34: Iatrogenic infection: Unsafe injection administration

These six steps are interlinked to each other and any breach in the line of contact leads to break in the spread of infection.

Emerging infections has significantly increased in the past few years and are a threat to increase in the near future. These diseases rapidly spread across national boundaries and communities challenge the ability of public health systems to prevent and control the spread of the disease.

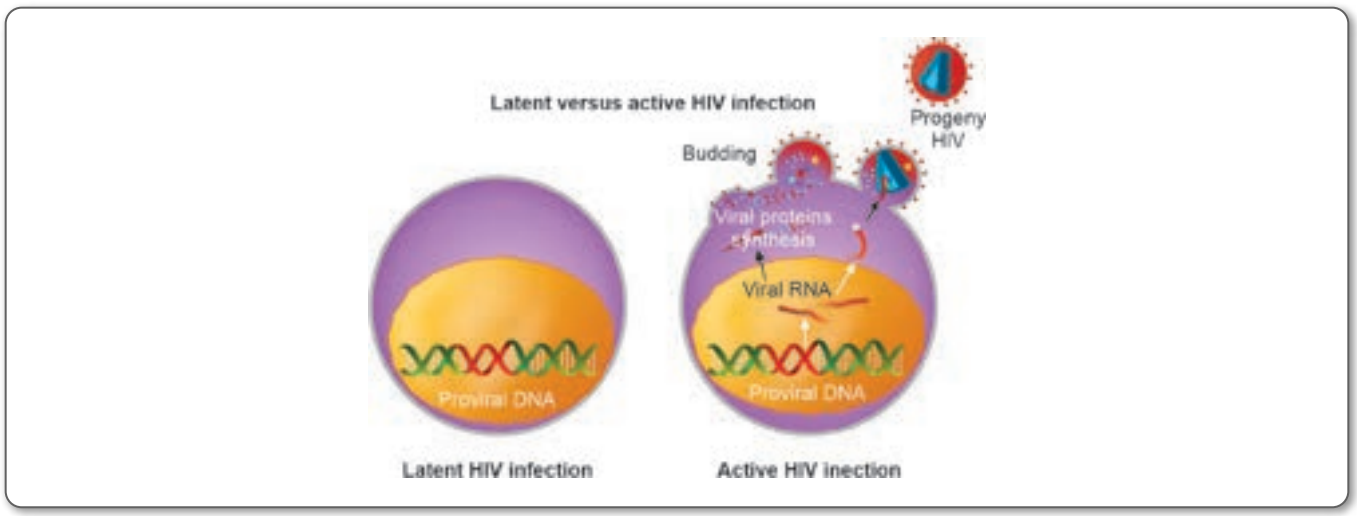


Fig. 1.35: Latent-infection: HIV infection

The spread of infection can be described as a chain with six links (Fig. 1.36):

1. **Infectious agent:** Microorganisms-Virus, Fungus, Bacteria.
2. **Reservoir (source):** A source where the microorganisms live, grow, and multiply. Humans, animals and the environment are the reservoirs for microorganisms.
3. **Portal of exit:** A path for the microorganism to come out from the host. Microorganism can come out through the mouth, while coughing and sneezing, through a cut, while bleeding, through feces during diaper changes or toileting.
4. **Mode of transmission:** How the microorganisms are transmitted from one person to another person. It can be through droplets, direct or indirect contact, or through airborne transmission.
5. **Portal of entry:** A path for the microorganism to get into a new host, through the similar route to the portal of exit.
6. **Susceptible host:** A person with a weakened immune system that is susceptible to the infectious agent.

If any link is broken then the infection will not occur. Infection Control principles are aimed at breaking one or more links in this chain.

Modes of Transmission (Fig. 1.37)

- **Direct transmission:** Immediate transfer of the disease agent by direct contact between the infected and susceptible individuals. This occurs through acts such as touching, sexual intercourse, biting, kissing or by direct projection (droplet spread) by coughing or sneezing within a distance of one meter. Examples of diseases for which transmission is usually direct are AIDS, syphilis, gonorrhea and the common cold.
- **Indirect transmission:** Can be of three types: airborne, vehicle-borne or vector-borne.
  1. **Airborne transmission:** It is the transmission of micro-bial aerosols to a suitable port of entry, usually the respiratory tract. Microbial aerosols are the suspensions of dust or droplet nuclei made up wholly or in part by microorganisms that may be suspended and infective for long periods of time. Examples of airborne diseases include tuberculosis, influenza, and histoplasmosis.
  2. **Vehicle-borne transmission:** Vehicle-borne transmission is a transmission of infection through contaminated inanimate object or material called a "fomite" in scientific terms. The fomite serves as a vehicle by which communicable agents are transferred to susceptible hosts. The vehicle contacts the person's body through skin or by direct ingestion. Examples of vehicles are toys, handkerchiefs, soiled clothes, bedding, food service utensils, surgical instruments, water, milk, food items or biological products such as blood, serum, plasma, organs and tissues. Most of the disease can be transmitted by vehicles, especially those in which the primary mode of transmission is direct, such as dysentery and hepatitis.

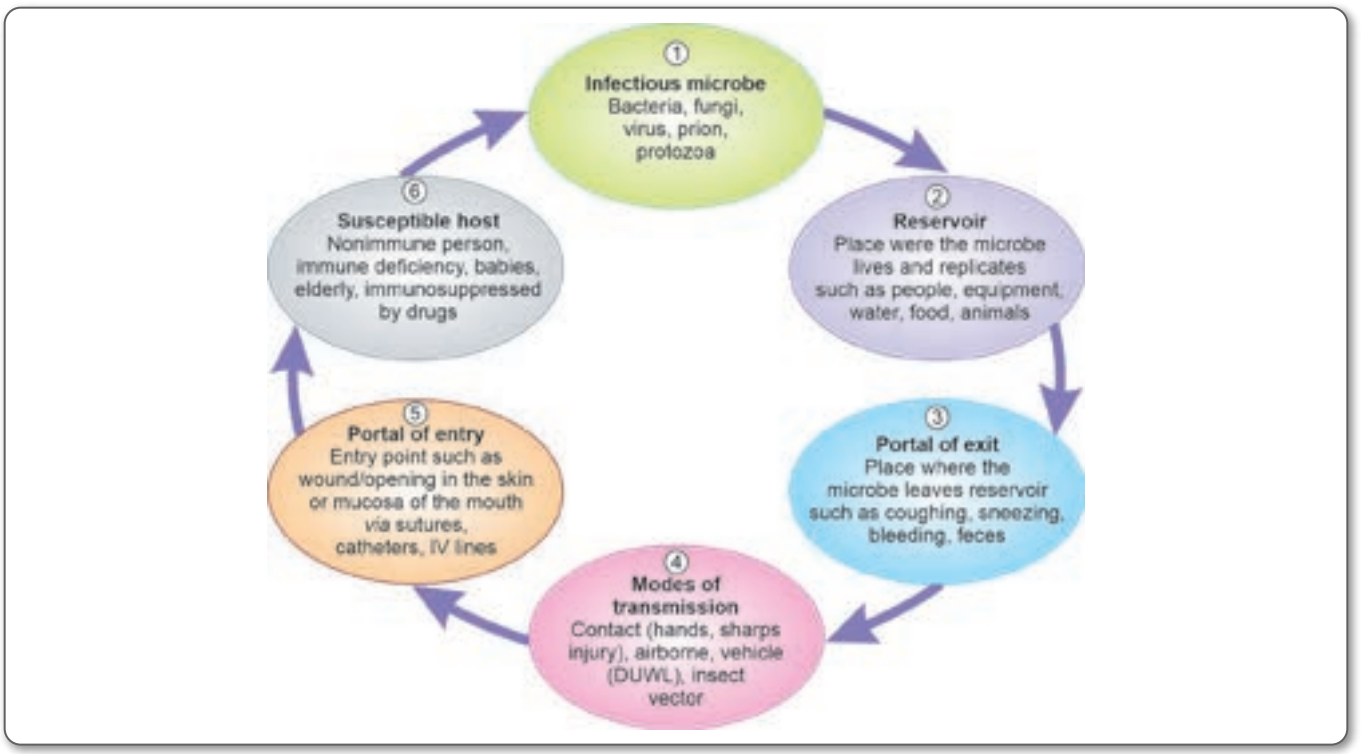


Fig. 1.36: Chain of infection

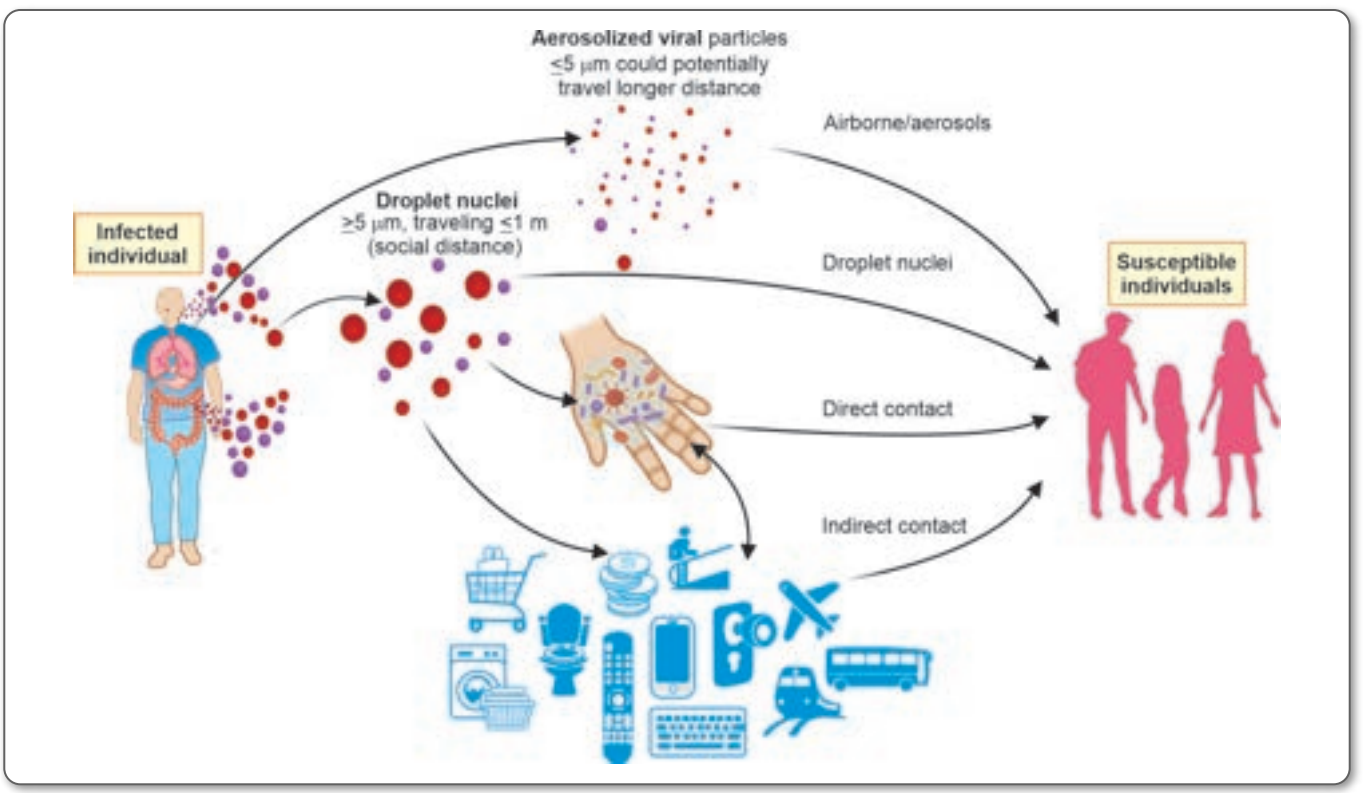


Fig. 1.37: Modes of transmission

IMMUNITY

The term "immunity" is referred to the resistance of an individual toward injury caused by microorganisms and their products. Two intrinsic defense systems act in the body, discussed ahead.

Innate (Nonspecific) System

First Line of Defense

The first line of defense is innate immune system which consists of **physical barriers like skin, the mucosal lining in respiratory tract**, the tears, sweat, saliva and mucous produced by the skin and mucosal lining. The intact skin and mucosa prevent the entry of microorganisms inside the body. Keratin in the skin protects from most of the microorganisms and is resistant to weak acids and bases, bacterial enzymes, and toxins. Mucosa also provides similar mechanical barriers. Epithelium produces protective chemicals that destroy microorganisms and inhibits bacterial growth. Mucus or saliva helps in trapping microorganisms that can enter the digestive and respiratory systems.

Respiratory tract mucosae also acts as a defense mechanism where mucus-coated hairs in the nose trap inhaled particles. The mucosa of the upper respiratory tract is ciliated where cilia helps to sweep dust- and bacteria-laden mucus away from lower respiratory passages.

Second Line of Defense

The second line of defense includes antimicrobial proteins, phagocytes, and other cells. This line of defense inhibits spread of invaders throughout the body and most important mechanism is the inflammation through which it works. The body uses nonspecific cellular and chemical devices to protect itself. This includes:

- Phagocytes
- Natural killer (NK) cells
- Inflammatory response shows macrophages, mast cells, WBCs, and chemicals
- Antimicrobial proteins in blood and tissue fluid

Phagocytes

Macrophages are the chief phagocytic cells. Free macrophages wander throughout a region in search of cellular debris. Fixed type of macrophages are Kupffer cells (liver) and microglia (brain). Neutrophils become phagocytic when they come across infectious material. Eosinophils are weakly phagocytic against parasitic worms but mast cells bind and ingest a wide range of bacteria. Mechanism of phagocytosis have been discussed in Figure 1.38.

Natural Killer (NK) Cells

These are a small, distinct groups of large granular lymphocytes that react nonspecifically and eliminate cancerous and virus-infected cells. They kill the target cells by releasing perforins and other cytolytic chemicals and secrete potent chemicals that enhance the inflammatory response.

Inflammation Response

The inflammatory response is triggered when body tissues are injured. It prevents the spread of damaging agents to nearby tissues, disposes of cell debris and pathogens and

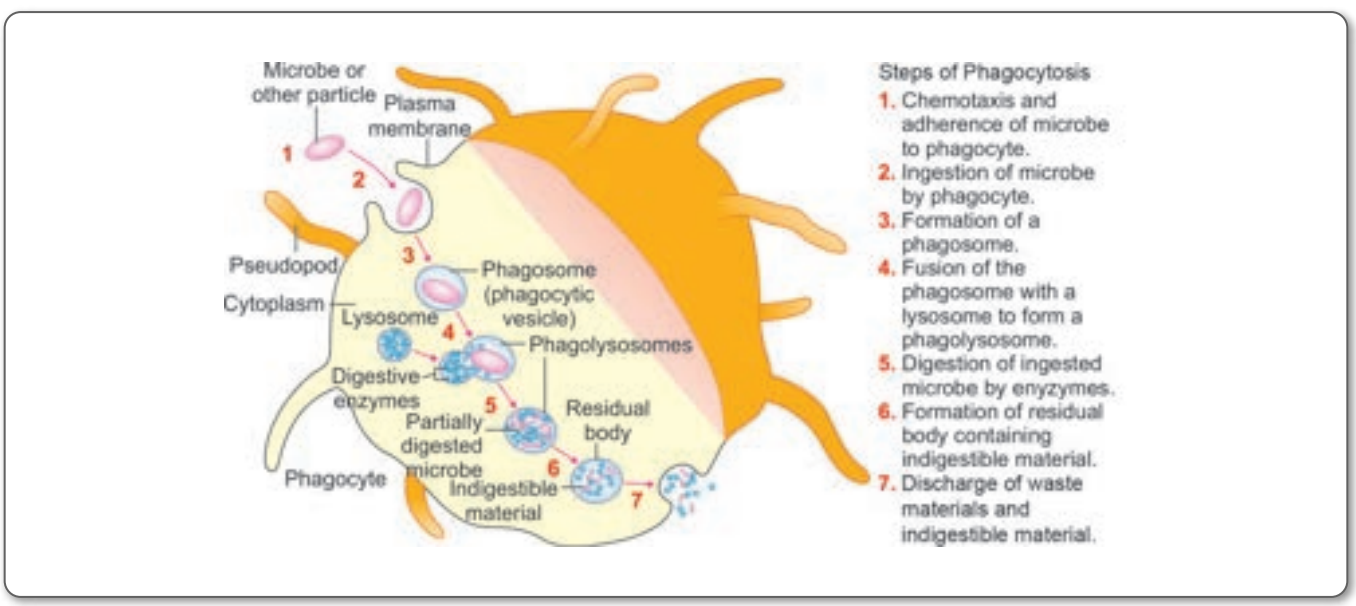


Fig. 1.38: Mechanism of phagocytosis

helps in repairing processes. The four cardinal signs of acute inflammation are heat, swelling, redness and pain.

- **Inflammatory chemicals** are released into the extracellular fluid. These chemical mediators include kinins, prostaglandins (PGs), complement and cytokines, which are released by injured tissue, phagocytes, lymphocytes, and mast cells and cause local small blood vessels to dilate, resulting in hyperemia.
- **Toll-like receptors (TLRs):** It is a membrane protein, a receptor, which is present on the surface of certain cells and detects foreign substances and passes on appropriate signals to the cells of the immune system. Macrophages and cells lining the gastrointestinal and respiratory tracts possess TLRs. Activated TLRs trigger the release of cytokines that promote inflammation.
- **Vascular permeability:** Vascular permeability characterizes the capacity of a blood vessel wall to allow for the flow of small molecules such as drugs, nutrients, water, ions or even whole cells sometimes in and out of the vessel. Exudate contains fluids which has proteins, clotting factors, and antibodies and seeps into tissue spaces causing local edema, which contributes to the sensation of pain.
- **Edema:** Edema or swelling caused by the gush of protein-rich fluids into tissue spaces that helps to dilute harmful substances and supply oxygen and nutrients needed for repair. It also brings clotting proteins, which prevent the spread of bacteria.
- **Phagocytic mobilization:** Occurs in four main phases:
  1. **Leukocytosis:** Neutrophils are released from the bone marrow in response to leukocytosis-inducing factors released by injured cells
  2. **Margination:** Neutrophils adhere to the walls of capillaries in the injured area
  3. **Diapedesis:** Neutrophils squeeze through capillary walls and begin phagocytosis
  4. **Chemotaxis:** Inflammatory chemicals attract neutrophils to the injury site.

Antimicrobial Proteins

Enhance the innate defenses by attacking microorganisms directly and hindering microorganisms' ability to reproduce. Some of the important antimicrobial proteins are:

- Interferon
- **Complement proteins:** The complement system primarily serves to fight bacterial infections. It works at several levels. It has a recognition function for many bacteria, can alert and recruit phagocytes, enhance visibility of bacteria to phagocytes and sometimes even lyse bacteria.

Adaptive (Specific) Defense System

Third Line of Defense

The third line of defense increases attack against particular foreign substances but takes longer to react than the innate system. Adaptive immune system is a functional system that helps in:

- Recognizing specific foreign substances
- Acts to immobilize, neutralize, or destroy foreign substances
- Amplifies inflammatory response and activates complement

The adaptive immune system is antigen-specific and consists of:

- Humoral or antibody-mediated (B Cell) immunity
- Cellular or cell-mediated (T Cell) immunity.

Antigens

Substances that can mobilize the immune system and provoke an immune response.

- **Complete Antigens:** Includes foreign protein, nucleic acid, some lipids, and large polysaccharides. Functions are:
  - **Immunogenicity:** The ability to stimulate proliferation of specific lymphocytes and antibody production
  - **Reactivity:** It is the ability to react with the products of the activated lymphocytes and the antibodies released in response to them
- **Haptens are incomplete antigens:** Includes small molecules, such as peptides, nucleotides, and many hormones. These are:
  - Nonimmunogenic (does not stimulate a response)
  - When attached to protein carriers, reactive

  If they link up with the body's proteins, the adaptive immune system recognizes them as foreign and mount a harmful attack (allergy). In poison ivy, dander, some detergents, and cosmetics haptens are found.

Cells of the Adaptive Immune System

- **Lymphocytes:** There are two types of lymphocytes:
  1. **B lymphocytes:** Supervises humoral immunity
  2. **T lymphocytes:** Nonantibody-producing cells that constitute the cell-mediated arm of immunity

  Whether a lymphocyte matures into a B cell or a T cell, it depends on where in the body it becomes immunocompetent

  B cells: B cells mature in the bone marrow. B cells become self-tolerant in bone marrow. Some self-reactive B cells are inactivated while others are killed.

  T cells: T cells mature in the thymus under negative and positive selection pressures.

- **Antigen-presenting cells (APCs):** Do not respond to specific antigens.
  Their major function is to engulf foreign particles and to present fragments of antigens on their own surfaces, to be recognized by T cells.
  Major APCs are dendritic cells (DCs), macrophages, and activated B cells. The major initiators of adaptive immunity are DCs, which actively migrate to the lymph nodes and secondary lymphoid organs and present antigens to T and B cells.

Types of Immunity (Table 1.9)

Types of Acquired Immunity (Fig. 1.39)

Active Immunity

- Active immunity is naturally acquired immunity which develops through disease and artificially acquired through vaccination. The immune system produces antibodies against a specific disease.
- Active immunity is permanent immunity for mostly diseases. Vaccines are made by inactivated toxins, parts of microbes, killed microbes. A vaccinated person has a secondary response based on memory cells when encountering the specific pathogen again.
- Routine immunization against infectious diseases such as measles and whooping cough led to the eradication of disease.

TABLE 1.9: Types of immunity

Active Immunity	Passive Immunity
Naturally acquired active immunity	Naturally acquired passive immunity
Artificially acquired active immunity	Artificially acquired passive immunity

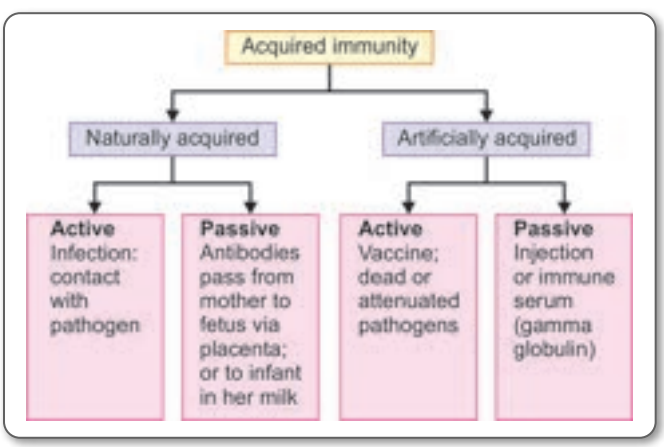


Fig. 1.39: Types of acquired immunity

Passive Immunity

Passive immunity is effective and temporary immunity which gives protection against disease through antibodies produced by another human being or animal.

- Maternal antibodies in colostrum are an example.
- Passive immunity can be artificial by injecting antibodies from an animal that is already immune to a disease into another animal. For example, Rabies treatment: Injection with antibodies against rabies virus that are both passive immunization and active immunization.

Immune System Response to Antigens

- **Active humoral immunity:** B cells encounter antigens and produce antibodies against them.
  - **Naturally acquired:** Response to a bacterial or viral infection
  - **Artificially acquired:** Response to a vaccine of dead or attenuated pathogens
- **Passive humoral immunity:** Differs from active immunity in the antibody source and the degree of protection. Here B cells are not challenged by antigens and protection ends when antigens naturally degrade in the body.
  - **Naturally acquired:** From the mother to her fetus via the placenta
  - **Artificially acquired:** From the injection of serum, such as gamma globulin
- **Antibodies:** Also called immunoglobulins constitute the gamma globulin portion of blood proteins and are soluble proteins secreted by activated B cells and plasma cells in response to an antigen. They are capable of binding specifically with that antigen.
  There are five classes of antibodies:
  1. **IgD:** Monomer attached to the surface of B cells and is important in B cell activation and cannot cross placenta.
  2. **IgM:** Pentamer released by plasma cells during the primary immune response.
     It is the first response to antigen and is very effective in agglutination and is not able to cross placenta.
  3. **IgG:** Monomer that is the most abundant and diverse antibody in primary and secondary response; crosses the placenta and confers passive immunity.
  4. **IgA:** Dimer that helps prevent attachment of pathogens to epithelial cell surfaces. Secreted from mucus membranes.
  5. **IgE:** Monomer that binds to mast cells and basophils, causing histamine release when activated.

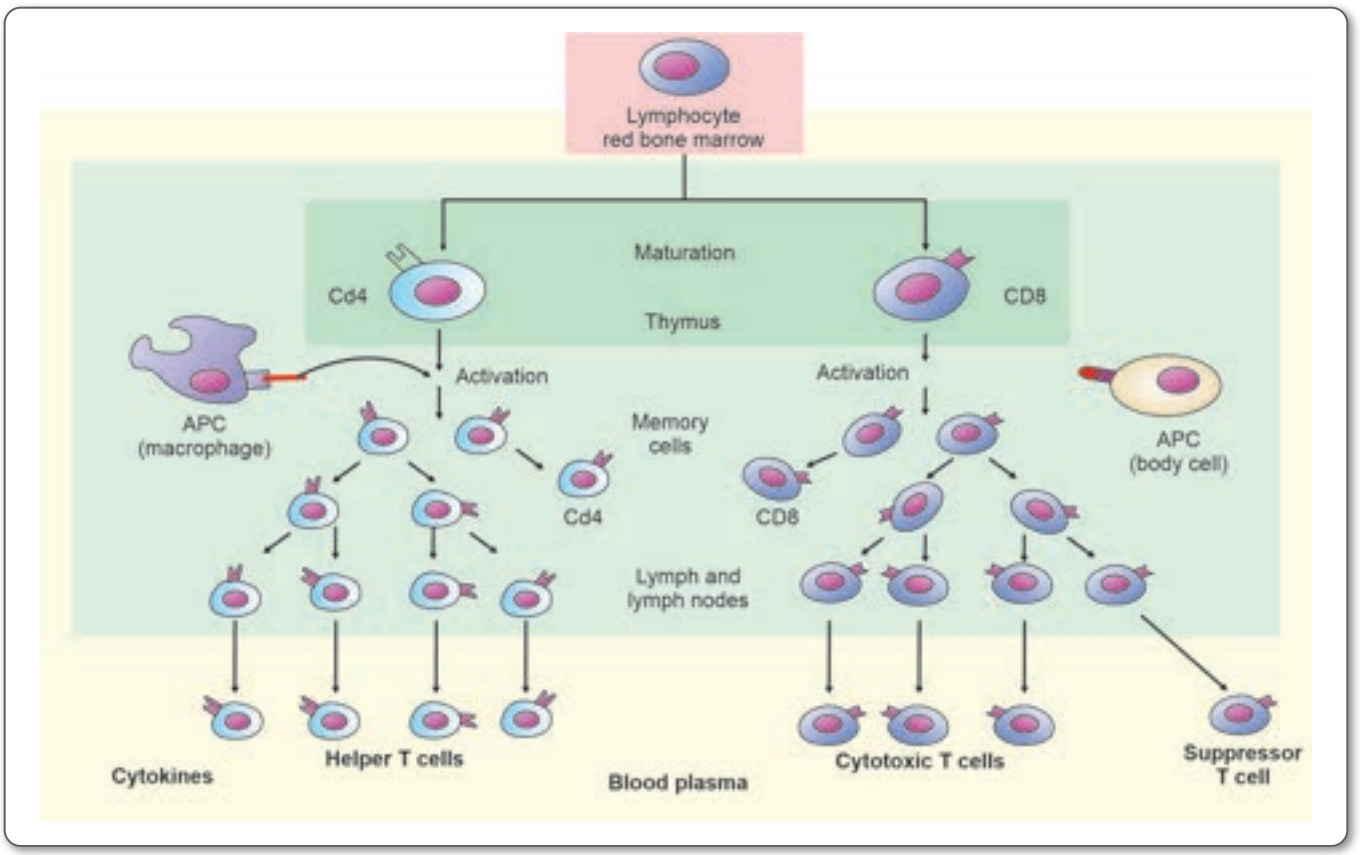


Fig. 1.40: T cells

Cell-Mediated Immune Response

Since antibodies are not effective against intracellular antigens, cell-mediated immunity is needed. Two major populations of T cells that mediate cellular immunity are:

- CD4 cells (T4 cells) are primarily helper T cells (T_H)
- CD8 cells (T8 cells) are cytotoxic T cells (T_C) that destroy cells harboring foreign antigens
- Other types of T cells are:
  - Suppressor T cells (TS)
  - Memory T cells

Major Types of T Cells

Major types of T cells have been discussed in Figure 1.40.

Importance of Cellular Response

T cells recognize and respond only to processed fragments of antigen displayed on the surface of body cells. T cells are best suited for cell-to-cell interactions, and target:

- Cells infected with bacteria, viruses, or intracellular parasites
- Abnormal or cancerous cells
- Cells of infused or transplanted foreign tissue.

Diseases of Immune System

Malfunctions of the immune system can produce effects ranging from the minor inconvenience of some allergies to the serious and often fatal consequences of certain autoimmune and immunodeficiency diseases like:

- **Autoimmune diseases** like rheumatoid arthritis, lupus systemic erythematosus, crohn's disease.
- **Allergy:** Hypersensitive response to certain environmental allergens like food, pollen, pet dander, asthma, bee sting.
- **Immunodeficiency:** AIDS where HIV (virus) attacks T-cells and weakens immune system.

WOUND HEALING

Wound healing is also known as wound repair. A wound is a cut or injury that occurs either to a tissue or the skin surface. A wound breaks down the skin, the protective layer leading to loss of continuity of epithelium and sometimes it may lead to the loss of connective tissue also.

Wound healing, as the word suggests, is a process of repair of the wound. This happens by itself after an injury. The sequence of events that takes place in the repairing process of

a wound leads to the return of the epithelium and connective tissue to its normal steady state of equilibrium and protects the skin from the external environment.

Types of Wound

- **Acute wound:** Most often heals within 21 days with no complications (Fig. 1.41A).
- **Chronic wound:** It is a delayed healing wound. When the healing balance is disturbed, wound healing time is often longer and ends up with complications (Fig. 1.41B).
- **Open wound:** Wounds with exposed underlying tissue that is open to the outside environment (like penetrating wounds) (Fig. 1.42A).
- **Closed wound:** The damage occurs without exposing the underlying tissue and organs (nonpenetrating wounds) like contusion (Fig. 1.42B).
- **Clean wound:** Is free of foreign materials or debris inside (Fig. 1.43A).
- **Contaminated wound**: Presence of dirt, bacteria or other foreign materials (Fig. 1.43B).

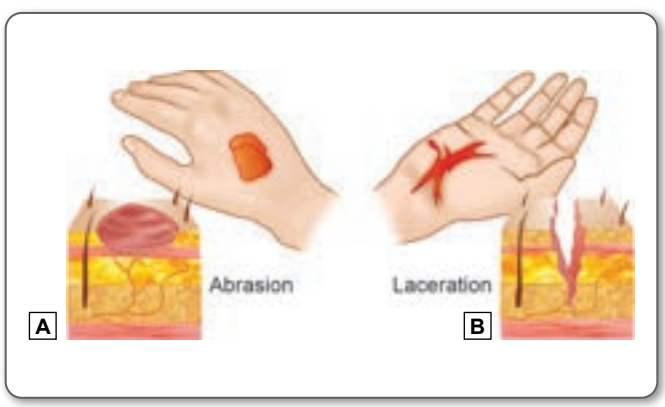
Figs 1.41A and B: Showing various types of wounds. **A.** Acute wound; **B.** Chronic wound

Figs 1.42A and B: **A.** Open wound; **B.** Closed wound

Figs 1.43A and B: **A.** Clean wound; **B.** Contaminated wound

- **Internal wounds:** Occur as a result of impaired immune and nervous system functions or reduced supply of blood, oxygen or nutrients, e.g., Diabetes, deep vein thrombosis (Fig. 1.44A).
- **External wounds:** Include penetrating objects or non-penetrating trauma (Fig. 1.44B).
- **Nonpenetrating wounds:** Result due to blunt trauma or friction with other surfaces; the wound does not break through the skin, and may include:
  - **Abrasions:** Superficial damage to the skin (scraping of the outer skin layer) (Fig. 1.45A)
  - **Lacerations:** A deep cut or tear-like injury (Fig. 1.45B)

Figs 1.44A and B: **A.** Internal wound; **B.** External wound



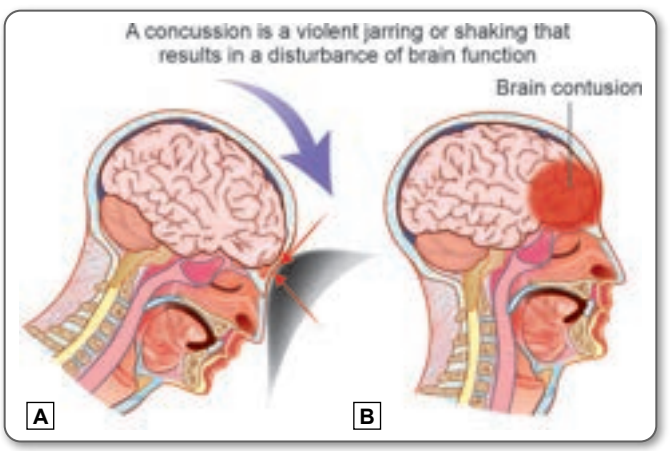
Figs 1.45A and B: Abrasion and laceration

- **Concussions:** Often referred to as mild traumatic brain injury where damage is caused to the underlying organs and tissue on head without significant external wound (Fig. 1.46A).
- **Contusions:** Injured tissue or skin where blood capillaries have been ruptured (Fig. 1.46B).

- **Penetrating wounds:** Trauma reaching down to the underlying tissue and organs, and includes:
  - Stab wounds (trauma from sharp objects, such as knives) (Fig. 1.47A)
  - Skin cuts (Fig. 1.47B)
  - Gunshot wounds (Fig. 1.47C)
  - Surgical wounds (Fig. 1.47D)
- **Superficial wounds:** Include only the epidermis
- **Partial thickness wounds:** Include the epidermis and dermis
- **Full thickness wounds:** Include the epidermis, dermis, subcutaneous fat and sometimes the bone.

Types of Wound Healing

There are mainly three types of wound healing. This division is made on the basis of how much skin and tissue is lost.



Figs 1.46A and B: **A.** Concussion; **B.** Contusion

Primary Intention Healing (Primary Union, First Intention Healing)

This type of healing occurs when there is only involvement of epidermis and dermis without total penetration of dermis. In short, it is a type of closure where there is only little loss of tissue. This occurs mainly with a surgical incision namely stitches, staples or with tapes which are adhesive.

Secondary Intention Healing

This type of healing occurs when the wound is extensive and involves much tissue loss. This type of healing takes longer time to heal than the primary union healing and has greater scarring. The rate or chances of infection is also greater in this type.

Tertiary Intention Healing (Delayed, Secondary Closure)

This type of healing involves keeping the wound open purposely for few days prior to closure of the wound. This is done so that the circulation can be increased as well as it promotes damage from the wound.

Stages of Wound/Bedsore

The stages of wound/bedsore are shown diagrammatically in (Fig. 1.48).

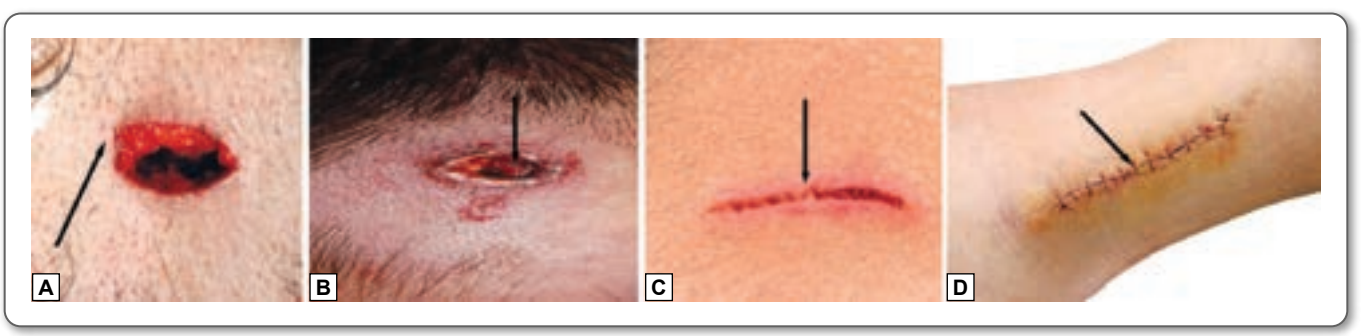
Phases of Wound Healing

Epidermal Wound Healing

Steps of epidermal wound healing have been discussed (Figs 1.49 and 1.50A to C).

Deep Wound Healing

Deep wound healing is more complex than epidermal wound healing as this will be in deep including the dermis and subcutaneous layer and, hence multiple tissue layers have to be repaired. The healed tissue at the end of the process loses some of its normal functions as scar tissue is formed.



Figs 1.47A to D: Penetrating wounds; **A.** Stab wound; **B.** Gunshot; **C.** Skin cut; **D.** Surgical wound

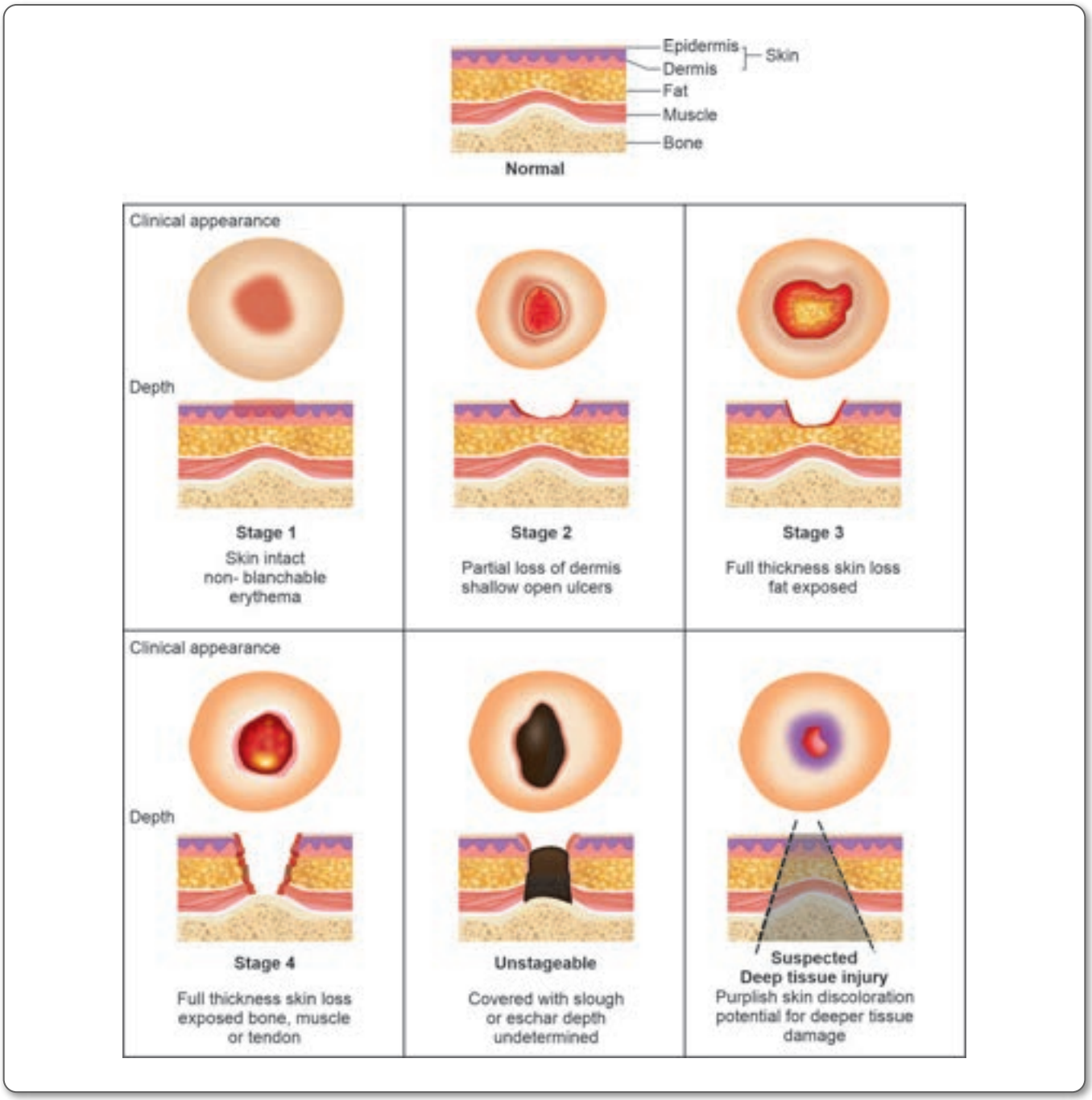


Fig. 1.48: Stages of wound/bedsore

There are four phases in deep wound healing (Fig. 1.51). They are:

1. Inflammatory phase
2. Migratory phase
3. Proliferative phase
4. Maturation phase

Stages of deep wound healing are shown in Figures 1.52A to D.

Stoma Care

Assess

- Condition of the stoma
- Condition of the peristomal skin
- Stomal output
- Bridge/stents/peristomal sutures
- Check appropriate appliance is in situ and secure

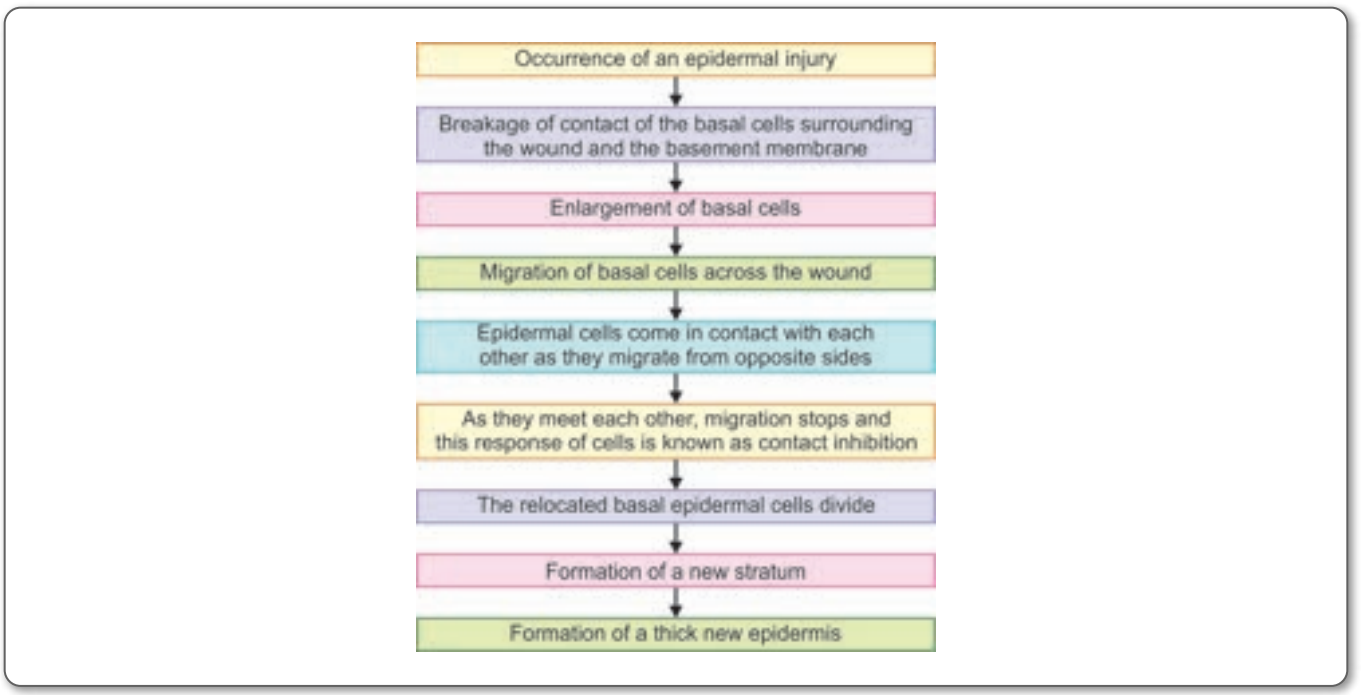
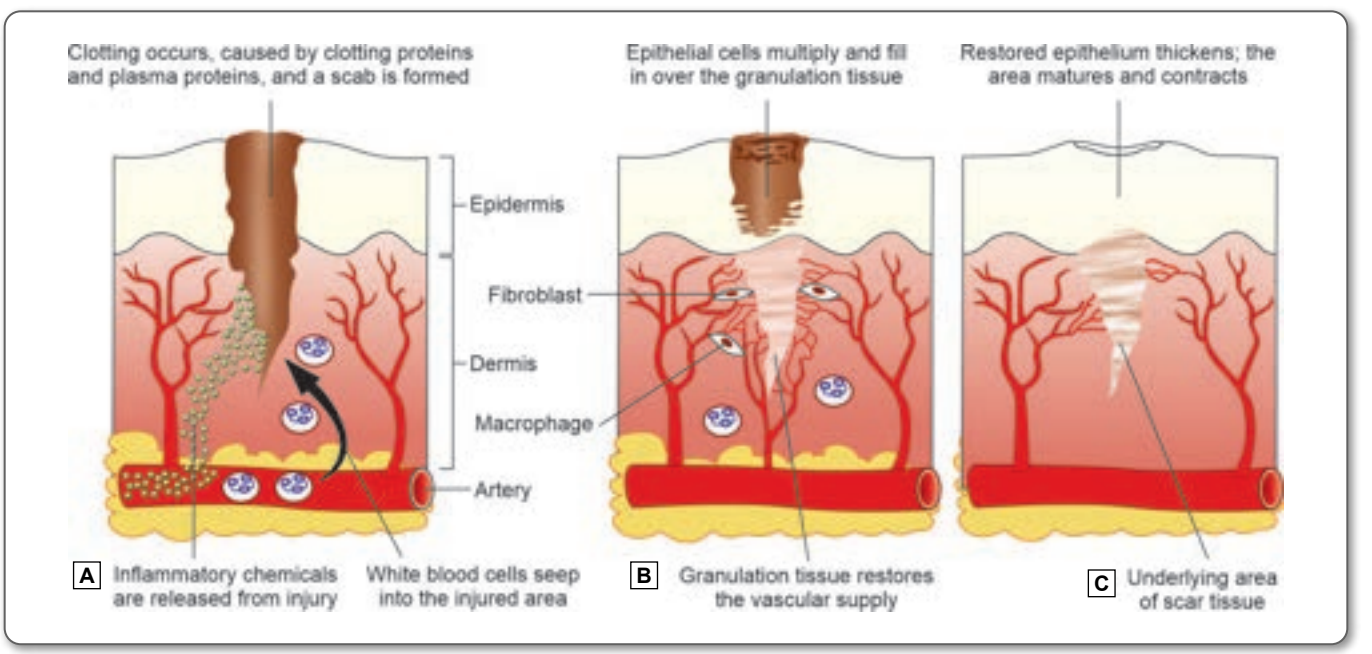


Fig. 1.49: Steps in epidermal wound healing



Figs 1.50A to C: Phases of epidermal wound healing

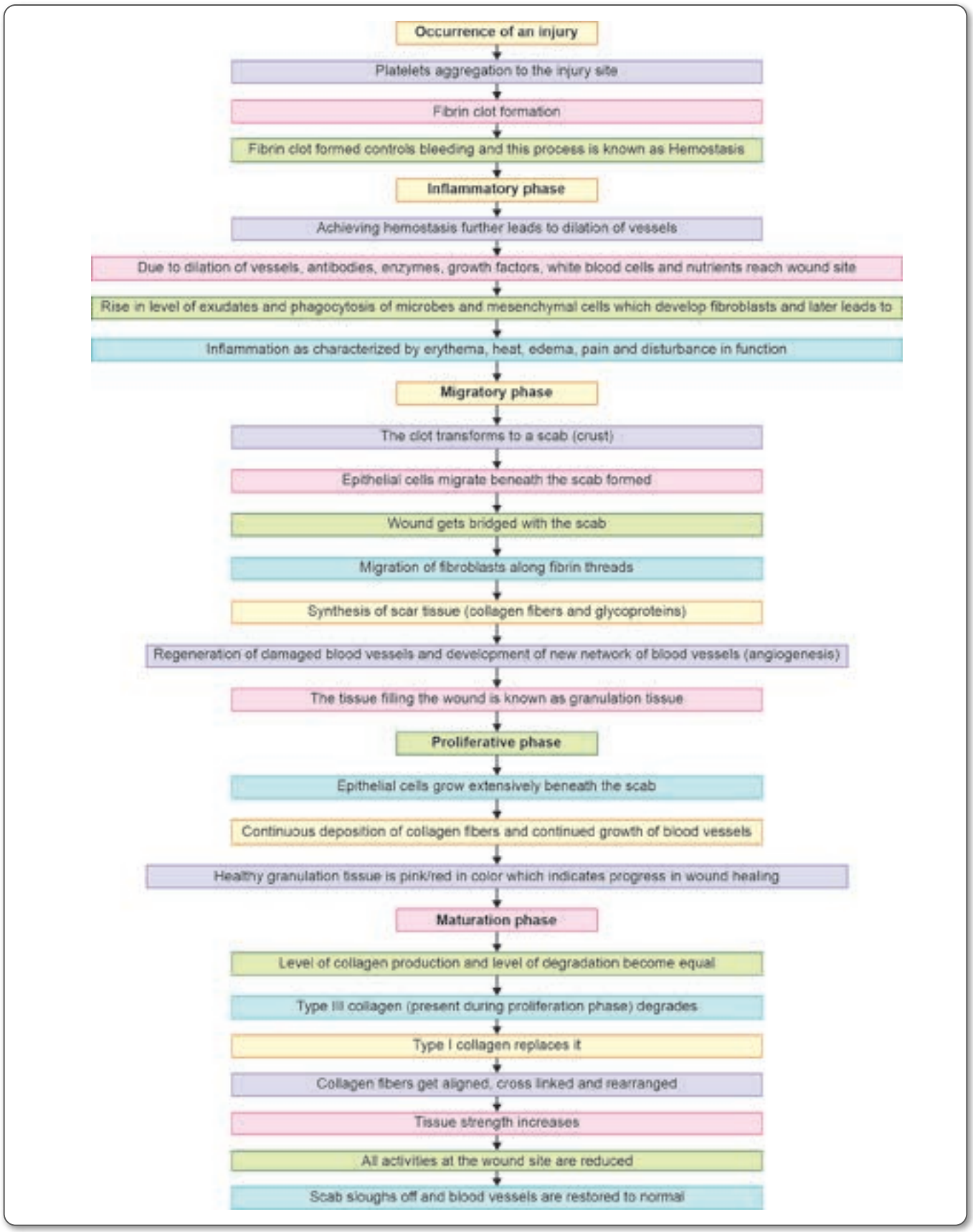
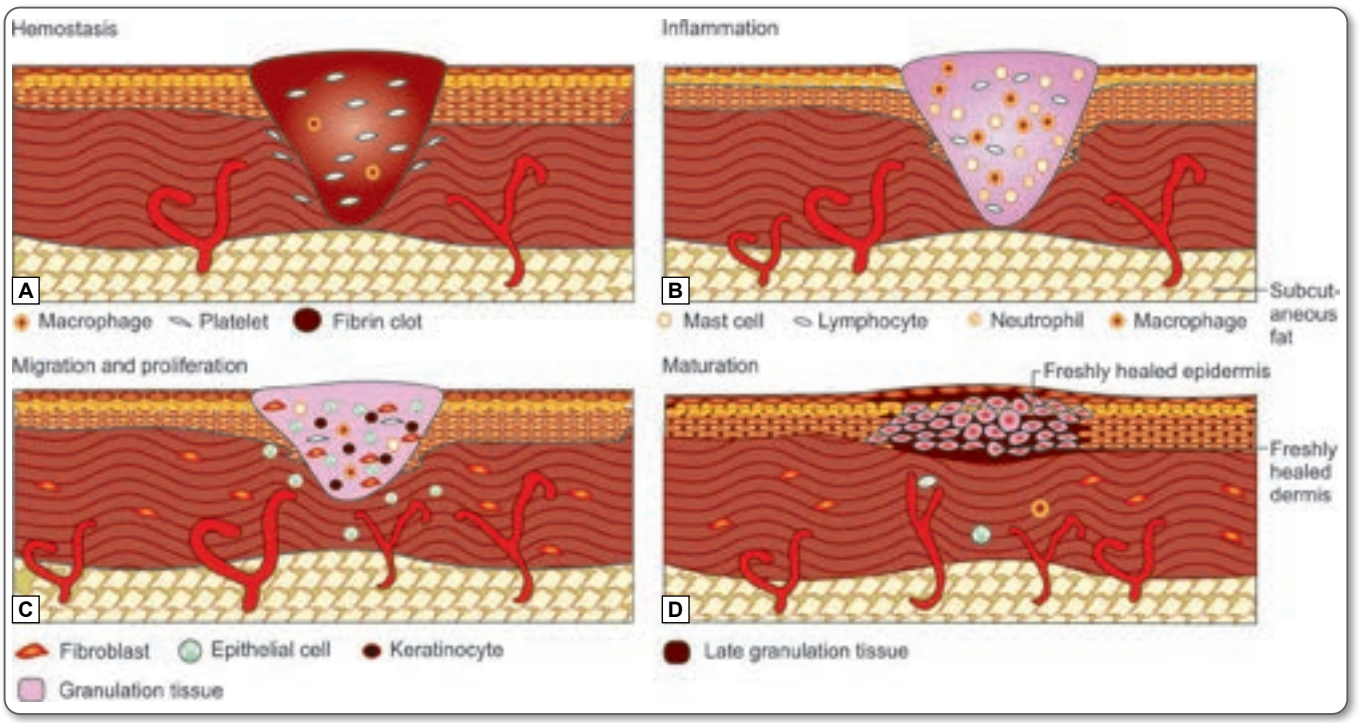


Fig. 1.51: Phases of deep wound healing

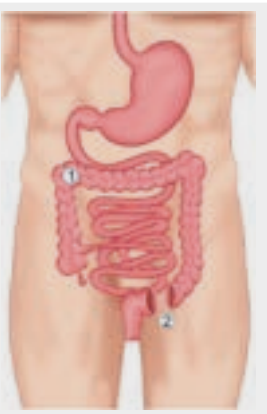


Figs 1.52A to D: Stages of deep wound healing

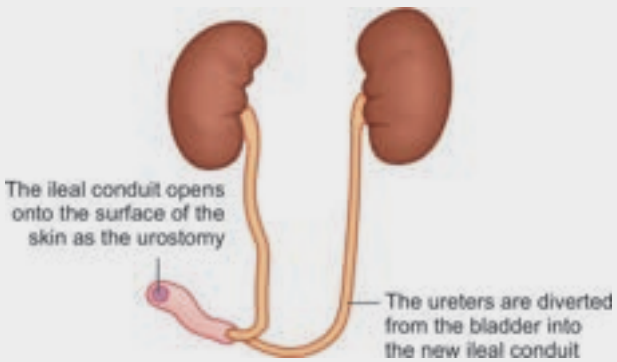
- Provide adequate supplies of suitable appliance
- Provides appropriate template according to size and shape of stoma
- Teach patient/carer to become competent at an appliance change prior to discharge, including preparation, pouch emptying, pouch renewal, skin care, disposal and the importance of hand washing.
- Discuss implications of stoma on lifestyle with patient/carer including: dietary issues, rectal discharge, hygiene, physical activity, sexuality.
- Address patient's need for psychological support in relation to the change in body image. Evaluate and document all interactions and liaise with relevant health care professionals.

Types of Stoma

The type of bag used depends on the type of stoma.

Types of stomas		Stoma bag
Colostomy - colon (large bowel)		Closed bags

Contd...

Types of stomas		Stoma bag
Ileostomy - ileum (small bowel)		Drainable bags
Urostomy - urinary tract		Urostomy bag

Care of a New Stoma

Regular assessment of the stoma should be made especially during the first 5 days when stoma necrosis can occur.

Action: Observe, assess and document the status of stoma every shift for:

- Bleeding
- Perfusion
- Prolapse
- Skin integrity
- Retraction
- Ostomy appliance adherence
- Status of wound incision, i.e., signs of infection

Stoma size will decrease during the first 6 weeks as the edema and swelling resolve.

Stoma Output

Stoma output will tend to be watery to loose in the first couple of days. Colostomy output will tend to be soft formed; Ileostomy output tends to be looser (Fig. 1.53).

Action

- If ileostomy output is greater than 20–30 mL/kg/day, then report to medical staff
- Neonates – If there is >30–49 mL/kg/day, then report to medical staff

Care while Removal of Stomal Bag

- Use warm water and a soft cloth/gauze
- Peel downwards
- Push down on the skin to separate it from the water while lifting up on the pouch to prevent skin stripping
- Pat dry peristomal skin well

Skin Care

Maintaining skin integrity is a basic skill that will ensure good stoma management. Skin breakdown can occur from:

- Contact with fecal enzymes. Ileostomies have a higher level of enzymes. Intact peristomal skin is essential for normal usage of an ostomy appliance
- Moisture – prolonged contact with water can weaken and break down the skin
- Chemical/biological irritants

Healthy skin can also be compromised by:

- Ill-fitting stoma appliance
- High output stoma
- Poorly sited stoma
- Never leave a leaking appliance unattended
- Clean using warm sterile saline until the wound suture line is healed then use warm sterile water.

Daily Bathing with or without Ostomy Appliance

- Wait for a few days before bathing without the ostomy appliance on
- Use a mild soap or warm water
- Use a soft cloth to minimize contact bleeding
- If it is not possible to apply an ostomy appliance:
  - Cover the stoma with Vaseline gauze or similar for ease of observation.
  - Cover this with dry gauze and
  - Change both as necessary

Complications (Figs 1.53 and 1.54)

- **Prolapse:** If pink and healthy and working conservative management

Fig. 1.53: Stoma complication-prolapse

Fig. 1.54: Stoma complication-prolapse, necrosis, retraction

- **Necrosis:** Usually occurs within the first 5 days post formation. It appears discolored, cyanotic, black, dark red, dusky bluish purple.
- **Skin irritation:** Skin irritation around a stoma is usually caused by leakage from the ostomy pouch and the output from the stoma gets underneath the adhesive and onto the skin.
- **Retraction:** Here the stoma retracts to below skin level. One can make applying an appliance difficult.

Principles of Wound Care

- Identify and control the underlying causes as best as possible
- Support patient-centered concern
- Address pain issues
- Optimize local wound care under most moist conditions
- Involve the multi disciplinary team

Principles of Aseptic Technique in Wound Care

- **Medical hand washing:** Before cleaning the trolley and before opening the old dressing to clean the wound.
- **Surgical hand washing:** For scrubbing in surgery.
- Gowns and aprons are the protective clothing to avoid contamination from nurse's uniform which are heavily contaminated during clinical procedures.
- **Gloves:** The purpose of wearing gloves is to protect the hands from contamination and to prevent the transfer of microorganisms already on the hands to the patient.
- Single-use medical devices should not be used for multiuse; it increases the chances for cross-infection between patients, e.g., IV lines and buckets.

High Yield Point

Preventing pressure ulcers

- Turn, Turn, Turn.....
- **SIRA:** Skin Integrity Risk Assessment
- Offloading pressure—pillows, bed cradles, padded heal dressings
- Diet

Management

As per clinical guidelines for wound care: phases of wound healing:

Memory Joggers

Treat the wound!

- **D**ebridement
- **I**nfection
- **M**oisture
- **B**alance, and then
- **E**dge. (DIM before DIME).

Phase 1—Inflammatory Phase (0–3 Days)

The body's system response to injury. During this phase, vasodilatation occurs and leads to increased blood flow causing heat, redness, pain, swelling, and loss of function. Oozing from the wound may also be present.

Phase 2—Proliferative Phase (3–24 Days)

This phase starts when healing begins and body starts making new blood vessels to cover the surface of the wound. Reconstruction and epithelialization occur during this phase. The wound size also becomes smaller as it heals.

Phase 3—Maturation Phase (24–365 Days)

This phase is the final phase of healing where the scar tissue is formed. The wound should be protected in this phase also.

Mechanisms of Wound Healing

- **Primary intention:** The clean surgical wounds and recent traumatic injuries are managed by primary closure with sutures and/or staples. Scar tissue is formed with minimal loss of tissue. Delayed primary intention is a condition when the surgical closure of a wound 3–5 days after the thorough cleansing or debridement of the wound bed.
- **Secondary intention:** Secondary intention occurs slowly by granulation, contraction and re-epithelialization and form scar. Mostly used for pressure injuries, leg ulcers and removal of partial or full thickness segment of epidermis and dermis from its blood supply. Skin flap is a surgical relocation of skin and underlying structures used to repair a wound.

Acute Management

All aspects of care should be documented properly. The components of care include assessment, treatment, implementation, management and evaluation. All wounds should be assessed regularly for early healing and all assessment and interventions must be documented.

Wound Cleansing

Different fluids and ointments are used to clean the wound and optimize the healing environment. The goals of wound cleansing are to:

- Remove debris
- Devitalized tissue
- Remove dressing shed
- Remove excessive crusting exudates.

Procedure

Irrigation is the common method for cleansing open wounds with using a syringe to produce gentle pressure—in order to loosen debris. Gauze swabs and cotton wool should be used with caution for cleaning the wound or covering the wound as they can cause mechanical damage to new tissue and delay healing.

Dressing

Choice of Dressing (Table 1.10): Wound healing occurs at different stages with different management and treatment. Same type dressing and dressing material are not suitable for all wounds; therefore, the nurse should do frequent assessment of the wound. The following considerations should follow when choosing dressing products:

- Maintain a moist or dry environment at the wound/dressing interface
- Be able to remove and control excess exudates.
- Dressing should not be sticky to the wound
- Shed fibers of dressing cause trauma to the wound or surrounding tissue on removal
- Which protects the wound from the outside environment - bacterial barrier
- Good adhesion to skin
- Sterile
- Aid debridement if there is necrotic or sloughy tissue in the wound
- Keep the wound close to normal body temperature
- Conformable to body parts and does not interfere with body function
- Be cost-effective
- **For diabetes:** Choose dressings which allow frequent inspection
- Nonflammable and non-toxic

Dressings can be categorized into four types:

1. **Primary dressing** is one that comes directly in contact with the wound bed.

Memory Joggers

Wound Mnemonics for Infection

STONES: Indicates deep compartment infection

- Size is bigger
- Temperature increased
- Probe to be bone or exposed bone
- New areas of breakdown
- Exudates, erythema, edema
- Smell

TABLE 1.10: Choice of dressing according to wound

Dry wound	Minimal exudate	Moderate exudate	Heavy exudate
Nonadherent dressing	Hydrogel	Calcium alginate	Hydrofiber
Hydrocolloid	Hydrocolloid	Hydrofiber	Foam
Films semi-permeable	Silicone absorbent	Foams	Absorbent dressing
		Negative Pressure	Negative pressure wound therapy
		Hydrocolloid: paste/powder	Ostomy bags

2. **Secondary dressing** is used to cover a primary dressing when the primary dressing is not able to protect the wound from contamination.
3. **Occlusive dressing** covers a wound from the outside environment and keeps nearly all wound vapors at the wound site.
4. **Semiocclusive dressing** which allows some oxygen and moisture vapor to evaporate.

Factors Delaying Wound Healing

A number of local and systemic factors can delay or impair wound healing. These may include:

- Inadequate protein-lacking diet and lack of essential elements in the food
- **Impaired blood supply:** Cardiovascular disorders and ischemia
- Noncompliance
- **Drug use:** Nonsteroidal anti-inflammatory drugs and corticosteroids.
- Unrelieved pressure
- **Use of cytotoxic agents:** Suppresses the immune system and inflammatory response
- **Immobility and obesity:** Cause impaired tissue perfusion
- **Stress and lack of sleep:** Increase risk of infection and delayed healing
- **Infection:** Damaged epithelium and inflammation
- **Underlying pathology:** Diabetes mellitus and autoimmune disorders
- Wound exudates - reduces wound tensile strength
- Improper wound care
- Substance abuse including alcohol and cigarette smoke.

Wound Complications

The common wound complications are:

- **Infections:** Signs of wound infection at surgical site are pus drainage, foul odor, dull throbbing pain, mild swelling and heat at wound site.
- **Inflammation:** Signs of inflamed wounds are red, painful and swollen.
- **Scarring:** Fibrous tissue leave a scar behind.
- **Loss of function:** Wounds may be life threatening if a major organ, blood vessel or nerve got damaged during injury. Also the affected limb or area will lose its functions until all damaged tissue are repaired or wound get healed.

CARE OF SURGICAL PATIENT

Preoperative Nursing Management

Preoperative preparation is the preparation of a patient requiring surgery to optimize postoperative outcomes. The preparation begins from the time of contact of the patient with the surgeon and ends on the day of surgery in the preoperative room. The approach is a multidisciplinary approach. It involves participation of anesthetic team, surgical team radiologists, pathologists, specialist nursing staff and operating room staffs.

Objectives

- To gather all information
- Surgical, medical and anesthetic aspects of assessment
- How to optimize the patient's conditions and comorbidities?
- How to take consent?
- How to organize an operating list?

Preoperative Plan

The best patient outcome can be achieved if:

- All relevant information are gathered and reported
- Optimize patient condition
- Choose surgery that offers minimal risk and maximum benefit
- Anticipate and plan for adverse events
- Inform everyone concerned
- Surgery cannot be made risk free, but risks must be known so that the patient can make an informed decision
- Patients should be given advice that they should be nil by mouth (NBM) and what to do about regular medications and premedication.
- A plan for the operating list should be drawn up and all those involved in making the list run smoothly should be informed.

Patient Assessment

History Taking

A set of fixed questions should be asked to determine "fitness" for surgery. Surgery-specific symptoms onset, duration and exacerbating and relieving factors should also be documented.

- **Cardiovascular history:** High blood pressure, chest pains, palpitations, syncope, dyspnea and poor exercise tolerance
- **Respiratory system history:** History of smoking, dyspnea, hoarseness of voice or stridor productive cough, wheeze, present. Increasing severity of symptoms generally indicates worsening of the condition.
- **Past history:** Past surgery and anesthesia can reveal problems which are present during the current hospitalization (e.g., intra-abdominal adhesions and suxamethonium apnea).
- **Drug history:** The use of recreational drugs and alcohol consumption should be noted as they are known to have association with adverse outcomes.

Physical Examination

Medical Examination (General)

- Anemia, jaundice, sources of infection (teeth, feet, leg ulcers) cyanosis and nutritional status,
- **Cardiovascular:** Pulse, blood pressure, heart sounds, bruits and peripheral edema
- **Respiratory:** Respiratory rate and effort, chest expansion and percussion note, breath sounds, oxygen saturation
- **Gastrointestinal:** Abdominal masses, ascites, bowel sounds, hernia and genitalia
- **Neurological:** Consciousness level, cognitive function, sensation, muscle power, tone and reflexes
- Airway assessment.

Surgery Related Examination

The nurse should examine the patient condition related to surgery such as type and site of surgery, complications of surgery.

Examination Specific to Surgery

The nurse should examine the patient specific to surgery that includes, site of surgery, side of surgery, specific imaging or investigation findings related to the pathology for which the surgery is proposed should be noted. Examine carefully for potential source of infection especially in the orthopedic surgeries if artificial material is implanted, such as in joint replacement surgery or arterial grafting. A nurse also must screen the patients for methicillin-resistant *Staphylococcus aureus* colonization.

Investigations

- Full blood count
- Serum creatinine
- ECG
- Chest X-ray
- Urinalysis
- Blood glucose
- HbA1c
- Clotting screening
- Arterial blood gases
- Liver function tests
- Other-relevant investigations to assess capacity of specific organ system and risk associated

Informed Consent

- Informed consent is a legal document which represents that it is given voluntarily by a patient or family member and informed him/her who is not under stress
- In emergency situations or in an unconscious patient, consent must be obtained

The Operative Team

- Nursing staff from ward, theater and recovery room
- Anesthetic
- Operation theater technician
- Surgeon and junior doctors
- Radiology, pathology
- Rehabilitation workers
- Specific personnel in individual patient cases.

Duties of Nurses

The primary responsibilities of the nurse in preoperative holding area are:

- To provide emotional support to the patients and family members
- To ensure that all preoperative documentation has completed
- To maintain patients' hemodynamic status
- To teach and demonstrate exercises that will benefit the patient postoperatively.

Arranging the Theater List

- The date, place and time of operation should be aligned with the availability of surgeon and patient
- All appropriate equipment and instruments should be available in the OR
- The operating list should be shared with all the surgical team prior to surgery day
- Give priority to the vulnerable patients such as children and diabetic patients, life and limb-threatening surgery and cancer patients need to be treated early.

Special Considerations

- Nil by mouth and regular medications
- Patients are advised not to take solids 6 hours before and clear fluids (isotonic drinks and water) within 2 hours before anesthetic is to avoid the risk of acid aspiration syndrome. Infants are allowed a clear drink up to 2 hours, mother's milk up to 3 hours and cow or formula milk up to 6 hours before anesthetic
- Patients can continue to take their specified routine medications with sips of water during this period.

Medications

- The drugs for hypertension, ischemic heart disease and bronchodilators should continue over the preoperative period
- Administer drugs through intravenous routes
- Stop anticoagulants 3–4 days preoperatively and check the prothrombin time prior to surgery.

- The patient who are taking warfarin and have had a life threatening thrombotic episode (e.g., pulmonary embolus) within the previous 3 months should be switched to heparin intravenously until 6 hours before surgery.

Preoperative Nursing Management

- Educating patient for deep breathing and coughing exercises
- Teaching mobility and active body movement, e.g., changing position, foot and leg exercise
- Describing pain management
- Teaching coping strategies
- Managing nutrition
- Managing fluid intake
  - The purpose of withholding food before surgery is to prevent the risk of aspiration during anesthesia
- Preparing the bowel for surgery
  - Enema or laxatives is not recommended for every surgery, until and unless the patient is undergoing abdomen or pelvic surgery.
- Preparing the skin
  - Skin preparation is must to decrease bacterial invasion from surgical site
- Administering pre-anesthetic medication
- Maintaining the pre-operative record
  - For example, surgical checklist, consent form, identification of patient, site of surgery.

The anticipated outcome of preoperative preparation is a patient who is informed about the surgical course, and copes with it successfully. The goal is to decrease complications along with promoting recovery. When patients are prepared psychologically and physically, and policies and guidelines have been followed, the risk of postoperative complications should be low, leading to a quick recovery.

Intraoperative Management

The "intraoperative" phase refers to the time during surgery. Throughout the intraoperative phase, the nurse acts as a chief advocate for the patient. The nurse's care and concern extend from the time the patient is prepared for surgery and to the immediate preoperative period and into the operative phase and recovery from anesthesia.

Definition: The intraoperative phase extends from the time the patient is admitted to the operating room, the time of anesthesia administration, performance of the surgical procedure and until the patient is transported to the recovery room or post anesthesia care unit (PACU).

Purposes

The purposes of intraoperative care are:

- To maintain patient safety and comfort during surgical procedures.
- To maintain homeostasis during the procedure.
- To maintain strict sterile techniques to decrease the chance of cross-infection.
- To ensure that the patient is secure on the operating table.
- To prevent hematomas from safety strips or from positioning.

The Surgical Team

The surgical team is responsible for activities of intraoperative phase which begins when the patient is received in the surgical area and lasts until the patient is transferred to the recovery area. The key members of the surgical team are:

Surgeon

Surgeon is leader of the surgical team. Surgeon is responsible for performing the surgery with the help of surgical team members.

Anesthesiologist or Anesthetist

Anesthetist is responsible for administering anesthesia in order to prevent pain and provide relaxation to the patient during the surgical procedure. The anesthesiologist also continually monitors the physiologic status of the patient, i.e., oxygen exchange, systemic circulation, neurologic status, and vital signs.

Scrub Nurse or Assistant

A scrub nurse is responsible for prepares the surgical setup, maintains surgical asepsis while draping and handling instruments, and assists the surgeon by passing instruments, sutures and supplies. The responsibilities of the scrub nurse are:

- Scrub for surgery
- Set up sterile instrument's tables
- Prepare sutures and equipment for surgery
- Assist the surgeon during the surgical procedure
- Keep notice of the time the patient is under anesthesia
- Keep notice of the time the wound is open
- Count equipment and materials such as needles, sponges and instruments as the surgical incision is closed.

Circulating Nurse

The circulating nurse is responsible to respond to the requests from the surgeon, anesthesiologist or anesthetist, deliver supplies to the sterile field, and carry out the nursing care plan.

The circulatory nurse also manages the operating room. The circulatory nurse also protects the safety and health needs of the patient by monitoring activities of members of the surgical team. Responsibilities of a circulation nurse are to:

- Perform proper cleanliness in the operation theater
- Maintain the proper room temperature
- Ensure that all the supplies and materials are available during surgical procedures
- Monitor aseptic technique in the operation theater
- Monitor the patient during the operative procedure to ensure the patient's safety

Positioning

The operation theater nurse must have an idea about various types of patient positions required for a specific surgical procedure to be performed. The following factors must be considered in positioning the patient:

- Patient should be in a comfortable position
- The operative area must be adequately exposed or opened
- An awkward position or undue pressure on a part should not obstruct the vascular supply
- Patient's respiration should not be interfered as a result of pressure of the arms on the chest or constriction of the neck or chest caused by a gown
- The nerves of the patient must be protected from undue pressure. Improper positioning of the arms, hands, legs or feet results from serious injury or paralysis
- To prevent irreparable nerve injury, shoulder braces must be well padded
- Patient safety must be observed
- The patient needs gentle restraint before induction if he/she is excited.

Images of various positions during intraoperative phase are as given in Figure 1.55.

Complications

Intraoperative complications can be:

- Surgery related
- Anesthesia related
- Anaphylactic (allergic) reaction to anesthesia.
- Malignant hyperthermia.
- Hypovolemic shock (due to blood loss during surgery)
- Injuries from poor positioning during surgery
- Infection of the surgical wound
- Fluid and electrolyte imbalances
- Aspiration pneumonia.

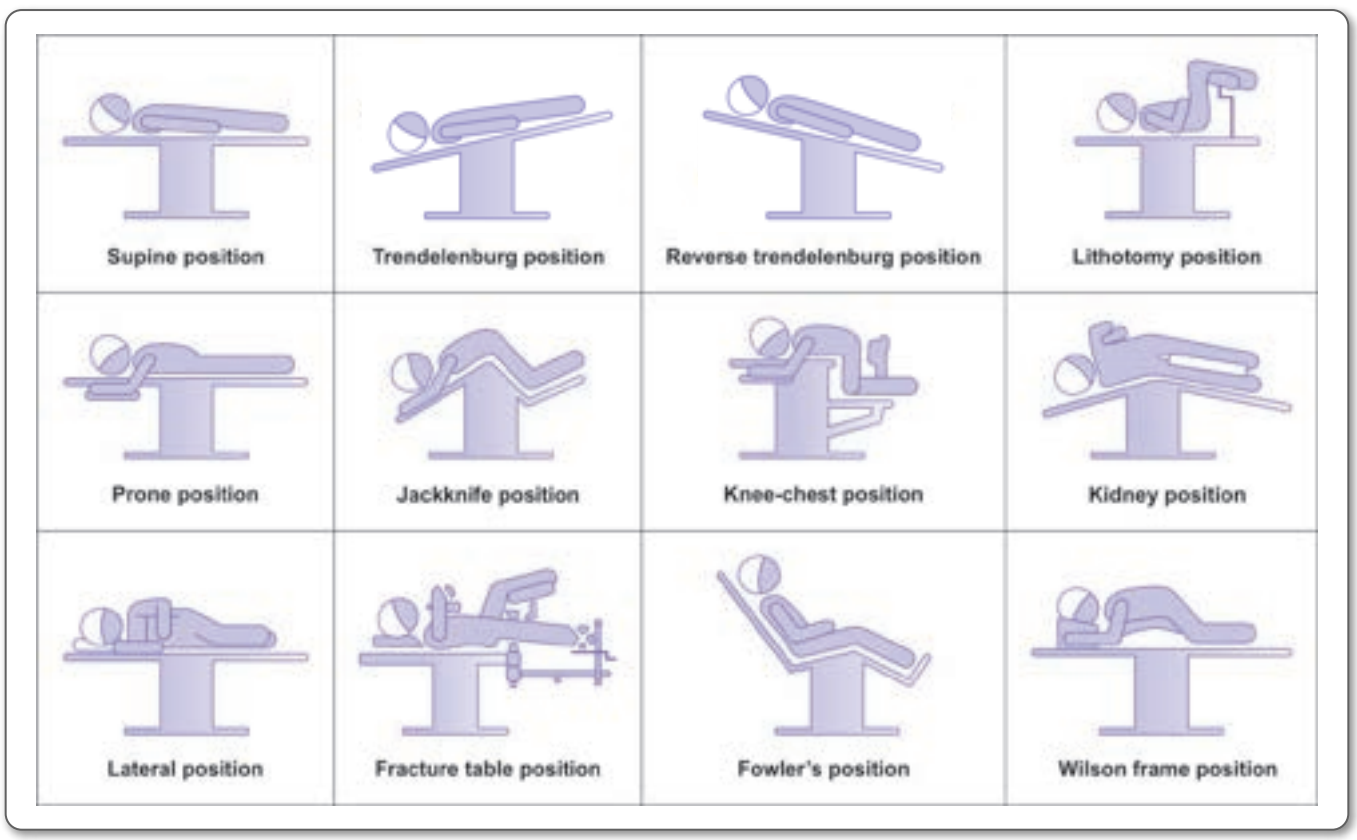


Fig. 1.55: Various surgical positions during intraoperative phase

Postoperative Management

Postoperative care is the care given after a surgical procedure. The type of postoperative care depends on the type of surgery, as well as the health history of the patient. It mainly includes pain management and wound care. Postoperative care begins immediately after the surgery. It lasts for the duration of hospital stay and may be continued after discharge too.

Definition: The **postoperative phase** of the surgical procedure extends from the time the patient is transferred to the recovery room or postanesthesia care unit (PACU) to the moment he or she is transported back to the surgical unit, discharged from the hospital until the follow-up care.

Purposes

- Re-establishing the patient's physiologic balance
- Pain management
- Prevention of complications
- Maintaining adequate body system functions
- Restoring body homeostasis.

Memory Joggers

"POSTOPERATIVE"

P – Preventing and/or relieving complications
O – Optimal respiratory function
S – Support: psychosocial well-being
T – Tissue perfusion and cardiovascular status maintenance
O – Observing and maintaining adequate fluid intake
P – Promoting adequate nutrition and elimination
E – Encouraging activity and mobility within limits
R – Renal function maintenance
A – Adequate fluid and electrolyte balance
T – Thorough wound care for adequate wound healing
I – Infection Control
V – Vigilant to manifestations of anxiety and promoting ways of relieving it
E – Eliminating environmental hazards and promoting client safety

Patient Care During Immediate Postoperative Phase

The following parameters are used for making decision to shift the patient from post-anesthesia care unit to the floor:

- Uncompromised cardiopulmonary status
- Stable vital signs
- Adequate urine output–at least 30 mL/hour
- Orientation to time, date and place
- Satisfactory response to commands
- Minimal pain
- Absence or controlled nausea and vomiting
- Pulse oximetry readings of adequate oxygen saturation
- Satisfactory response to commands
- Movement of extremities after regional anesthesia

Patient Assessment

- Assess for gas exchange status and check the patient's skin color
- Verify the patient identity, type of operative procedure performed and the name of the surgeon responsible for the operation
- Check Level of Consciousness (LOC) and use the Glasgow Coma Scale (GCS) to determine the neurologic status of the patient
- Determine the patient's vital signs in the immediate postoperative period and skin temperature
- Surgical site examination for any bleeding, drainage, redness and oozing

Positioning

Moving a patient from one position may cause arterial hypotension. Moving patient from lithotomy to horizontal position, from lateral to supine position, prone to supine position and even when a patient is transferred to the stretcher can cause serious arterial hypotension. Nurses should be very careful during the changing of position of patient after the immediate postoperative phase.

Promoting Patient Safety

During transferring of the patient to the stretcher, the patient should be covered with blankets. Side rails should be raised to protect the patient from falls.

- S — Securing restraints for IV fluids as well as blood transfusion
- A — Assist the patient to a position appropriate based on the location of incision site and presence of drainage tubes
- F — Fall precaution implementation
- E — Eliminating possible sources of injuries and accidents

Postoperative Nursing Care

Airway

- Keep airway in place until the patient is fully conscious.
- Suction secretions when needed to clear the airway.

Breathing

- B — Bilateral lung auscultation
- R — Rest and keep the patient in a lateral position
- E — Encourage the patient for deep breathing exercises
- A — Assess the patient's orientation to name or command.
- T — Turn position of the patient every 1 to 2 hours to improve breathing
- H — Humidified oxygen administration.

Circulation

- Check patient's vital signs and report for any abnormalities
- Monitor intake and output
- Identify early symptoms of shock or hemorrhage (cold extremities, decreased urine output slow capillary refill, drop in blood pressure, narrowing pulse pressure and tachycardia.)

Thermoregulation

- Check body temperature hourly
- Report any temperature abnormalities
- Monitor the patient for post-anesthesia effect, i.e., post-anesthesia shivering. Post-anesthesia shivering represents a heat-gain mechanism and causes thermal imbalance
- Provide environment with proper temperature and humidity.
- Provide warm blankets when the patient is cold.

Fluid Volume

- Assess patient's skin color and turgor and body temperature
- Identify the evidence of fluid and electrolyte imbalances (E.g., nausea, vomiting and body weakness)
- Monitor intake and output of fluids
- Identify signs of fluid imbalances
- **Signs of hypovolemia:** Decreased blood pressure, decreased urine output, increased pulse rate, increased respiration rate, and decreased CVP.
- **Signs of hypervolemia:** Increased blood pressure and CVP, changes in lung (crackles) in both the lungs and changes in heart sounds (presence of S3 gallop).

Safety

- Properly support and pad the pressure areas to avoid nerve damage and muscle strain
- Examine for dressing
- Prevent the patient from falling, raise the side rails
- Prevent any possible needle dislodge
- The bed wheels should be locked.

GI Function and Nutrition

- Insert the nasogastric tube and check for drainage
- Provide antiemetic medications for nausea and vomiting
- Administer phenothiazine for severe, persistent hiccups
- Assist patient to start normal dietary intake gradually
- Start liquids first, then soft foods, then solid food
- Paralytic ileus and intestinal obstruction are postoperative complications that occur in patients undergoing intestinal or abdominal surgery
- Educate patient for high-protein meals that provide sufficient and appropriate fiber, calories, and vitamins and also to take multivitamins, iron and vitamin C supplements postoperatively, if prescribed.

Comfort

- Observe and assess for any pain
- Administer prescribed medications for pain
- Assist the patient to a comfortable position to reduce pain

Drainage

- Observe for any presence of drainage
- Connect tubes to a specific drainage system
- Note presence and condition of dressings
- Observe color of drainage

Skin Integrity

- Maintain record for amount and color of wound drainage
- Regularly do the dressings
- Wash hands regularly
- Maintain sterile technique during wound care
- Maintain the patient's body alignment to prevent pressure ulcer

Assessing and Managing Voluntary Voiding

- Check for bladder distention
- Patient should void within 8 hours of surgery
- Catheterize the patient if patient has an urge to void or not
- Facilitate various methods like letting water run, applying heat to perineum to encourage the patient to void
- Make sure that the bedpan is warm to reduce discomfort, tightening of muscles and urethral sphincter
- Assist the patient who is not ready to use the bedpan to use a commode
- Maintain urine output record
- Palpate the suprapubic area for distention or tenderness.
- Continue intermittent catheterization every 4 to 6 hours until patient passes urine spontaneous

Encouraging Activity

- Encourage for mobilization as soon as possible.
- Advise the importance of early ambulation for the prevention of complications.
- Avoid orthostatic hypotension.
- Assess for dizziness and blood pressure first in supine position, sitting position, standing position and 2 to 3 minutes later.
- Assist to position the patient gradually.
- Initiate and encourage patient to perform range of motion exercises to improve circulation.
- Apply anti-embolism stockings.

Summary

The celebrated authorities' in Ayurvedic medicine were Atreya, Charaka and Vagbhata. The laws of Manu were a code of personal hygiene, which was very well maintained through knowledge of sanitation, water supply and engineering in Indus Valley Civilization.

Sushruta, the father of Indian surgery, compiled the surgical knowledge in *Sushruta Samhita* which includes medicine, pathology, anatomy, midwifery, ophthalmology, hygiene and bedside manners.

Health is a state of complete physical, mental, social well-being and not merely the absence of disease or infirmity." —World Health Organization

- **Concept of health:** Biomedical concept, Ecological concept, Psychosocial concept, Holistic concept
- Health is multidimensional. World Health Organization (WHO) explained health in four dimensional perspectives: physical, mental, social and spiritual.
- The concept of prevention came into being when Leavell and Clark in 1953 defined levels of application for disease prevention. **These are five:** Health promotion, Specific protection, Early recognition and prompt treatment, Disability limitation and Rehabilitation.
- **Medical asepsis:** It is a method used to prevent contamination of wounds and other susceptible sites by organisms that can later cause infection.
- **Surgical asepsis:** Sterilization destroys all microorganisms and their spores. Surgical asepsis demands the highest level of aseptic technique and requires all areas to be kept as free as possible of infectious microorganisms.
- Inflammation is the local response of living mammalian tissues to injury due to any agent.
- Infection is the invasion to a host organism's bodily tissues by disease-causing organisms, their multiplication, and the reaction of host tissues to these organisms and the toxins they produce.
- The term "immunity" is referred to the resistance of an individual toward injury caused by microorganisms and their products.
- A wound is a cut or injury that occurs either to a tissue or the skin surface.
- **Informed consent:** Valid consent represents that it is given voluntarily by a competent and informed person who is not under stress
- The term "intraoperative" refers to the time during surgery. Intraoperative care is patient care during an operation and ancillary to that operation.
- The postoperative phase of the surgical procedure extends from the time the patient is transferred to the recovery room or postanesthesia care unit (PACU) to the moment he or she is transported back to the surgical unit, discharged from the hospital until the follow-up care.

Assess Yourself

Long Answer Questions

1. Define immunity. Explain its types.
2. Explain the nursing responsibility during postoperative phase.
3. Elaborate trends in medical surgical nursing.
4. Explain expanded and extended role of nurses.
5. What is stoma? Enlist the complication of stoma? Explain care of stoma?

Short Notes

1. Medical and surgical asepsis
2. Phases of wound healing
3. Different models of health care delivery system

Define the Terms

- Health
- Illness
- Asepsis
- Infection
- Immunity
- Wound
- Inflammation
- Active immunity
- Passive immunity
- Surgical asepsis

Multiple Choice Questions

1. The condition of being free from disease producing microorganism is:
   a. Sepsis b. Asepsis
   c. Disease d. Infection
2. The illness characterized by severe symptoms of relatively short duration is called:
   a. Infection b. Inflammation
   c. Acute illness d. Chronic illness
3. The condition characterized by the local vascular and exudative changes and lasts less than 2 weeks is:
   a. Acute illness b. Acute inflammation
   c. Asepsis d. Infection
4. The inability of an individual's adaptive responses to maintain physical and emotional balance and an impairment of functional abilities is termed as:
   a. Illness b. Disease
   c. Health d. Inflammation
5. When the organism moves or is carried from one place to another, it is:
   a. Portal of entry b. Portal of exit
   c. Mode of transmission d. Reservoir
6. The period during which the patient is undergoing surgery in the operating room is:
   a. Postoperative phase b. Preoperative phase
   c. Intraoperative phase d. Preparation phase
7. The place of exit providing a way for a microorganism to leave the reservoir is:
   a. Reservoir b. Portal of entry
   c. Portal of exit d. Mode of transmission
8. An opening through which the microorganism can enter into the host is:
   a. Portal of entry b. Portal of exit
   c. Wound d. Infection
9. A disruption in the continuity and regulatory process of tissue cells is called:
   a. Wound b. Infection
   c. Inflammation d. Asepsis
10. The method of healing in which the wound edges are surgically approximated and the integumentary continuity is restored without granulation is called:
    a. First intension healing b. Second intension healing
    c. Third intension healing d. Fourth intension healing
11. The method of healing in which the wound edges are not surgically approximated and the integumentary continuity is restored with granulation is called:
    a. First intension healing b. Second intension healing
    c. Third intension healing d. Fourth intension healing
12. The method of healing in which the surgical approximation of wound edges is delayed and the integumentary continuity is restored by apposing areas of granulation is called:
    a. First intension healing b. Second intension healing
    c. Third intension healing d. Fourth intension healing
13. An infection which is considered fatal/incurable is:
    a. Acute illness b. Chronic illness
    c. Terminal illness d. Infection
14. A person who cannot resist a microorganism invading the body, multiplying and resulting in infection is:
    a. Susceptible host b. Reservoir
    c. Infectious agent d. Pathogen
15. The surgical term used to explain the reconstruction of an injured, damaged or deformed part of the body is:
    a. Elective surgery b. Reconstructive surgery
    c. Curative surgery d. Constructive surgery
16. The direct physical transfer of an agent from an infected person to a host through direct contact with a contaminated object is called:
    a. Contact transmission b. Droplet transmission
    c. Airborne transmission d. Vector transmission
17. The period between entrance of pathogen into body and appearance of the first symptoms:
    a. Incubation period b. Prodromal stage
    c. Illness stage d. Convalescence stage
18. The stage in which the individual shows the signs and symptoms is:
    a. Prodromal stage b. Illness stage
    c. Convalescence stage d. Incubation period
19. A person's state of health, wellness or illness depends on an individual's:
    a. Self concept
    b. Lifestyle only
    c. Known risk factors
    d. Values, personality and lifestyle
20. All of them are phagocytic cells; except:
    a. Neutrophils b. Macrophages
    c. Histiocytes d. Platelets

Answer Key

1. b	**2.** c	**3.** b	**4.** a	**5.** c	**6.** c	**7.** c	**8.** a	**9.** a	**10.** a
11. b	**12.** c	**13.** c	**14.** a	**15.** b	**16.** a	**17.** a	**18.** b	**19.** c	**20.** d

Further Readings

1. Black, Hawks (2005) Medical Surgical Nursing (7th Edition) Missouri. Saunders
2. Brunner and Suddarths (2008). Medical Surgical Nursing (11th Edition). New Delhi. Wolters Kluwer (India) Pvt. Ltd.
3. Gulani K.K. (2008) Community Health Nursing. Principles and Practice. (1st Edition). Delhi. Kumar Publishing House.
4. History and trends in nursing in India, TNAI, 2001
5. Holloway, Nancy M. (1999), Medical Surgical care planning: Now with critical pathways (3rd edition), USA: Springhouse Co-operation.
6. Keithley, Joyce K. (1998), Mastering Medical-Surgical Nursing, USA: Springhouse Co-operation.
7. Kuruvilla, Jaya (2007). Essentials of Critical Care Nursing, N Delhi: Jaypee Brothers Page 15-16
8. Le Mone, Burke. (2008) Medical Surgical Nursing. Critical Thinking in Client Care. (4th Edition). South Asia. Dorling Kindersley (India) Pvt. Ltd.
9. Lewis Heitkemper, Dirksen. (2004). Medical Surgical Nursing-Assessment and Management of Clinical Problems (6th Edition) Missouri. Mosby.
10. Le Mone, P. (2008), Medical-Surgical Nursing: Critical thinking in client care, (1st edition), New Delhi: Dorling Kindersley (India) Ltd.
11. Nair, Usha R. (2009), Textbook of Medical and Surgical Nursing (1st edition), New Delhi: Jaypee Brothers Medical Publishers.
    James Drife, (24/5/09), History of Medical and Surgical nursing, www.bmjjournals.com.
    Nemours, (24/4/08), Trends in Medical Surgical Nursing, http://www.hkmj.org
    Potter, Perry. (2003) Basic Nursing Essentials for Practice (5th Edition). USA. Mosby
12. Park K. (2009). Preventive and Social Medicine 20th Edition). Jabalpur. M/S Banarsidas Bhanot.
13. Park's Textbook of Preventive and Social Medicine, 21st edition
    Textbook of Epidemiology, Leon Gordis, 4th edition.
14. Taylor, Carol R (2008), Fundamentals of Nursing (The Art and Science of Nursing Care) 6th edition Vol-1, N. Delhi: Wolter Kluwer P Ltd page 155
15. The Trained Nurses Association of India (2009), Fundamentals of Nursing (a procedure manual. N Delhi: Aravati Printers and Pub. 11-12, 33-34.
16. www.wisc-online.com/objects/index_tj.asp
17. www.accessmylibrary.com/.../health-comprehensive-concept.html