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MANAGEMENT for PATIENT SAFETY

Editors :
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MANAGEMENT
FOR PATIENT SAFETY

UU No 28 tahun 2014 tentang Hak Cipta

Fungsi dan sifat hak cipta Pasal 4

Hak Cipta sebagaimana dimaksud dalam Pasal 3 huruf a merupakan hak eksklusif yang terdiri atas hak moral dan hak ekonomi.

Pembatasan Pelindungan Pasal 26

Ketentuan sebagaimana dimaksud dalam Pasal 23, Pasal 24, dan Pasal 25 tidak berlaku terhadap:

i. Penggunaan kutipan singkat Ciptaan dan/atau produk Hak Terkait untuk pelaporan peristiwa aktual yang ditujukan hanya untuk keperluan penyediaan informasi aktual;
ii. Penggandaan Ciptaan dan/atau produk Hak Terkait hanya untuk kepentingan penelitian ilmu pengetahuan;
iii. Penggandaan Ciptaan dan/atau produk Hak Terkait hanya untuk keperluan pengajaran, kecuali pertunjukan dan Fonogram yang telah dilakukan Pengumuman sebagai bahan ajar; dan
iv. Penggunaan untuk kepentingan pendidikan dan pengembangan ilmu pengetahuan yang memungkinkan suatu Ciptaan dan/atau produk Hak Terkait dapat digunakan tanpa izin Pelaku Pertunjukan, Produser Fonogram, atau Lembaga Penyiaran.

Sanksi Pelanggaran Pasal 113

1. Setiap Orang yang dengan tanpa hak melakukan pelanggaran hak ekonomi sebagaimana dimaksud dalam Pasal 9 ayat (1) huruf i untuk Penggunaan Secara Komersial dipidana dengan pidana penjara paling lama 1 (satu) tahun dan/atau pidana denda paling banyak Rp100.000.000 (seratus juta rupiah).
2. Setiap Orang yang dengan tanpa hak dan/atau tanpa izin Pencipta atau pemegang Hak Cipta melakukan pelanggaran hak ekonomi Pencipta sebagaimana dimaksud dalam Pasal 9 ayat (1) huruf c, huruf d, huruf f, dan/atau huruf h untuk Penggunaan Secara Komersial dipidana dengan pidana penjara paling lama 3 (tiga) tahun dan/atau pidana denda paling banyak Rp500.000.000,00 (lima ratus juta rupiah).

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FOREWORD

Praise be to God Almighty, for His mercy and grace, the authors have completed this textbook with the title *Management for Patient Safety*. This textbook was developed to provide guidance for nursing students in the international class of vocational bachelor study programs. This textbook is arranged based on the curriculum for nursing.

This textbook is expected to help students get information about patient safety and work safety in nursing. This is also intended to equip vocational bachelor students of the international class with adequate hard skills and soft skills to be competent in health services.

In nursing education, students are expected to be able to combine technical skills with knowledge and apply theories to laboratory and clinical settings. Patient safety is an important priority in hospitals. Efforts are made to improve patient safety, in addition to reducing the occurrence of accidents and risks. Nurses must be able to apply Occupational Safety and Health properly and correctly.

The authors realize that this teaching material is still far from perfect, so feedback and suggestions for improvement in the future are welcomed. The authors would like to thank all those who have helped and taken part in the completion of this textbook.

Authors

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INTRODUCTION

A. Overview

Nurses around the world have a major role to play in improving patient safety. Efforts to improve patient safety have become a global movement. This has also led to a remarkable transformation, in that patient safety is a real issue. This view of patient safety as a real issue began as an academic subject at the minority level, but has now become a top priority in the healthcare system. Nonetheless, the current state of patient safety worldwide is still a source of deep concern. the various errors and incidence rates, can explain that medical care insecurity is an element that occurs in almost every aspect of health services. Education and training of nurses and other health professionals has become the foundation of high quality and safe health care. However, the value of patient safety has been underestimated even though it is an important tool for overcoming challenges in achieving increased patient safety. It is clear that a new approach is needed in education and training to play its full role and provide an understanding that medical personnel must improve patient safety.

Patient safety is a system in which hospitals make patient care safer, where the system includes risk assessment, identification and management of matters related to patient risk, reporting and analysis of incidents, ability to learn from incidents and their follow-up as well as implementation and solutions to minimize risks and prevent injuries caused by mistakes due to carrying out an action or not carrying out an action that should have been carried out. Patient safety is the responsibility of health workers including nurses in order to reduce the phenomenon of medical error (Di Simone et al., 2018)

A nurse acts as one of the health workers who have a longer contact time with patients compared to other health workers, thus allowing the occurrence of medical errors in patients to be higher by nurses. Given how important this is, it is very important for a nurse or student to understand the concept of patient safety,

so that when carrying out nursing care starting from assessment, determining nursing diagnoses, interventions, taking actions, and evaluating medical errors does not occur. it is expected that students' abilities regarding patient safety.

After studying patient safety, students are expected to:

1. Able to show devotion to God Almighty and pride as the Indonesian nation that upholds human, ethical, legal, moral, and cultural values in providing nursing care.
2. Able to master the science of nursing to perform nursing care in a professional manner using the nursing process approach.
3. Able to carry out therapeutic communication, be responsible and play an active role in interprofessional, collaboration with health teams, clients, families, and communities.
4. Able to provide health education and counseling in nursing care by developing communication skills and utilizing scientific information.
5. Able to evaluate the quality of nursing services in clinical and community settings by using the principles of leadership and nursing management.

B. Study Guidance

1. Study patient safety material carefully which is divided into several sections covering the mastery of the knowledge and skills and attitudes that underlie the mastery of competencies until you feel confident that you have mastered the abilities in this subject
2. Examine patient safety goals properly
3. Read the summary carefully
4. Do the formative test exercises at the end of each material

Feedback and Follow Up:

Check your answers with the formative test answer key which is located at the end of this textbook. Calculate the correct answers, then give an assessment using the formula to find out your level of mastery regarding the material in this learning activity

$$\text{Knowledge Level} = \frac{\text{Number of Correct Answers}}{\text{Number of questions}} \times 100\%$$

Meaning of mastery level:

90–100% = Very good
80–89% = Good
70–79% = Enough
<70% = Poor

If you score 80% or more, you can continue studying the next material. GOOD, UPGRADE YOUR SKILLS! If it's still below 80%, it means you have to repeat studying the previous material, especially in the parts that you haven't mastered.

UNIT 1
PATIENT SAFETY CONCEPTS AND PRINCIPLES

LEARNING OBJECTIVES

1. Students can explain the concept of patient safety correctly
2. Students can apply the principle of patient safety
3. Students can determine the components and goals of patient safety
4. Students can describe patient safety standards
5. Students can compile the steps for implementing a safety pass
6. Students can monitor patient safety evaluations
7. Students can carry out communication between members of the health team
8. Students can implement policies that support patient safety

1. Understanding Patient Safety

Patient safety is freedom from physical and psychological injury that guarantees patient safety, through the establishment of an operational system. minimize the occurrence of errors, reduce patient insecurity in the health care system and improve optimal service (Canadian Nursing Association, 2004). The International Council of Nurses (2002) says that patient safety is fundamental in the quality of health services and nursing services. Improving patient safety includes concrete actions in the recruitment, training and retention of professionals, performance development. risk management and a safe environment, infection control, safe use of medicines, equipment, and a safe treatment environment as

well as integrated accumulation of scientific knowledge focused on patient safety accompanied by infrastructure support for existing developments.

The Canadian Nurse Association (2009) says that patient safety is not just an issue that is allowed to develop in nursing or is part of what nurses will do. However, patient safety is an embodiment of nurses' commitment to a code of ethics to maintain patient safety (Pelzang dkk., 2017). Patient safety is also the basis for carrying out nursing care wherever the nurse works.

According to the International of Medicine (IOM) patient safety is defined as freedom from accidental injury. Accidental injury caused by an error covering failure of a plan or using the wrong plan in achieving a goal. Accidental injury is also the result of carrying out the wrong action (commission) or not taking the action that should be taken (omission). Accidental injury in practice will be in the form of an unwanted event (near miss). According to Sir Liam Donaldson (Chairman of the WHO World Alliance for Patient Safety, Forward Programme, 2006-2007) revealed that "Safe care is not an option. It is the right of every patient who entrusts their care to our health care system", namely health services What is safe for patients is not an option but is the patient's right to believe in the services provided by a health care system.

According to the Regulation of the Minister of Health (2011) Hospital patient safety is a system where hospitals make patient care safer. The system includes risk assessment, identification and treatment of matters related to patient risk, reporting and analysis of incidents, the ability to learn from incidents and their follow-up and implementation of solutions to minimize risk and prevent injury caused by errors due to carrying out an action or not take the action that should be taken. The system is expected to prevent injuries caused by errors due to carrying out an action or not taking the action that should be done.

Patient safety is a safe system that is carried out by every health worker starting from assessment, identification to analysis of events that aim to improve the quality of health services. So, it can be concluded that patient safety is avoiding injury or being free from injury to patients due to medication errors or medical treatment.

According (Cousins & Heath, 2008) the objectives of the patient safety program in hospitals (Hospital Patient Safety Committee, 2008) are as follows:

a. Creating a culture of patient safety in the hospital.
b. Increase hospital accountability to patients and society.

c. Reduction of unexpected events in the hospital.
d. Implementation of a prevention program that results in no repetition of adverse events.

According (Hunt, 2023) global patient safety goals are:

a. Correctly identify the patient (accurately identify the patient)
b. Increase effective communication
c. Work to achieve patient well-being, working with full vigilance.
d. Reduce wrong place, wrong patient, wrong strategy of medical procedures
e. Reduce the risk of infection associated with health services
f. Reduce the risk of the patient being injured by a fall

2. Patient Safety Incident

According to Holden & Card (2019) Events or incidents are characterized as unexpected events and conditions that result or may cause preventable injury to patients Some understanding of patient safety incidents includes:

a. Adverse events
   Adverse events are incidents that result in injury to the patient.
b. Near miss incident
   near miss is an incident that has not yet been exposed to the patient
c. No-harm events
   Non-injury event means an incident that has been exposed to the patient, but no injury occurred.
d. Potential injury event
   Potential Injury Occurrence is a condition where there is a high potential for injury, but the incident has not yet occurred.
e. Sentinel incident
   Sentinel events are unexpected events that result in death or serious injury (Hospital Patient Safety Committee, 2015).

3. Principle Of Patient Safety

There are 5 Principles of Patient Safety according to Kohn (2000) for designing safety systems in health organizations namely (Vaismoradi dkk., 2020).

1. Provide leadership includes:
   - Making patient safety the main goal/priority
   - Making patient safety a shared responsibility
   - Designate/assign a person responsible for the safety program system
   - Develop an effective mechanism to identify “unsafe” doctors
2. Paying attention to human limitations in process design, namely:
   - Design jobs for safety
   - Simplify the process
   - Establish process standards
3. Develop an effective tea
4. Anticipation for adverse events:
   - Proactive approach
   - Provide antidotes
   - Simulation training
5. Creating a “learning” atmosphere

4. Patient Safety Components

Policy alone cannot be expected to drive a change towards a patient safety culture. If what the hospital expects is only increased reporting of incidents and adverse events, then a transactional approach is sufficient (Hegarty dkk., 2021).That is, the approach taken is through the establishment of a transactional nature, from the organizational structure, policies, the existence of new procedures or an electronic-based reporting system.

However, according to him, this transactional approach is insufficient and unable to touch the essence of patient safety. This is because the transactional approach cannot overcome problems and resistance within the organization. In this case, a transformational approach is still needed, namely leadership, mission, strategy, and organizational culture. Realizing patient safety requires a combination of a transactional approach and a transformational approach. The combination of these approaches is as follows:

a. External Environment

   Environment outside the hospital or health care provider has a significant influence to change the orientation of the organization. In the context of health organizations or health care providers, pressure from the outside environment can come from many things. For example, inter-hospital competition, policy rules for implementing health service quality, medicolegal demands, and customer response in general. Thus, external factors greatly influence the orientation of health organizations.

b. Leadership

   A leader has an important role in holding the key to change, because he must be responsible for leading change. A leader has a tough enough task to build an organization's vision and mission, communicate development ideas, policies or strategies towards better change, especially in the implementation of patient safety. Without strong leaders who are responsive to patient safety issues and dare to make policies, patient safety is just a myth.

c. Organizational Culture

   The most important thing from this element is how patient safety culture is attached to organizational culture. That is, how to change the patient safety culture from a blaming culture to a safety culture is the key to improving patient quality and safety from an organizational perspective.

d. Management Practice

   The hospital is a system that is of course interrelated, both between units, between staff and between management. So, the important thing to realize patient safety is to carry out the best possible management. The management includes planning, funding, organization, staffing, problem solving, analysis and evaluation. Management at all levels must work together to take responsibility for implementing mutually agreed policies and procedures. For example: nursing managers are responsible for patient safety with regard to nursing duties and medical support managers are responsible for patient safety with regard to medical support units and so on.

e. Structure and System

Health organizations need a special team that deals with patient safety. Usually in hospitals a Patient Safety Team is formed with various working groups within it (e.g., the transfusion working group, the drug error working group, the nosocomial infection working group and so on). The design of this system is based on three principles, namely: designing the system so that every error can be seen (making errors visible), designing the system so that the effects of errors are reduced (mitigating the effect errors) and designing the system so that errors do not occur (error prevention).

f. Individual Tasks and Skills

In accordance with the times, sometimes there are medical staff who lack knowledge and skills because they do not update their knowledge. There are also staff who care about patient safety but don't know what to do (e.g., non-medical). Based on this fact, it is necessary to update knowledge and skills as well as ability information basic patient safety in non-medical staff. For example, what to do when a patient falls or faints.

g. Work Environment, Individual Needs, and Motivation

The environment in which we work influences the motivation of everyone in implementing patient safety. For example, the work environment creates a system that minimizes confusion or doubts by medical staff in acting against patients, appropriate workloads, clear assignments, and various other aspects that affect individual needs and motivation in improving patient safety.

5. Patient Safety Standards

Patient Safety Standards must be applied to health service facilities such as hospitals and the assessment is carried out using an Accreditation Instrument (Hospital Accreditation). Seven Patient Safety Standards (referring to the "Hospital Patient Safety Standards" issued by the Joint Commission on Accreditation of Health Organizations, Illinois, USA, 2002), namely:

Standard I. Patient Rights

Patients and their families have the right to receive information about plans and results of services, including the possibility of adverse events.

Criteria:

a. There must be a doctor in charge of the service.
b. The doctor in charge of the service must make a service plan.
c. The doctor in charge of the service must provide a clear and correct explanation to the patient and his family about the plans and results of the service, treatment and procedures for the patient including the possibility of an Unexpected Event

Standard II. Educate Patient and Family

Hospitals must educate patients and their families about the obligations and responsibilities of patients in patient care. Patient safety in providing services can be improved by involving patients who are partners in the service process. Therefore, in hospitals there must be a system and mechanism for educating patients and their families about patient obligations and responsibilities in patient care.

Criteria:

a. Provide true, clear, complete, and honest information.
b. Know the obligations and responsibilities of patients and families.
c. Ask questions about things you don't understand.
d. Understand and accept the consequences of service.
e. Follow instructions and respect hospital rules.
f. Show respect and consideration.
g. Fulfill agreed financial obligations.

Standard III. Patient Safety and Service Continuity

The hospital guarantees continuity of service and guarantees coordination between staff and between service units.

Criteria.

a. There is overall service coordination starting from the time the patient enters, examination, diagnosis, service planning, treatment measures, referrals and time patient discharged from hospital.

b. There is coordination of services that are adjusted to the needs of patients and the feasibility of resources on an ongoing basis so that at all stages of service transactions between service units can run well and smoothly.
c. There is service coordination which includes increased communication to facilitate family support, nursing services, social services, consultations and referrals, primary health services and other follow-ups.
d. There is communication and information transfer between health professions so that a process of coordination can be achieved without hindrance, safe and effective.

Standard IV:

Hospitals must design new processes or improve existing processes, monitor, and evaluate performance through data collection, intensive analysis, and make changes to improve performance and patient safety.

Criteria:

a. Every hospital must carry out a good planning process, referring to the vision, mission and goals of the hospital, the needs of patient health care workers, the latest clinical principles, sound business practices and other factors that have the potential to pose a risk to patients according to the "steps towards hospital patient safety.
b. Every hospital must collect performance data including those related to incident reporting, accreditation, risk management, utilization, service quality, finance.
c. Every hospital must carry out an intensive evaluation related to all Adverse Events and proactively evaluate a process of high-risk cases.
d. Each hospital must use all data and information from the analysis results to determine the necessary system changes, so that patient performance and safety are guaranteed.

Standard V. The Role of Leadership in Improving Patient Safety

1. Leaders encourage and guarantee the implementation of an integrated patient safety program within the organization through the implementation of "7 steps towards hospital patient safety".
2. Leaders ensure ongoing proactive programs to identify patient safety risks and programs to suppress or reduce Adverse Events/near misses.

3. Leaders encourage and foster communication and coordination between units and individuals related to decision making regarding patient safety.
4. Leaders allocate adequate resources to measure, review and improve the performance of the raft and improve patient safety.
5. Leaders measure and review the effectiveness of their contributions in improving hospital performance and patient safety.

Criteria:

a. There is an interdisciplinary team to manage the patient safety program.
b. A proactive program is in place for identification of safety risks and incident minimization programs, which cover the types of incidents that require attention, from near misses to unexpected incidents.
c. There is a working mechanism in place to ensure that all components of the hospital are integrated and participate in the patient safety program.
d. Incident response procedures are in place, including care for affected patients, limiting risks to others, and conveying correct and clear information for analysis purposes.
e. There are internal and external reporting mechanisms related to incidents, including the provision of correct and clear information regarding the analysis of the root causes of incidents when the patient safety program is implemented.
f. Mechanisms are in place to deal with different types of incidents or to proactively mitigate risk, including mechanisms to support staff in relation to incidents.
g. There is collaboration and voluntary open communication between units and between service managers within the Hospital with an interdisciplinary approach.
h. Available resources and information systems needed in hospital performance improvement activities and repairs.
i. Patient Safety, including periodic evaluation of the adequacy of these resources.
j. Measurable targets and information collection are provided using objective criteria to evaluate the effectiveness of improving hospital performance and patient safety, including follow-up plans and their implementation.

Standar VI: Educating Staff about Patient Safety

1. The hospital has an education, training and orientation process for each position that includes a clear relationship between the position and patient safety.
2. The hospital organizes ongoing education and training programs to improve and maintain staff competence and support an interdisciplinary approach in patient care.

Criteria:

a. Each hospital must have an education, training and orientation program for new staff that includes topics on patient safety according to their respective duties.
b. Every hospital must integrate the topic of patient safety in every in-service training activity and provide clear guidelines on incident reporting.
c. Every hospital must organize training on group collaboration to support an interdisciplinary and collaborative approach in serving patients.

Standard VII. Communication is the Key for Staff to Achieve Safety Patient

1. The hospital plans and designs a patient safety information management process to meet internal and external information needs
2. Transmission of data and information must be timely and accurate.
   Criteria:

a. It is necessary to provide a budget to plan and design management processes to obtain data and information on matters related to patient safety.
b. Mechanisms for identifying problems and communication constraints are in place to revise existing information management.

6. Steps To Implement Patient Safety

It is very important for health-care facility staff to be able to assess the progress that has been made in providing safer care. With seven steps towards patient safety Health care facilities can improve patient safety, through activity planning and performance measurement. Implementing these seven steps will help ensure that the care provided is as safe as possible, and that if something does go wrong, appropriate action can be taken immediately. These seven steps can also

help Health-care Facilities achieve their goals for Clinical Governance, Risk Management, and Quality Control. The seven steps towards patient safety consist of:

1. Build Awareness of Patient Safety Values Create leadership and a culture that is open and fair.

Deployment steps:

A. For Hospital:

Make sure the hospital has a policy outlining what staff should do immediately after an incident, what fact-gathering steps should be taken and what support should be provided to staff, patients, and families.

1) Make sure the hospital has a policy outlining individual roles and responsibilities when an incident occurs.
2) Fostering a culture of reporting and learning from incidents that occurred in the hospital.
3) Conduct an assessment using a patient safety assessment survey.

B. For Units/Teams:

1) Make sure your co-workers feel able to talk about concerns and have the courage to report any incidents.
2) Demonstrate to your team the measurements used in your hospital to ensure all reports are made publicly and learning takes place and appropriate actions/solutions are implemented.

2. Lead and Support Staff

Establish a strong and clear focus on patient safety throughout your healthcare facility.

A. For Hospitals:

1. Building a strong and clear commitment and focus on patient safety in the hospital.

Deployment steps

2) Identification in each part of the hospital, people who can be counted on to become a “mover” in the Patient Safety movement
3) Prioritize patient safety in the agenda for meetings of the Board of Directors/Leaders as well as hospital management meetings

4) Include Patient Safety in all your hospital staff training programs and ensure that this training is followed and its effectiveness is measured.

B. For Units/Teams:

1) Nominate “movers” in your own team to lead the Patient Safety Movement
2) Explain to your team the relevance and importance and benefits to them by carrying out the Patient Safety movement
3) Cultivate a chivalrous attitude that values incident reporting.
   Leadership is the art of coordinating and providing encouragement, motivation to individuals or groups to achieve set goals. The role of the leader of the hospital/health facility in the Patient Safety Program is to encourage and create an atmosphere within the team to be aware of and engage in the Patient Safety Program.

3. Integrate risk management activities. Build systems and processes to manage risk and identify possible errors.

A. For hospitals:

1) It has considered existing structures and processes in clinical and risk management non-clinical, and make sure it includes and is integrated with safety patients and staff;
2) Develop performance indicators for a risk management system that can be monitored by hospital directors/leaders;
3) Use correct and clear information obtained from the incident reporting system and risk assessment to be able to proactively increase patient awareness.

B. For Units/Teams:

1) Form forums within the hospital to discuss patient safety issues to provide feedback to related management;
2) Make sure there is a risk assessment on individual patients in the hospital risk assessment process;
3) Carry out the risk assessment process regularly, to determine the acceptability of each risk, and take appropriate steps to minimize these risks;
4) Ensure that the risk assessment is submitted as input to the assessment process and recording of hospital risks.

4. Develop a reporting system. Make sure your staff is easy to report incidents internally (locally) and externally (nationally).

Deployment steps:

A. For Hospitals: Complete an incident reporting system implementation plan inside and outside, which must be reported to the National Safety Committee Hospital patient.

B. For Units/Teams: Encourage your colleagues to be active in reporting any incidents that occurred and incidents that were prevented but persisted too, because it contains important learning material.

5. Engage and Communicate with Patients

Develop ways of open communication with patients. Deployment steps:

A. For Hospitals:
   1) Make sure the hospital has a policy that clearly spells out how open communication throughout the care process about incidents with patients and their families.
   2) Make sure patients and their families are properly and clearly informed when an incident occurs.
   3) Provide support, training, and encouragement to staff to always be open to patients and their families.

B. For Units/Teams:
   1) Make sure your team values and supports patient and family involvement when an incident occurs.
   2) Prioritize notification to patients and families in the event of an incident, and promptly provide them with clear and correct information in a timely manner
   3) Make sure, immediately after the incident, the team shows empathy to the patient and his family.

6. Learn and share experiences about patient safety

Encourage staff to conduct a root cause analysis to learn how and why the incident occurred. Deployment steps

A. For Hospitals:
   1) Make sure the relevant staff are trained to carry out proper incident reviews, that can be used to identify causes.

2) Develop a policy that clearly describes the criteria for carrying out a root cause analysis (RCA) which includes incidents that occur and at least once per year conducts Failure Modes and Effects Analysis (FMEA) for high-risk processes.

B. For units/teams
   a. Discuss in your team the experiences from the incident analysis results
   b. Identify other units or sections that may be affected in the future and share those experiences more broadly.

7. Prevent injuries through the implementation of patient safety systems

Use existing information about problem occurrences to make changes to the service system.

Implementation steps:

A. For Hospital
   a. Use correct and clear information obtained from risk assessment reporting systems, incident reviews and audits and analysis to determine local solutions.
   b. Such solutions may include redefining systems (structures and processes) adapting staff training or clinical activities, including the use of instruments to ensure patient safety.
   c. Perform a risk assessment for any changes planned.
   d. Provide feedback to staff on any action taken on reported incidents.

B. For Units/Teams:
   1) Involve your team in developing different ways to create care patients are getting better and safer.
   2) Review the changes your team made and ensure their implementation.
   3) Make sure your team receives feedback on any follow-up on the incident.

The seven hospital patient safety steps are a comprehensive guide to patient safety, so that the seven steps must be implemented in full by every hospital. In implementation, the seven steps do not have to be sequential and do not have to be simultaneous. Choose the steps that are most strategic and easiest

to implement in the hospital. If these steps are successful, then develop the steps that have not been implemented. If these seven steps have been implemented properly, the hospital can add to the use of other methods.

7. Monitoring and Evaluation of Patient Safety Criteria

A. Patient Safety Monitoring and Evaluation Criteria

Based on the *Indonesian Language Dictionary*, monitor has a number of meanings. Monitor can be interpreted as monitoring and verifying the correct operation of a program during its implementation based on diagnostic routines used from time to time to answer questions about the program. In general, monitoring can be interpreted as the process of monitoring a system or work program. In the patient safety management process, there are activities in the form of monitoring the implementation of services related to patient safety programs. Monitoring and evaluation need to be carried out in every patient safety program, both in pharmaceutical, nursing, midwifery services, as well as in every service provided by the hospital.

The purpose of monitoring is so that the services provided to patients are in accordance with patient safety rules. Monitoring and evaluation must also be carried out to prevent incidents that could threaten patient safety. Monitoring and evaluation also aim to prevent the same incident from happening again one day. For example, in pharmaceutical services that are carried out in accordance with patient safety rules and prevent undesirable things from happening in the medical field.

Monitoring and evaluation in pharmaceutical services is carried out on human resources, management of pharmaceutical supplies (selection, planning, procurement, receipt, storage and distribution/use), clinical pharmacy services (prescription review, drug delivery, provision of drug information, drug counseling, cancer reconstruction, and so on) as well as documented reports.

The act of monitoring and evaluating a health service aims to obtain the results of an assessment of a service. For example, in the pharmaceutical sector, how have policies been applied regarding patient safety so far? One of them is efforts to prevent medication errors (medication errors). From the monitoring and evaluation results, interventions will be carried out in the form of recommendations and follow-up. Recommendations and follow-up are carried out on matters that

need to be improved, such as improving a policy, procedure, improving the performance of human resources, infrastructure, and organization. Monitoring and evaluation criteria also cover a number of these things.

Improvement of human resources for health services is intended to provide maximum service for patients. This HR improvement can take the form of training, improvement, and upgrading of new knowledge related to patient safety for staff in their respective fields. Policy improvements can take the form of evaluating policies that are deemed to need to be changed to further improve patient safety and employee health efforts.

Monitoring and evaluation in the field of infrastructure can be in the form of additional facilities or medical equipment which are considered to improve patient safety. Of course, the addition of medical equipment and infrastructure must be adjusted to the needs and capabilities of the hospital. Likewise, with follow-up of the organizational structure in the form of adding members or certain officers in a field of service to patients. Everything can be done with consideration of improving patient safety.

The results of monitoring and evaluation must be fed back to all parties related to the hospital's patient safety program. Indicators are needed to measure the success of the program activities that have been determined. An indicator is a tool or benchmark that points to a measure of adherence to a predetermined procedure. In accordance with the provisions of the Indonesian Ministry of Health (2008), indicators of the success of patient safety programs can be seen from the decrease in the number of unwanted events, near misses, and sentinel events. The second indicator is the decrease in the three incidents (adverse events, near miss and sentinel events) recurring or recurring.

B. Monitoring and Evaluation of Patient Safety

As has been explained, the implementation of monitoring and evaluation of patient safety can be carried out through follow-up of the results of monitoring and evaluation. Implementation in hospitals or health care providers can be done internally. For example, in the pharmaceutical sector there are several things that can be carried out related to monitoring and evaluation, both in improving human resources (HR), management of pharmaceutical supplies, pharmaceutical sector services to following up on reports of patient safety incidents. In Permenkes (2011) Articles 15 and 16, there are several implementations in coaching and supervision

related to patient safety. First, ministers, Provincial Governments and Regency/City Governments in stages must carry out guidance and supervision of hospital patient safety activities in accordance with their respective duties and functions. Second, in carrying out guidance and supervision, the Minister, the Head of the Provincial Office and the Head of City/District Health Office must involve hospital associations and health professional organizations. Third, the Head of the Hospital must also periodically provide guidance and supervision of patient safety activities carried out by the Hospital Patient Safety Team.

Permenkes (2011) states that the Minister, Provincial Government and Regency/City Government can take administrative action at the hospital for violations of the provisions of Article 6 paragraph 1, Article 8 paragraph 1 and Article 11 paragraph 1. These actions are in the form of verbal warnings, written warnings, and postponement or postponement of the extension of operational permits.

Based on the implementation of monitoring and evaluation in accordance with the provisions above, all matters relating to patient safety are prioritized. Patient safety is wrong a priority in health care. This is because patient safety is the main goal of a treatment process in hospitals and health care providers.

C. Nursing Evaluation

Evaluation is an intellectual act to complete the nursing process which indicates how far the nursing diagnosis, action plan, and implementation have been successfully achieved. Evaluation in this phase can be seen from several things, for example, whether the treatment is going according to what has been planned and whether there is new information about work.

Evaluation talks about what if the treatment that has been given is not in accordance with what was planned or something new arises. Evaluation should be done repeatedly. An evaluation needs to be carried out continuously so that the continuity of care is maintained. Before going through the evaluation process, nurses must go through a series of nursing processes first. For

example, how is a nursing diagnosis, determining planning goals, and how is the implementation of the nursing process. The next aspect of nursing is assessing the processes of developing care based on various treatments implemented in the field of care.

The point of evaluation of care can be things that can really advance the nursing system and process. For example, one point or area of concern from a treatment evaluation may become something that should be re-evaluated. It is this source handled by the nurse that should be evaluated. Evaluation has several purposes, including: to see carefully whether the treatment follows the patient's treatment plan; whether the treatment performed resulted in what the patient expected; and whether the nurse is dealing with things that are not desirable. The thing that needs to be underlined from the evaluation process is how the next nursing process will be after the evaluation is carried out.

8. Communication Between Members of the Health Patient Safety Team

In general, communication in the medical world includes several types of communication. First, communication that occurs within a hospital or a health care provider. The communication in question is communication that occurs between medical personnel in serving patients. In medical practice, the transfer of responsibility usually occurs between one paramedic and another directly or indirectly. Directly, for example, delivery is done directly when face to face, while indirectly it can be through other media such as telephone, writing, and so on. The communication process occurs at any time and is not limited in number. Second, communication that contains health information to patients, the community, and the public. This communication is also mandatory with full range of responsibilities. For example, health information disseminated must be in accordance with medical facts and reality. In fact, the hospital component has several homework. One of them is to ensure that the information circulating in the community (which is officially distributed by the hospital) is guaranteed to be true. Likewise, in the world of health. Communication is certainly needed, both between nurses and between medical officers, communication with patients and their families, as well as anyone in the hospital environment. Nurses can be senders of news (communicators) and patients can be recipients of news (communicants). Communication that occurs can also vary, namely verbal communication that occurs with the help of words, to nonverbal communication consisting of body language. These two types of communication are very likely to be used in everyday life. Likewise in the hospital environment (Imani & Jalal, 2021) are the most important dimensions that must be owned by every health care worker. Communication is one of the bridges to create

cooperation with patients in meeting their health needs. Every health care worker must also have good communication competence. For example, in communicating with patients of a certain age (elderly patients) or patients who are still children. Officers must master communication techniques considering differences in language, ethnicity, gender, and age.

In communication, including in the health sector, several barriers to communication must be overcome. The first is the obstacle caused by not knowing and not understanding the patient. A health worker should know patients well, let alone nurses. This understanding will make the communication process more effective. Second, the obstacle is because the officers do not know the culture of the patient. Sometimes there are patients who like clear and concise communication in explanations or vice versa. Third, the officer as the communicator does not evaluate the communication related to the process response. Fourth, obstacles can be in the form of not being a good listener. Finally, do not understand the strategy of using the media as a means of communication. If a number of these obstacles can be overcome, then effective communication can run.

Effective communication in question is the communication given by medical staff, both doctors, nurses, and the hospital to patients. In (Panesar dkk., 2014), it is explained that interactions between doctors and patients that are established through effective communication can influence the healing process. What patients need is a treatment process that includes physical, behavioral, cognitive, and emotional care. In a number of studies, it is reported that effective communication skills can improve disease complaints more quickly, improve emotional scores and reduce patient tests and referrals. The conclusion of this study is that good communication can improve health status and improve treatment efficiency.

1. Definition and Elements of Health Communication

Etymologically, communication comes from the word communication, namely from Latin, which is rooted from two words, namely "*com*" (Latin *cum*) which means "with or together with" and "*unio*" (Latin *union*) which means "to unite with". So, communication can be interpreted as "union with" (united with) or together with (together with). In its development, communication experiences a shift in meaning which makes us understand human communication activities as an effort to build cooperation. Communication is a series of processes of

transferring information from one person to another with a specific purpose (Müller dkk., 2018).

Definitively communication is an effective tool to influence human behavior, so that its existence continues to be developed and maintained. Communication aims to facilitate, expedite, and carry out certain activities in achieving goals optimally, both within the scope of work and human relations. Communication is defined as an effort to create togetherness, exchange of messages, and information as well as a process of sending information. Communication is a process of conveying messages from one person to another in order to notify, change attitudes, opinions, or behavior as a whole, either directly or indirectly stated that apart from communicating with those outside of health workers such as patients, communication within the organization is also important. This is because the determinant of the success of medical action is communication carried out within the organization, namely between officers, superiors, and supervisors.

Communication can be interpreted as a process of exchanging messages, whether written or not. This exchange of information is carried out by a certain method. This process can also use the media in delivering messages. So, every communication process as a human activity certainly involves sources of communication, communication messages in the form of verbal and non-verbal, media or channels as a means or container for messages to be transferred, as well as dealing with ways, tools, and methods for transferring messages. Communication is one of the means that must be used to make public health successful. All health analyzes consider including communication strategies to improve people's quality of life. Thus, the role of communication science in the health sector is very important to disseminate information that can affect individuals and society. Talking about health communication, will not be separated from all the discussion about health and about health promotion.

Development of health communication, previously health communication began with informative movements in the health sector. For example, there is a movement to improve hygiene and education for the community and citizens to always live a healthy life. Likewise, the self-monitoring movement in the form of keeping the body in contact with the environment, in the form of protection from infection or germs that are spread in the environment. In the past, health communication only discussed reporting and health information whose sources were unclear. So, at this time, health service providers and all health workers

certainly have an obligation to participate in supervising and maintaining that health information circulating in the community can be accounted for so that the effects of misinformation on health do not occur.

While the next communication is the process of exchanging information within a health care provider. As explained above, the communication process carried out by paramedics with each other is very long. In just one day, no less than one million communication processes occur in the hospital. Unfortunately, the communication process just took place without a clear structure. Moreover, the type of information provided and conveyed in the process is very important. The important thing to note is if the lack of clarity in the information results in a fatal error. Errors in the process of transferring information will result in the patient getting injured, both mild adverse events, even to the point of death of the patient. Supposedly, communication and information within the hospital must be done in a very precise, accurate and clear manner. If not, then the potential for medical errors will occur.

Several conclusions related to communication in the hospital are first, actual medical injury does not need to occur if there has been a transfer of clear information (both verbal and nonverbal). Second, without standardization of communication in the form of structured communication procedures, the transfer of information will become very vulnerable and prone to bias. Third, in the process of transferring information and responsibility, interruptions often occur in tasks. Fourth, without empowering patients and families, especially in the process of transferring tasks between officers, it is easier for mistakes to occur. So, a nurse or health worker in an institution or health service providers must really document the information they get properly, so that data errors do not occur when transferring information. several facts show that inaccurate information will lead to errors and adverse events. Cahyono (2008) explained that based on the Agency for Healthcare Research and Quality (AHRQ) report, after analyzing 2966 adverse events, 65% occurred due to communication problems. Thus, effective communication is important to become the standard of communication in hospitals. Effective communication is important as a communication strategy to realize proper patient care and of course has the main goal of patient safety.

2. Purpose of Health Communication

At least, there are two health communication goals, namely strategic goals and practical goals (Bechini dkk., 2017). The first goal is a strategic goal. Generally, health communication programs are delivered and designed in an attractive way. For example, in the form of module packages, banners, standing banners and so on. The strategic objectives of health communication are as follows:

a. Relay information, namely forwarding health information from a policy source to another party in series (hunting).
b. Enable informed decision making–provide accurate information to enable decision making.
c. Promote healthy behaviors–information to introduce healthy living behaviors.
d. Promote peer information exchange and emotional support, support the first exchange of information, and emotionally support the exchange of health information.
e. Promote self-care, introduce self-care of health.
f. Manage demand for health services, fulfill the demand for health services.

Therefore, the second goal of health communication is practical goals., practically, the specific goal of health communication is to improve the quality of human resources through education and training efforts. The goals include:

a. Increase knowledge covering the principles and processes of human communication.
b. Become a communicator who has *ethos*, *pathos*, *logos* and is credible.
c. Arrange verbal and nonverbal messages in health communication.
d. Choose health information media that are appropriate to the context of health communication and determine the appropriate communicant segmentation and so on.

In addition to external communication in the health sector, effective communication between medical personnel is also very important in health services. Effective communication between internal health care providers is included in patient safety goals. The use of effective communication will certainly reduce errors and medical incidents. The use of effective communication certainly also results in increased patient safety. Communication requires means of

conveying information or messages so that communication can occur more effectively, either through oral, written, or electronic media. Most mistakes in the medical world in communication are communications made orally or by telephone. So, re-recording on a medical order (for example, from a doctor to a nurse) is important. Usually, the recording is done on a computer to make it more secure and structured. Then the record must be checked again (read back) and seen whether the medical order was correct.

Communication must indeed be used with the best possible purpose, namely, to improve patient safety. On the other hand, communication in health must be done very carefully. Several elements that must be met in the target of effective communication include the following.

a. Complete orders verbally and via telephone or complete written inspection results by the recipient of the order.
b. Complete oral and telephone orders or the results of the inspection are read back in full by the recipient of the order.
c. The order or inspection result is confirmed by the person giving the order or submitting the inspection result.
d. Policies and procedures direct the implementation of consistently verifying the accuracy of verbal or telephone communications.

3. Health Communication Barriers and Strategies

One of the mistakes that has a big impact on health services is communication. This is evident from barriers that come from signs, symbols that are interpreted as the meaning of words (semantics). This obstacle occurs due to a lack of clear understanding of the information or message received. Therefore, it is important for nurses and other medical staff to understand the meaning of the word first before using it to convey to others. A number of these obstacles often occur and make the communication ineffective. When communication is not effective, it can lead to misunderstandings and misperceptions. For example, miss communication that occurs between nurse managers and nurses. The instructions given did not match what the nurse was doing. After being analyzed, it was discovered that according to the Commission on Accreditation of Healthcare Organization (JCHO) report, it was found that as many as 65% of the 2840 sentinel event cases (fatal unexpected events) were caused by communication. The communication problem in question is communication between officers and

officers, officers, and patients, as well as officers and the patient's family. In the world of health, communication problems are often overlooked. Clinical skills are always prioritized by forgetting communication skills with several parties. This is what then becomes a gap in the world of health, that a health care provider should not ignore communication in the process of the patient's journey to achieve healing. Communication in health organizations can also be regarded as a communication that is very difficult to do. Because must consider interpersonal and organizational aspects. To minimize barriers to communication, all health workers must improve their effective communication skills:

a. Physical barriers, in the form of barriers from environmental factors. These barriers can be distance, space, temperature, noise, equipment, improper methods, and ventilation.
b. Psychosocial barriers, in the form of differences between senders and receivers both in terms of background, values, beliefs, perceptions, negative feelings and so on.
c. The semantic barrier turns out that the nurse has not completely captured the message or information in the form of instructions given by the manager. This is what makes the nurse not carry out instructions according to the nurse manager's information. For this reason, effective communication is very important to prevent adverse events.

In line with that (Alshehry, 2022), communication is also the cause of the most errors. The types of service errors committed by officers at the hospital include many things including discipline, communication, and technical errors. However, it turned out that the most common cause of errors stated by respondents was misinformation. One of the causes of misinformation is bad communication so that the officer does not clearly understand what is being said or the message being conveyed. The results of this study are in line with the explanation in the Journal of the Royal Society of Medicine that the cause of service errors is system failure, in this case bad communication. In addition, the cause of service errors by officers is lack of knowledge so that officers cannot carry out their duties properly. Errors in health services can be caused by human factors, such as variations in education, training, and experience of officers who provide health services.

The health communication strategy includes several design options, namely health communicators, health messages, health media, health communicants (audience-communication targets), reducing communication barriers, and determining and selecting health communication contexts. This is of course in accordance with the elements of ongoing communication, namely the communicator, the message, the communicant and the means or media for conveying the message. Thus, health communication talks about the ongoing process of exchanging meaning from one individual to another, which of course is related to health issues. Effective communication skills to remove barriers in communication. These skills include being a good listener or listening effectively. Effective listening is very important in communication skills. Because, one way to be an effective communicator is to be a good listener. Being a good listener is also an effort to overcome obstacles and misunderstandings in communication. Especially for health workers, listening to patients talk, complain about their illness and so on is very important. Listening is one way of empathy so that patients can speak comfortably to nurses or health workers. Listening well also means understanding and understanding what the most appropriate response will be used to respond to the other person. That is, a good listening process is also an effort to create effective communication. Another effective communication strategy is to take assertive actions in communication. Assertive is a behavior that is used by someone to express themselves and their rights without violating the rights of others. This is very important to do to create effective communication. The opposite of assertiveness is aggressiveness, in which a person imposes his desires or ideas on others. Aggressive behavior in communication is not permitted because it can make a communication process ineffective and have a negative impact. Communication skills within the team are also needed to build effective communication. Good communication within the team can be improved by increasing trust and sincerity within the organization. Conformity of words and deeds in an organization including the team at the hospital will increase trust. From sincerity and trust in the organization, effective, open communication will emerge, and mutually provide constructive input for an organization or health team.

9. Policies that Support Patient Safety

Policies that Support Patient Safety
The legal aspects of "patient safety" or patient safety are as follows:
Law on Health & Law on Hospitals

1. Patient Safety as a Legal Issue

a. Article 53 (3) Law No.36/2009
"The implementation of health services must prioritize safety patient's life."
b. Article 32n UU No.44/2009
"Patients have the right to get their own security and safety while in hospital treatment."
c. Article 58 UU No.36/2009
1) "Everyone has the right to demand a G.R against a person, health worker, and/or health care providers who cause losses due to errors or negligence in the Pelkes he received."
2) "…..does not apply to health workers who carry out rescue actions life or prevention of disability of a person in an emergency."

2. Hospital Legal Responsibilities

a. Article 29b UU No.44/2009
"Providing safe, quality, anti-discrimination and effective health services by prioritizing the interests of patients in accordance with service standards hospital."
b. Article 46 UU No.44/2009
"The hospital is legally responsible for all losses that occur caused by negligence committed by health workers in the hospital."
c. Article 45 (2) Law No.44/2009
"Hospitals cannot be prosecuted for carrying out tasks within the framework save human lives."

3. Not the responsibility of the Hospital

Article 45 (1) Law No.44/2009 Concerning Hospitals
"The hospital is not legally responsible if the patient and/or his family refused or stopped treatment that could result in death patient after a comprehensive medical explanation. "

4. Patient Rights

1. Article 32d UU No.44/2009
   "Every patient has the right to obtain appropriate quality health services with professional standards and standard operating procedures"
2. Article 32e UU No.44/2009
   "Every patient has the right to obtain effective and efficient services so that patients are spared from physical and material losses"
3. Article 32j UU No.44/2009
   "Every patient has the right to medical action goals, alternative actions, risks and complications that may occur, and the prognosis of the actions taken as well estimated cost of treatment"
4. Article 32q UU No.44/2009
   "Every patient has the right to sue and/or sue the hospital if the hospital is suspected of providing services that are not in accordance with good standards civil or criminal"

5. Policies that support patient safety

Article 43 Law No.44/2009

a. Hospitals are required to implement patient safety standards
b. Patient safety standards are implemented through incident reporting, analyzing, and establish solutions to problems in order to reduce the number of incidents that occur not expected.
c. The hospital reports patient safety activities to the committee in charge patient safety determined by the minister
d. Reporting of patient safety incidents is made anonymously and is intended for correcting the system to improve patient safety.

The government is responsible for issuing policies on patient safety. Patient safety in question is a system in which the hospital makes safer patient care.

SUMMARY

Patient safety is a safe system that is carried out by every health worker starting from assessment, identification to analysis of events that aim to improve the quality of health services. So it can be concluded that patient safety is avoiding injury or being free from injury to patients due to medication errors or medical treatment.

Monitoring and evaluation must also be carried out to prevent incidents that could threaten patient safety. Patient safety is one of the priorities in health services. This is because patient safety is the main goal of a treatment process in hospitals and health care providers.

Communication skills within the team are also needed to build effective communication. good communication within the team can be improved by increasing trust and sincerity within the organization. Conformity of words and deeds in an organization including the team at the hospital will increase trust. From sincerity and trust in the organization, effective, open communication will emerge, and mutually provide constructive input for an organization or health team

FORMATIVE TEST

1. The government is responsible for issuing policies regarding patient safety. Patient safety in question is a system in which the hospital makes patient care safer. Which of these systems is below?
    a. Incident reporting and analysis
    b. Identification and management of patient-associated diseases
    c. Assessment to obtain data
    d. Follow-up and implementation of solutions due to risks
    e. Identification drugs

2. Evaluation of the implementation of patient safety is carried out through:
    a. Incident reporting
    b. Passenger safety standards
    c. 7 steps to patient safety
    d. Hospital accreditation program
    e. Adverse event

3. Mrs. A, 27 years old, post sectio caesaria, received a blood transfusion, the safety management carried out by the nurse is:
    a. provide security on the patient's bed
    b. ensure proper location and procedure
    c. make sure the identification of the patient says the name and matches the label
    d. use the smallest size needle
    e. provide therapeutic communication

4. If an adverse event occurs, the nurse must be able to manage patient safety. For example, leaving scissors in the abdomen after a laparotomy. In this case the nurse immediately conveyed to the patient's family about this. So this is in accordance with the 8 principles of providing incident information, namely:
    a. support from medical staff
    b. understand the wishes of the patient and family
    c. confession
    d. the best communication
    e. express regret

5. When the morning shift comes in, the night shift nurse conveys and emphasizes that one of the patients who has just been treated is under supervision to prevent seizures. the morning shift nurse will take the right actions for this prevention, namely if you take the following actions for the patient:
    a. serve good food
    b. keep the patient's bed in a low position
    c. put the barrel of the spatula in the mouth
    d. move the patient to the nurse's station
    e. the patient must sleep on his back

GLOSSARY

1. Adverse events
   Adverse events are incidents that result in injury to the patient.
2. Near miss incident
   near miss is an incident that has not yet been exposed to the patient
3. No-harm events
   Non-injury event means an incident that has been exposed to the patient, but no injury occurred.
4. Potential injury event
   Potential Injury Occurrence is a condition where there is a high potential for injury, but the incident has not yet occurred.
5. Sentinel incident
   Sentinel events are unexpected events that result in death or serious injury

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UNIT 2
THE ROLE OF NURSES IN SAFETY PATIENT MANAGEMENT

LEARNING OBJECTIVE

1. Students can explain the importance of the role of nurses in patient safety management
2. Students can prevent and transmit nosocomial infections

1. The Importance of the Nurse Profession in Patient Safety Management

Nurses as one of the health workers who provide nursing care for patients in the hospital in their services have a longer contact time with patients for 24 hours when compared to other health workers (Yen dkk., 2018), then with a long time contact with the patient does not rule out the possibility of an occurrence, the higher incidence or medical error carried out by a nurse in providing health services in hospitals. So that a nurse in carrying out service tasks needs to understand the concept of patient safety, so that when conducting nursing care starting from the assessment, determination of nursing diagnoses, interventions, taking action and evaluation does not occur medical errors.

Nurses are one of the important professions in an institution or agency of health service providers. The task of the nurse can be said to be heavy. Because, nurses can be called the medical officer who is most often in the hospital. In fact, nurses are also the most frequent position in the world of health and often associated with patients and families of patients. So, it can be said that the role of nurses is very significant, as well as in the patient safety program.

Professionalism of health workers must be demonstrated from the behavior of health workers when providing health services. One of them is included in the Patient Safety program. Based on health service standards, health workers must be independent, responsible, and responsible, and develop abilities in accordance with the development of science and technology. The characteristics of the professionalism of these health workers must be maintained and improved to maintain high quality standards. Nurses as one of the main components of health services providers to the community have an important role because it is directly related to nursing care providers to patients in accordance with their abilities. Nurses as the spearhead of health services in the field are very decisive in efforts to prevent and break the chain of infection transmission to meet patient safety needs. The professionalism of nurses in patient safety programs is strongly influenced by the perceptions of nurses. That is, how the attitude of the nurse towards work, service, quality, attitude and application of patient safety. If the nurse has the right perception of the program and the concept of Patient Safety, then the action What is taken is also confirmed to aim by providing services safely, responsibly, and so forth with great love. Conversely, if the nurse has a wrong assumption about Patients Safety, then the actions taken can deviate and hamper the implementation of hospital patient safety programs. Thus, it is believed that perception contributes to the implementation of the Patients Safety program.

Nurses as one of the important elements in hospitals should also be given policies in the form of self-development, training, education, and the like to develop their knowledge. Similarly, the motivation of nurses has. This motivation greatly affects the level of implementation of the Patient Safety program. Thus, hospital motivation and support for the nurse profession must also be improved given the significance of the role of nurses in patient care.

Nurses also have a significant role in the patient safety program in hospitals. As one of the hospital components that is most often related to patients, nurses have enormous responsibilities regarding Patient Safety. Clinical competence and nurse capabilities must also be supported by several things. Special understanding of the issue of controlling and preventing infections in patients must also be mastered by nurses. Nurses are required to have a sensitivity in dealing with patients at the risk of infection.

Nurses must really understand and realize the factors that cause infection risk such as lack of hygiene, lack of nutrition, or weakening of the patient's immune

system. Replacement of wound wounds after surgery, health education in patients and the patient's family, as well as various other nurses' tasks must be done so that the patient avoids nosocomial infections.

For the achievement of maximum Patient Safety program, it takes several things to improve the professionalism of nurses in the patient safety program. For example, environmental factors and workloads that are indeed adjusted to the performance carried out by nurses. Do not let the double workload with a not reward that is not experienced by nurses. Because, in addition to its very significant role in the patient's treatment process, nurses are also the first health workers who are very potential and vulnerable to disease from patients.

Patient safety culture for nurses must also be applied. The trick is to apply the policies that have been described above for nurses. For example, the obligation to report patient safety incidents. Nurses as one of the parties who most often intersect directly with patients certainly have many things that can be seen. The risks of incidents that are not known by other components can be seen by nurses. This can be underlined that nurses have a significant role in the patient safety program.

For the sake of patient safety, nurses are expected to be honest when making mistakes both individually and in groups when doing medical services to patients. For example, when an adverse event/near miss. Incident Nurse is expected to be honest about what has happened so that the medical incident can occur. If overall the program has been implemented, then of course the role of the nurse will go hand in hand with the main objectives of health services. The main purpose of health services is to realize a health service system that prioritizes patient safety. In addition, the ultimate goal of treatment in hospitals is certainly to create a healthy community.

A healthy society is certainly the key to national development. Because health is the key to human productivity. If the community is healthy, then the situation is a critical point to improve other aspects. Improvements that can be cultivated from healthy communities are reducing poverty, economic growth, and other improvements. Moreover, the success of a country lies in human capital. Health is one of the main factors determining the quality of human resources (Drábek dkk., 2017).

Of course, all health workers are required to play a role in improving patient safety, of course by carrying out series and stages of patient safety programs, in

preventing and transmitting infections in hospitals. Nurses play an important role in the health service process. Besides having a share in the treatment process, nurses also have several positions in the infection prevention process that occurs in the hospital. Nurse's closeness and intensity–patients make nurses play a spearhead of efforts to prevent nosocomial infections in the hospital. Nosocomial infection is the entry of germs that arise when the patient is hospitalized. These infections should be prevented for maintaining patient safety, especially when still under hospital care. Infection occurs if microorganisms grow and defeat the body's defense mechanism. If these microorganisms damage the body, it is called pathogens. A pathogen must multiply to eventually cause infection. several microorganisms that cause infection can produce toxins. This toxin can cause body damage that is far from the location of the initial infection. Because, this toxin can spread. For example, tetanus toxins that cause spastic paralysis, generally enter the body through stab wounds.

Ironically, infections that occur in the hospital are even higher than traffic accidents. (Monegro dkk., 2023) explains that nosocomial infections, or often called Hospital Acquired Infections (HAI's), obtained by patients in the hospital are very high. Nosocomial infection (from Latin *nosocomium* means the hospital) also costs a very large cost for much longer hospitalization. This is the severe task of health workers, especially nurses in preventing infection to improve patient safety.

The method used to prevent nosocomial infections is aseptic technique. This technique is used in every invasive procedure and equipment such as urine catheter. This procedure must be carried out in place to minimize the risk of infection. If you have carried out this aseptic technical procedure, it is estimated that 30% of nosocomial infections can be prevented. Nurses are required to run all these aseptic techniques in order to prevent nosocomial infections that cause many losses for patients and for hospitals.

Nurses must also know how the entrance to infection in patients. This is to provide knowledge for nurses to find out solutions and handling when or before nosocomial infections. Infection, according to DeWit & O'Neill (2014) can occur if microorganisms spread from a vulnerable reservoir to the body. Infection reservoir is a place where microorganisms can survive and multiply. This reservoir can also be in the form of patients themselves (self-infections, or from other patients, visitors, or hospital staff). The incidence of this infection is called a cross infection. The entrance to infection, including in the table as follows:

Figure 1: Source: Infection Entrance: (DeWit & O'Neill, 2014)

Infection entrance (transmission)	Example
Contact	Hands, equipment, contaminated clothing
Aerosol	Inhalation of dust, peeling skin in the air, water droplet from a nebulizer or air moisturizer
Blood	Inoculation accidentally, from mother to baby (prenatal) and sexual activity
Food or water	Swallowing viruses and bacteria or toxins from food or water
Insect	Pathogenic carrier cockroaches can contaminate Sterile or food items

The infection can come from yourself if the tissue is infected due to infection from different locations in the patient's body. For example, the upper respiratory tract, digestive tract, and skin. While a cross infection occurs from people suffering from infection or career that is not symptomatic of an infection reservoir. Sharma dkk. (2020) argues that nurses have an important role in minimizing the occurrence of infection and the spread of infection by carrying out aseptic actions. Aseptic is a condition where the absence of pathogens that cause a disease. Aseptic technique is carried out to keep patients free from microorganisms. Wahid (2012) explains that there are two aseptic techniques that nurses can do. First, medical asepsis techniques or clean techniques. This technique includes procedures for preventing or reducing the number of microorganisms, washing hands, and changing linen. In this technique, an area is said to be contaminated if aware of pathogens. For example, the bedpan that has been used, wet floors and gauze.

Second, Surgical Asepsis technique (sterile technique). If the first technique only reduces or prevents the development of microorganisms, the second technique aims to really eliminate microorganisms. Actions that enter this technique are called sterilization. In the sterilization technique, an object is said to be sterile after being touched by an unsterile object. For example, the outer gloves are touched by the hands, the sterile devices are touched by the hands and so on.

Prevention of nosocomial infections by nurses

The important role of nurses is to know the procedures and practices that most likely cause nosocomial infections. For example, invasive techniques, line manipulation (line manipulation) and realize other factors that can increase the risk of intendance. For example, lack of cleanliness, lack of nutritional status or low

body power of the patient. The most important prevention factor is to ensure the implementation of infection control procedures carried out in every hospital. Separate treatment is an effort to prevent infection with isolation or prevent infection from infected patients (source isolation).

There are several hygienic actions that can be performed by nurses in treatment procedures that are at risk of causing infection, including (1) hand washing, (2) central venous catheter treatment, (3) short-term urethral catheter treatment in acute treatment, (4) washing and disinfection, and (5) sterilization.

First is washing hands. Hand washing is a cheap and easy to do routine but very important to do infection control. Hand washing is the best method to prevent the transmission of microorganisms. Hand washing has been proven to be an effective action for infection prevention and control. Hand washing measures can also significantly reduce infection in the ICU and digestive tract.

Nurses must also know that damaged skin in the hand also contains pathogens which can cause nosocomial infections. For this reason, nurses must know a number of important factors in keeping the skin hygienic according to (DeWit & O'Neill, 2014), namely: the length of time washing hands (duration), exposure to the hand washing area and wrist to the tools used, rubbing hard, thorough flushing and ensuring Hands are dried again.

Meanwhile, in World Health Organization & WHO Patient Safety (2009), washing hands depends on the factors namely the intensity or frequency of contact with the client or contaminated material, as well as the level or amount of contamination that occurs and the resistance of the client and the health team (nurses, doctors and so on) to infection. Hand washing is also carried out for 10-15 seconds. Nurses are also required to wash their hands in several conditions including:

a. The beginning of the shift (on duty).
b. Before and after contact with the patient.
c. Before taking invasive action or procedure.
d. Before and after doing wound treatment.
e. After contact with the patient's body fluids, even though they already use gloves.
f. After finishing the shift, before going home,

Several studies have proven that a few bacteria will die when we wash hands using water and soap. However, resident bacteria will remain. These resident bacteria can disappear using bactericides. Nurses need to give direction to patients to wash their hands until they are completely clean, especially in between the fingers. Because, between the fingers that is a place that is often used as a residence of resident bacteria. Moreover, between the fingers is an area that is often forgotten or passed when washing hands. In addition to applying it himself before and after medical treatment, nurses must also provide education to patients for the prevention of infection transmission.

In addition to cultivating hand washing, nurses must also pay attention to several actions in patients for the prevention of infection. Actions that can reduce the risk of infection are tidying and cleaning the patient's bed, especially before wounding the wound. Because, the act of tidying and cleaning the bed can make microorganisms in the air flying. The nurse also knows that the act of wounding the wound is the last step after the sterilization of the entire patient's environment. Second, in addition to washing hands and sterilization of the patient's environment, hygienic measures that can be done by nurses in medical procedures are central venous catheter treatment. In(Domino dkk., 2004), the central venous catheter (CVC) can be implanted through surgery that requires long-term intravenous therapy or can also be inversed to the peripheral for the short term. However, so many cases of infections arise due to blood circulation due to catheter.

Infection caused by the installation of the catheter is an infection that causes dangerous complications for patients. Microorganisms The most common cause of this infection is Staphylococcus epidermis. This infection can be spread through the hands of medical staff during treatment. This infection can also occur when skin microorganisms that contaminate catheters during installation. The important thing to do by the nurse is to carry out maximum sterile obstacles when installing a central venous catheter.

A number of important things to consider related to the installation of the central venous catheter of the medical officer include: Choosing the right catheter for patients (a single hole catheter given antimicrobial substances), the best insertion place (e.g., subclavia/shoulder areas is more recommended than the jugular area (neck) or Femoral (thighs), using aseptic techniques when installing catheters and so forth.

Nurses must also pay attention to the action in the form of insertion preparation properly, namely cleaning the location of the skin to be given action with alcohol chlorhexidous gluconate and left until it drying before the insertion is done. Another action is to carry out catheter care and around the catheter area with the external surface disinfection of the catheter and the connection part and close it with sterile gauze or transparent dressing. Third, hygienic actions that can be done by nurses are doing short-term urethral catheter treatment in acute treatment. According to Domino dkk. (2004), urine catheterization has been known as the main risk of nosocomial infections. In patients with a urine catheter, 20-30% of patients will experience bacteriuria (bacteria in the urine). About 2% of patients who experience bacteriuria will experience bacteremia and around 22% will die. The longer the use of the catheter, will further increase the risk of infection in patients. Thus, nurses have a very large and significant role in this urine catheter treatment.

A number of risks of urine catheter infection can be minimized in a number of ways including: only using urine catheter when there are no other alternative procedures, choosing the smallest catheter that allows urine to flow well, using sterile equipment and aseptic techniques when installation and uses a closed sterile system and prevent Urine backflow from the urine sac by putting the urine sac under the bladder and placing a tube (climple) of the sac if the patient moves.

Fourth, the next action that nurses can take in the process of prevention and transmission of infection is washing and disinfection. that washing is the process of removing visible dirt, while disinfection is an action to kill or reduce the growth of microorganisms depending on the natural resistance of microorganisms. Disinfectant is generally dangerous for the skin. For this reason, in its use, humans must use protective clothing. Meanwhile, antiseptic is an antimicrobial agent that has a function of reducing the growth of microorganisms in living tissue. Examples of antiseptic include iodine and hydrogen peroxide.

In health practices and the medical world, nurses must really understand that the cleanliness of the tools is very important. Before being used or after use, medical devices must be sterilized. The medical equipment must be cleaned or disinfected before being used from patients to other patients. In general, medical equipment generally only needs to be cleaned or washed. However, a number of medical equipment affected by direct contact in the form of blood or body fluids of

patients suffering from infections, such as *Staphylococcus aureus* resistant meticillin (MRSA) infections, diarrhea, the medical equipment must be disinfected.

Nurses also should not forget that before being disinfected, the medical devices must be washed first. The concentration of bactericides (bacterial killer disinfectants) must be precise. In addition, the exact duration of time (length) of immersion in disinfectant solution also greatly affects the disinfection process is effective. For this reason, a nurse must be observant in this process because if not, it will cause new infections that are likely to risk the occurrence of adverse event. A number of examples of disinfectants that are most effectively used in the process of disinfection of medical devices include aldehyde compounds, peroxide and halogen. However, all these substances are not always appropriate to be used at any time because it contains strong side effects. All these substances are strong oxidizing agents. For this reason, the accuracy of usage and concentration in the disinfection process Fifth, the action that can be taken by nurses in the infection control process is sterilization. Sterilization is a procedure to kill all living organisms including endospores and viruses. Autoclave (can be done with high pressure cooking utensils, presto), can be used for sterilization using high pressure steam. This procedure is often used for the sterilization of the tools after general surgery.

The high temperature in question is when steam is at high pressure such as 121 degrees Celsius at 108 kPa (15 PSI) which can kill microorganisms in the short term. Sterile products such as syringe disposable (disposable syringe) are also sterilized before being packaged using gamma ray radiation to destroy microorganisms. A number of these actions are tasks that can be carried out by a nurse to prevent and control infection. Several above actions are important considering the infection that occurs in the hospital is a high risk that should be watched out for. Moreover, patient safety is the responsibility of all hospital elements, especially when they are still in hospital treatment. So, the role of nurses in efforts to improve patient safety and prevention of adverse event is very important.

A. Symptoms and Handling By Nurses (Zerwekh, 2021)

There is a number of knowledges that nurses must know in a number of situations. One of them is knowing the symptoms of patients who have infection. Because, despite the prevention and control of infections has been carried out,

infection can still occur. According to (Goldrick, 2005)the patient's body will experience a reaction to the entry and or propagation of microorganisms. An infection will cause a number of symptoms in patients. Among the symptoms of infection include:

a. The infected environment is red
b. Increased temperature, the infected place becomes hotter, high fever can also arise;
c. Swollen from the fixed place;
d. Sick
e. The occurrence of a function that is disturbed from the infected field, the patient feels himself sick and the function of the infected organs is disturbed.

Several steps can be done by nurses when the patient has an infection. If an infection occurs, then the nurse must handle the causes and consequences. Several actions that can be taken during an infection is to keep the infected patient from being infected by other microorganisms. Because, if a person is infected with germs/disease, the immune system/immunity against microorganisms is reduced. This will make the patient's body even weaker if infected with other microorganisms.

Nurses should also keep the patient who has been infected infecting other patients. In treatment, the patient's health must be really considered so as not to infect other patients or infect the nurse itself. In addition, nurses must also be aware of the infection through good wound care, the use of appropriate drugs. The nurse must ensure that the infection experienced by the patient does not get worse. Nurses must also ensure the state of food received, heart rate, awareness and so on.

B. Basic Needs Patients Who Must Know Nurses

Every nurse should know and understand the basic needs of the patient. Without knowing this need, the professionalism of a nurse can be questioned. Because, this basic concept is the foundation of a nurse carrying out his duties in meeting the basic needs of patients. Several experts describe the basic needs of human beings as living things. The concept of basic human needs must be

mastered so that nurses know the nature of basic human needs. Thus, nurses understand what the needs of patients should be met.

(Zerwekh, 2021) explains the theory of needs that state that every human being has five basic needs, namely physiological needs, security, love, self-esteem and self-actualization. Humans also have heterogeneous basic needs. Everyone basically has the same needs, but because of culture, then those needs also change and become different from one human being. In meeting needs, humans certainly adjust to priorities or important things that are more urgent to be met.

Abraham Maslow in (Zerwekh, 2021) divides basic human needs in the following five levels.

1. Physiological needs

   This need is the most fundamental need for humans and is the highest priority in Maslow's theory. Physiological needs are things that must be met by humans to survive. Physiological needs consist of fulfilling oxygen and gas exchange, fluid requirements (drinking), nutrition (food), elimination, rest and sleep, activity, balance of body temperature and sexual needs.
2. Needs of security and comfort

   This need is a second need, where every human being needs a sense of security and comfort in his life. The need for security and comfort is divided into two namely physical protection and psychological protection. Physical protection includes protection of threats to the body or living such as diseases, accidents, environmental hazards and so on. Meanwhile, psychological protection is a protection of threats that come from new and foreign experiences. For example, the concern experienced by someone when he first entered school, felt threatened during interaction with strangers.
3. Needs of love and love saying

   This need is a necessity to own and be owned. These needs include the activities of giving and receiving affection, warmth, friendship, getting a place in the family, social groups and so forth. This need is also a basic human need that should be met.
4. Needs of self-esteem

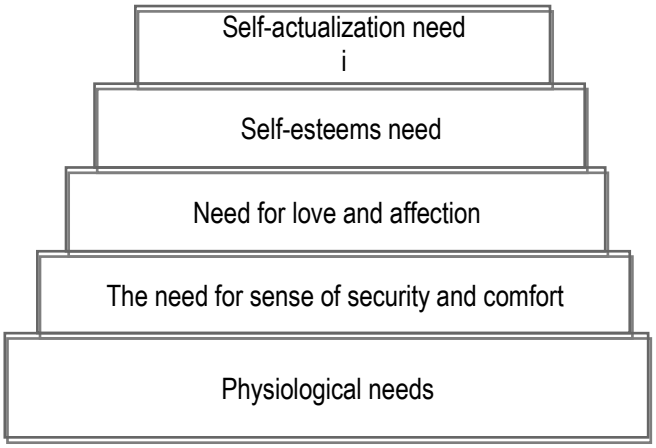
   The next need is the need for self-esteem and feelings valued at achievement, self-confidence and a sense of independence/freedom in him.

The sense of wanting to be recognized by others also includes the needs of self-esteem in humans.

5. Needs of self-actualization

   The last need is the highest need in the hierarchy of the theory of Maslow's needs. This need is in the form of a need to contribute to others or the environment and achieve fully self-potential.

Figure 2. Hierarchy of Basic Human Needs According to A. Maslow



(Source: Zerwekh, 2021)

In the process, each of these needs must be met. If not, then of course the balance of human life will be disrupted. For example, when someone needs oxygen as a physiological need and is the most basic need, then a person will be disturbed by his life. Maslow put these five needs in several levels. This also explains the priority sequence of human needs that should be met.

Nurses, are a profession whose job is to carry out care for patients (people who have a number of disorders/obstacles in the form of diseases in meeting their needs) who need help to return to be healthy. This assistance in order to make humans (patients) can return to their activities as they should and can meet their needs again.

Meanwhile, Fagerström (2021) explained, Virginia Henderson described the human needs in a number of fields of attention. Virgia Henderson who is an expert by others. This need is related to the desire to gain strength, care says that in

principle nurses must pay attention to the fields of attention as one of the starting points of testing the nursing process. The field of attention is a field where every nursing situation can be used to check the needs of the use of nursing science. In Zerwekh (2021), it is stated that basic human needs must consist of 14 components including humans must be able to breathe well and normal, eating and drinking enough, every day routine defecating and urinating (elimination), can move and maintaining the desired posture, can sleep and rest in peace, can choose the right clothes, maintain body temperature of the normal range, maintain cleanliness and self-care, avoid the dangers of the environment, communicate, worship according to their trust and religion, work for the necessities of life, satisfying curiosity and creativity and learning.

All these needs are basic human needs that should be met. However, when sick, a human in this case the patient certainly cannot do something or experience obstacles in meeting their needs. For this reason, nurses exist and are tasked with helping patients to be able to meet their needs and meet their concepts as humans.

(Zerwekh, 2021), mentioned the purpose of the treatment process which of course in the hospital was carried out by a nurse. The purpose of the treatment process is to produce quality nursing care so that the various basic needs of patients above can be met. The specific objectives of the treatment process are as follows:

1. Identifying various basic human needs that are not able to be done, or unknown how to do it.
2. Determine the diagnosis of nursing after identification.
3. Determine the nursing action plan after the diagnosis is made.
4. Carry out nursing actions after being planned.
5. Knowing the patient's development from various actions that have been taken to determine the level of success.

One example of a standard plan of care in the case of a patient with a physical weakness:

Figure 3: Examples of Standard Plans for Patients with Physical Weaknesses. (Source: Fagerström, 2021)

Area of Attention		Nursing Problems	Nursing Goals	Activity	Evaluation
a.	breathing	The patient sits in the same position all day long, the patient experiences mucus build-up and has poor breathing.	The patient is breathing regularly coughing and coughing up mucus	- The patient is stimulated every day to breathe properly provide breathing exercises	Every day
b.	Eat and drink	The patient often sits in the same position so that he can lead to the formation of kidney stones.	The patient drinks and eats enough	The patient is given an extra drink	Every day
c.	Elimination	- The patient has urinary incontinence and is always wet. He felt embarrassed. There is a possibility of urinary tract infection and bladder retention. - The patient also has fecal incontinence. The patient is worried about disturbing others. - There is a possibility of irregular defecation or constipation.	- Patients feel urinary incontinence does not bother others. - The patient does not have a urinary tract infection. - Fecal incontinence no bother. - The patient is not constipated.	Patient Stimulated to express his feelings with words. - Observe for signs of infection - Urinary tract regularly and use medication laxative. - Meet the needs of elimination regularly and every day. - Patient pay close attention to skin hygiene. - If necessary, attach a urinary	Every day

Area of Attention		Nursing Problems	Nursing Goals	Activity	Evaluation
				catheter. - Monitor defecation patterns. - Give laxative drugs to make it easier to defecate.	
d.	Temperature regulation			- Using support bars so can sit in balance continuously	Every day
e.	Attitude and motion	The patient has problems with balance due to sitting too long The danger is as follows: a. Lack of calcium in the bones b. decubitus c. Contamination	- The patient was treated in three weeks - The patient sits in a variety of positions and can transfer himself or herself into a wheelchair. - The patient has no complications due to treatment.	- In wheelchairs between the two legs of the chair, ropes are attached so that they don't fall fell while sitting. - Can also get electric wheelchair used - Encourage passive movement	Every day
f.	Personal care	The patient cannot bathe alone	Patient is able Bathe yourself and take care of yourself	- Patients are stimulated to be able to bathe themselves by avoiding dangerous things - Assist the patient when bathing the lower extremities	Every day

Area of Attention		Nursing Problems	Nursing Goals	Activity	Evaluation
g.	Rest and regularity				Every day
h.	Communication and activity				Every day
i.	Security, protection	- There is a danger that the patient will fall from the wheelchair - There is a sensory disturbance in the leg so it can be injured.	The patient is aware of the dangers of falling from a wheelchair The patient can get out of the wheelchair in 4 weeks.	- Explain to the patient to be aware of dangerous situations. - Give Safe environment for patients to move around in a wheelchair.	Every day
j.	Self-concept	- Acceptance of patient deficiencies can lead to problems. - The problem of care in the hospital has little social contact.	- The patient is aware of his own situation, calm--facing problems and filling his life in his own way alone. - Patients are ready to make contact with friends, fellow patients who treated.	- Carry out social contacts with friends and family. - Providing opportunities for patients to express their feelings---helping patients overcome their health problems	Every day

To carry out this task, a nurse is also required to go through a number of stages in the nursing process. These stages include the observation to identify the client's problems, whether healthy or sick. These five steps must be carried out in sequence using the cycle in the form of a cycle. That is, the five steps must be carried out step by step, from the first to the last. After completion, after the evaluation, the stages should return at the first stage of returning, namely the assessment. In addition to a series of tasks that need to be done, nurses must also know the main concepts regarding basic human needs. These concepts include:

1. Concept of oxygen needs

Oxygenation is the most basic human needs. Oxygen is a gas component and vital element in the metabolic process and to maintain the survival of all body cells. A nurse is required to have competence, understand, and can implement nursing practices in oxygenation disorders in patients. After identifying it, the nurse will plan and enforce a number of diagnoses to help patients meet their needs for oxygen.

For example, in a few cases, there are patients who experience a decrease in breathing ability due to physical tension or can also decrease breathing due to a buildup of mucus. So, the patient is declared as a human who has obstacles in meeting their needs for oxygen. Nurses must identify and establish a diagnosis so that it can help patients to be able to meet their needs again for oxygen. Moreover, oxygen demand is the most basic need for patients.

2. Concepts of eating needs (nutrition) and drink (liquid)

Every human being certainly needs food and drinking to meet the needs of his life. Without nutrition and fluids that enter the body, of course human functions and physiological are disturbed. In fact, cannot live. This need is one of the basic human needs that must be met. Based on his condition, there are a few patients who cannot meet their food and drink needs. For example, experiencing an acute throat or someone with indigestion.

For this reason, the nurse is tasked with studying and identifying what the patient's needs are and how to help patients to be able to meet their needs. For example, the need for drinking (fluid) is disrupted due to the patient often sitting in the same position so that it can result in the formation of kidney stones. This then

becomes a nursing problem which then results in a diagnosis to evaluation in the field of treatment.

3. Concept of elimination needs

Based on the Big Indonesian Dictionary in online version, elimination means expenditure (such as toxins from the body), removal, removal and so on. That is, elimination is a basic human need in the form of removing hazardous substances or useless substances from the body. To always be healthy, humans have a natural cycle in eliminating substances that are dangerous or useless for the body.

However, in unhealthy/disturbed conditions, the exhaust cycle that is a human need can be disrupted, not smooth or even difficult to do naturally. For example, patients cannot defecate/urinate. The opposite can also be the opposite due to disorders such as urinary tract infections, patients actually experience urine incontinence so we are wet throughout the day. In this condition, the task of the nurse is to help so that patients can meet the needs of elimination well/normal.

4. Concept of temperature management needs

The temperature regulation referred to here is when healthy, humans have the ability to regulate their body temperature. In very cold weather or vice versa, human body temperature will adjust and be stable to changes in temperature.

In a few patients under certain conditions experiencing soulfulness in regulating the temperature of the body. For example, the patient will be very sensitive or too sensitive to changes in temperature.

5. Concept of attitudes and motion needs

Every human being has the need in the form of attitudes, positions, and motion in accordance with what he wants. A human want to sit, stand, run and so on according to what he needs. However, the concept of attitudes and motion needs may not be met by patients with physical weaknesses. This physical weakness will make the patient very tired or even sick if you choose a certain position. For example, patients with certain physical weaknesses in the form of dependence on wheelchairs, because without a wheelchair, there is a risk of falling that makes his health condition worse. The problem of nursing in this case is in the

form of providing physical aids in order to help the patient's attitude and movement needs.

6. Concepts of rest and regular needs

Every human being needs rest. After doing a number of activities throughout the day, both physical and non-physical that the body needs is to rest. However, the body's needs are not just rest. The body also needs so that the body regularly moves. Doing activities, sports or running work/hobbies. The concept of human needs again requires regularity.

In unhealthy conditions, patients experience disorders in terms of rest and regular life. For example, after the day's activities the patient cannot sleep (insomnia). So, this is the disorder for the patient. The opposite can also occur, in certain conditions a patient is continuously weak, weak and dependency to continue to rest. This is also referred to as a disorder in terms of rest needs. Because, if it is continuously left, these dependences can continue to increase and make the patient's body inactive or total captivity.

7. Concept of communication and interaction needs

As explained in the previous chapters, communication is a process of exchanging information between one person and another. Communication is also very much needed, including when someone is in health/nursing services. Without

The existence of direct communication, health checks and maintenance may be less than optimal. The need in the form of communication and interaction for humans is one of the basic needs. Because, humans are social creatures. In fact, it would not be possible for humans not to communicate. The condition of the absence of fulfilling this communication needs can be exemplified by patients with memory disorders. For example, patients with chaotic thinking, unclear communication and often forget or not according to reality regarding his words.

8. Concept of security, protection, and intimacy needs

Humans need needs in the form of security and protection. Without security, humans will continue to feel that their lives are threatened. When sick, the need for safety and protection may not get it. For example, every patient with physical weakness, then has a danger potential. The potential that threatens its safety can be rolled out of a wheelchair, falling from bed or other risks of falling.

Not fulfilling the need for security is what makes patients need to be given more attention. Based on the concept of these needs, nurses should understand that the needs of each patient are different. For this reason, the need for treatment, diagnosis and implementation of treatment also differ from one patient and another patient oxygenation assistance.

When a patient experiences impaired fulfillment of needs related to oxygenation, nurses must be vigilant. Nurses must be prepared to perform several technical measures to be able to restore the patient's breathing. First, the nurse must understand the work procedure starts from preparing an oxygen tube equipped with a flow meter and humidifier, nasal catheter, kanula/mask to vaseline/jelly, then, the next action is to check the flow meter and humidifier, turn on the oxygen tube, adjust the position of the patient semi-fowler or according to the patient's condition. Then, the next step is to provide oxygen through cannula/mask. When using a catheter, the nurse must measure the nose distance with the ear, then give jelly and enter. Oxygenation assistance can also be done by looking and controlling the patient's breathing. Respiratory checking is one of the observations that needs to be made by nurses regarding the patient's oxygen needs.

9. Help for eating and drinking

Humans have a basic need to meet the nutritional needs and body fluids so that they can continue to live. So, eating and drinking must also be done by the patient. However, we know that someone who is sick often has no appetite. The patients seemed to lose their appetite, especially the food provided at the hospital often did not meet the patient's tastes. Food variations in hospitals are certainly one of the hospital tasks and the manager of the nutritional department in the hospital to arrange the patient's food menu in such a way.

Nurses must also pay attention to the patient's condition. In addition to meeting the nutrition or diet of the patient (not exchanged with other patients), nurses must pay attention to the condition of the patient himself. For example, whether the patient is alone or has been accompanied by his family, how the atmosphere of the patient's room, the patient's bed must be comfortable. Nurses need to pay attention to whether something that is not related to eating and drinking activities is still around the patient's bed or not. Comfort when eating needs to be considered nurses. Because, the condition of the sick is no longer

appetite to eat. If coupled with other conditions that worsen their appetite, the assistance to meet the nutritional needs and fluids will not be met.

Nurses need to help patients feel comfortable with their sitting position when eating. For that, help sit in a comfortable atmosphere without spending a lot of energy to eat. If you are unable to eat/drink alone and there is no patient's family, nurses need to help patients to eat by feeding them. However, if you are able, Nurses are enough to help patients by cutting meat in their food, pouring drinking water or other things that need help. When the patient has absolutely no appetite, the task of the nurse is to provide stimulation to the patient to eat. The encouragement can be in the form of suggestions and give patients understanding that he needs nutrition for his recovery. For example, with a suggestion that patients must eat at least a little, suggestions for eating for a bite for healing and so forth. These techniques are needed by nurses in providing assistance to fulfill the patient's nutrition and fluid.

10. Observation of excretion and fluid balance

Fluid balance is very important both when determining a diagnosis and management of several diseases. For this reason, nurses need to see the balance of the fluid from several conditions and conditions of the patient. For example, when the patient's body is dehydrated, vomiting, diarrhea and edema. These times are times when it is very important for nurses to help patients in terms of application of fluids. The task of the nurse is also to record the patient's fluid reception and the discharge of the patient's fluid.

A fluid balance is called positive if the fluid received is more than the fluid discharged by the patient. In normal situations, a fluid balance of 500 cc is considered positive. The release of fluids through breathing and sweat is very small and cannot be carried out. A fluid balance is said to be negative if the fluid that comes out is greater than the liquid received. This should be a record and attention for nurses. Meanwhile, assistance for excretion must also be given by nurses to patients. In Stevens et al (2012) it is explained that excretion is a basic human need from birth. Digestion and regulation of fluids in the body are very dependent on the excretion of waste materials. Everyone during his life is actively bound by excretion. If there are deviations in the excretion pattern, then it could be that someone is a sign of a disease. Nurses must pay attention to technical matters in the form of how much urine is issued by an adult person. For example,

every healthy person releases a urine of 1200 ml per 24 hours. It also depends on the amount of fluid received by the patient, but also depends on expenditure from other places. For example, the skin, the production of many sweats, diarrhea and so on. Normally a person releases urine as much as 4 to 6 times a day. In addition to volume, nurses must also pay attention to the color of urine. Normal urine is the color of straw yellow. The more concentrated urine will be darker in color, and urine whose concentration is reduced or even colorless. The thing that needs to be suspected of nurses is if the patient has several urine colors. For example, if the color of brown and bubble can show liver or bile abnormalities. While pink and brownish red color indicate the presence of blood in the urine. The urine color is green, blue, yellow-red can be caused by the use of drugs by the patient. Likewise, with clarity. Nurses must know that healthy urine is clear and transparent urine. Foundness can occur because of mucus. While based on the smell, healthy urine usually does not smell and there is only a light ammonia odor. While very smelly urine indicates the presence of health problems. For urine examination in the laboratory, nurses must really make sure the patient washing the genitals before submitting the urine sample. Likewise, with the cleanliness of the container pot. This certainly functions to ensure the accuracy of the diagnosis of laboratory results.

Other excretion results besides urine are feces (feces), vomiting and sputum (mucus). Each stool color also shows the patient's health condition. This must be known by each nurse. For example, feces in the form of hard chunks and difficult to remove are called obstipation. Meanwhile, if the stool is the opposite, too soft, runny, and very often comes out called diarrhea. Vomiting, the next excretion process that can be observed by this nurse occurs because of the peristaltic motion of the stomach and the esophagus that causes the contents of the stomach to be removed. The time and frequency of vomiting must be considered by the nurse. While sputum or mucus is something that is released from the bronchi. Deviations and bronchial disorders can often be seen from the mucus of a patient. These excretion processes need to be considered in the technical observation in patients

11. Help for elimination

Another technical problem, the thing that is also very important to pay attention to nurses related to meeting the needs of patients is assistance for

elimination. Problems included in elimination are defecation and urination. In fact, the problem of elimination is not just a patient problem in the hospital. In everyday life, problems related to urine and feces are often taboo discussed. In fact, nurses must really pay attention to these two things.

Problems relating to elimination are called incontinence. Incontinence associated with the detention of urine or feces. There are several forms of incontinence, for example, incontinence stress (urine only comes out a few drops). This happens when a person concerned suddenly his stomach pressure rises such as lifting, laughing, coughing and so on. It can also occur because of the weakening of the pelvic muscles, for example, lying down too long or being pregnant and so on.

There are also other forms of dripping incontinence, which often arises in men. This is due to the pinch of the urethra due to prostate enlargement. This makes someone incessantly dripping urine. Pressure incontinence, here the patient feels an urge to urinate (pee) when removing urine or the patient does not feel it at all, so that the patient unwittingly releases a lot of urine. This is what the nurse needs to do, which is to help the patient's elimination process.

The technical step of a nurse in helping patients with incontinence is to give adequate attention to these patients. Nurses also need to do effective communication in the form of solving problems experienced by patients and personal care of the patient. As for the physical matters of the patient that needs to be done by the nurse is sensitive to the smell and condition of the patient's body/skin. For example, for the skin care of the incontinence patient, nurses must often change the patient's dirty clothing, bathe the patient, installation of incontinence tools and so on. Nurses also need to accompany the patient to do bladder exercises or often referred to as pelvic floor muscle exercise. As for the smell, nurses also need to keep patients from odorless. For this reason, nurses must routinely change incontinence materials, wash, and replace bed linen and clothing. Nurses must also be able to distinguish and determine which urine incontinence aids are appropriate for patients. Examples of urine absorbers are cloth pieces and in the form of diapers/pads. The selection of the right material is related to the sensitivity of the patient's skin, whether it will cause irritation or not then interfere with activity or not.

Feces incontinence occurs less than urine incontinence. However, patients can also occur. This is what needs to be known and watched out by nurses. Where, anal muscle weakening can occur so that it is to make diarrhea and defecation. This fecal incontinence can also occur if there is a psychogeriatric disorder or the presence of neurological deviations in lack of control over the sphincter muscles of the anal. As it is explained, this disorder can make patients very uncomfortable nurses.

However, however this disorder must be given a number of assistances so that the needs of elimination can be met. Some actions that can keep the feces incontinence do not appear include training the pelvic floor muscles, providing the most appropriate food according to the type of feces incontinence experienced by the patient. Several physical things that should be considered by nurses in their technical actions to provide elimination assistance to patients.

12. Temperature regulation assistance

General human body temperature is constant. The existence of temperature deviations means there is a disruption of balance, although there is not necessarily a disease. If someone has a high fever, then we can see his body look red. When held, his body was also hot. As a nurse, to know how to help patients in body regulation, a nurse must understand the use of thermometers.

Nurses must also know, that in the normal scale division in the degree of Celsius the normal number is a range of 35 degrees to 42 degrees Celsius. Normal body temperature is between 36.5 degrees, while if the temperature increases 38 degrees Celsius then the person is called a fever. If above 40 degrees, the patient is said to be a high fever. This must also be known by nurses in the assistance of temperature regulation in patients. Several technical actions that can be taken by nurses are measuring regular body temperature for the sake of monitoring the stability of the temperature in patients. The most suitable location to measure the temperature is rectal with about 3 minutes. For this reason, temperature measurements are very necessary to monitor whether the patient's body temperature is still quite normal. If there is a fever, it must be known whether the symptoms of fever are a sign of other health problems (such as infection, etc.). If it is known the cause of fever (from laboratory results), the nurse then takes action in the form of drug administration based on their needs.

13. Self-care assistance

Self-care is an important need for every human being, including for patients. Self-care includes several things such as personal hygiene starting from the head to the toe. In certain circumstances, it could be that patients have difficulty doing self-care. For example, patients in a state of traffic accidents, vision defects, amputated feet, dementia (senile), patients with paralysis and several other conditions that cannot do self-care. So, the task of the nurse is to do technical things in the form of self-care activities to help patients. Several things that need to be considered for nurses to patients are bathing from a clean direction towards a clean body limb, must be taken into account routinely, as many stimuli as possible the patient to be able to cleanse themselves. In oral care, if the patient is unable to rub his teeth, then the task of the nurse is to take over the patient's teeth. Moreover, if found inflammation of the mucous membrane. Then the rubbing of the teeth assisted by nurses must be truly careful or with special attention.

Nurses also need to pay attention to other self-care from the patient's body, for example, hair care, removing clothes, patient nail care, glasses and other viewing tools, ear care and hearing aids as well as various self-care both clothing, beds and patient rooms. Technical things that need to be considered by nurses in helping the needs of self-care are nurses must pay attention to details, clean patients as well as possible.

Several trivial things but very important to consider nurses when bathing patients including closing the bed curtains when bathing the patient, knocking on the door before entering the patient's room and giving cloth cover for wheelchair users. Sometimes, we also need to think about the feelings of others that we bathe. For example, feelings of shame experienced by patients when bathed by nurses. Shame, between forced to be afraid of being ridiculed. Patients often consider himself useless if he is bathing and self-care is unable to do. This is what nurses must understand. Mobilization assistance motion is something that is needed by every human being. Without any movement, humans seem without direction. The movement is always aimed at people who have a purpose as well as the direction of the movement. Without movement, other necessities of life will never take place. Because, eating, drinking, exercising and various other activities can only take place if there is movement. So, movement is a very important need. However, as the difficulties and obstacles experienced by other patients, it could

be that the need for mobilization or this movement will be very difficult to be met by patients.

Especially patients with certain conditions. For example, physical weakness in the form of disability, paralysis, joint pain, bone loss and so forth. Nurses will be needed in providing assistance in the form of mobility to these patients. If you need help, nurses should help mobilize patients in certain cases. For example, the patient's desire to therapy after the accident, the patient's inability to go to the bathroom, the patient's inability to reach the desired object and so forth. This is what makes assistance in the form of mobilization is needed by patients.

2. Anticipating the Prevention of Unexpected Events by Nurses

1. Knowing and understanding the patient's vital signs

After discussing the basic needs of human beings, now is the time to discuss what are the vital signs of a person. As is known, a vital sign is a sign that shows that there are still signs of life in a person. When a patient enters the hospital, the first or vital examination is a few of this. These vital signs include body temperature, pulse, breathing and blood pressure. According to Wahid (2012), the purpose of the measurement of these vital signs is to detect and monitor patient changes and monitor patients who are at risk for health changes. These signs include:

a. Body temperature

Body surface temperature (skin, sub-kutane and fat tissue) functions according to the response to environmental factors that are not steady. Therefore, it is more appropriate to measure the core temperature or inner body tissue such as thorax and abdominal cavity. Until now, the body's core temperature is still measured using a mercury thermometer. However, nurses prefer the use of electronic thermometers that provide more accurate measurement time in 2-60 seconds.

In the patient's body temperature measurement, there are several ways. This method includes orally (by mouth) putting the thermometer in the patient's mouth, rectally (through the anus) put it through the anus. Most importantly, the patient's body temperature is very important to know and become a vital part of the hospital for nurses to know. Temperature measurements can also be done by axillary or through the armpits. The

type of thermometer used each is certainly different. Nurses must understand and of course know the difference in the use of each of these thermometers.

b. Pulse

The pulse is one of the vital signs of humans. In Wahid (2012), pulse can be divided into two, namely apical and peripheral pulse. Apical pulse is a pulse that is felt in the heart apex area. As for peripheral pulses, it is a pulse that is felt in the peripheral body such as the neck, wrists, and legs. In healthy patients, the rate of the pulse of the peripheral pulse is the same as the heart rate. Changes to the patient's health condition can weaken the peripheral rate and will have difficulty detected. Thus, the pulse assessment is one of the vital elements of patients who are very important.

From the pulse can be seen for example, the rate of the pulse of less than 60 times per minute is called bradycardia. Usually found in healthy and trained athletes. While the pulse that exceeds 100 times per minute is called tachycardia which is often found in healthy patients or patients who finish exercise. This pulse can be checked by checking the pressure released before the pulse is felt.

c. Breathing

The thing to know from breathing is to check whether there is anxiety when someone breathes. How to measure breathing, the thing that needs to be done is to prepare watches, books, stationery, sphygmomanometer mercury or needles that are ready to use, stethoscope. The way to calculate breathing is to see the ups and downs of the chest while holding the patient's wrist. then, counting the seconds hand counts the number of breaths 30 seconds multiplied by two to get the result in 1 minute.

d. Blood pressure

In the vital principle of blood pressure examination, it should be noted that it is that blood flowing and damages in the arterial system that makes two blood pressure. First systolic blood pressure is blood pressure at the peak of the wave when the left ventricle contraction. While second, diastolic blood pressure is blood pressure between two ventricular contractions, when the heart is in the rest phase. As is known that the measurement of blood pressure is to use tensimeter.

2. How to administer drugs to patients by nurses

Drug provision safely, accurately, and effectively is one of the nurses' tasks. For this reason, it is not wrong if the administration of this drug is included in the role of nurses in Patient Safety. Prevention of adverse event, of course, is related to drug administration. Where, cases of drug administration errors can also occur and result in adverse event. For this reason, nurses should have responsibilities, among others:

a. Understanding the actions and side effects of sleep.
b. Give the medicine correctly.
c. Monitor the patient's response.
d. Helps patients use drugs correctly.

Meanwhile, various kinds of drugs have their respective ways of use. In fact, the method used for drug use may depend on the use of drugs, side effects and physical forms of the drug.

Below there are tables of drugs and their use:

Figure 4. Use of Types and Methods of Drugs Source: (Killian, 2021)

Drug Type	How to Use	Information
Oral	The drug is given by mouth	- The most frequently used method. Usually has a long absorption - the effect is more long.
Sublingual	- This medication is designed to be absorbed after being placed under the tongue. - can't be swallowed.	- The function is not effective if taken before it dissolves. - Effect not achieved if the drug is swallowed first.
Buccal	- Solid drugs are given to the cheek mucosa until the drug dissolves. - Using alternate cheeks - Should not swallow	-The drug only acts on the mucosa. -Swallowed will work systemically
Parenteral	- Drugs are administered through body tissues by injection For example: subcutaneous, intradermal, intramuscular intravena.	There is a risk of injection, the client has a needle puncture.

Drug Type	How to Use	Information
Topical	Drugs are used by topical, ointment, aerosol spray, suspension lotion.	Used on the skin.
Anus or rectum	Inserted through the anus.	Must be with the placement true

In addition to paying attention to the way and use of drugs, to improve patient safety, nurses as one of the officers who play an important role in patient safety also need to apply the accuracy of drug administration. There are 10 stages of administration of drugs that are correct and safe, namely 10 correct drugs. Killian (2021) said that these ten stages must be carried out entirely by nurses so that patients really avoid adverse event, especially due to drug administration. The ten stages include:

I. Knowing the patient (meaning, patient identification is done correctly). Both names, medical record numbers, identity, sex, age, etc. have been confirmed correct.
II. Knowing the drug (nurses must also ensure that the drug given is what drugs for sufferers, what type of medicine and the method of administration).
III. Communication clearly (communication in this case, especially in the field of pharmacists or pharmaceuticals who directly handle drugs. Asking as clearly as possible regarding the drug).
IV. Be careful with drugs that have similar names or similar shapes.
V. Tight and standardize the storage, supply, and distribution of drugs (this is carried out by the pharmacy field of a health care provider).
VI. Check the tools used.
VII. Don't sabotage yourself.
VIII. Conduct education to officers (medical direction about caution of drug administration and adverse event risks).
IX. Encourage the patient to be part of safeguarding the drug.
X. Determine the target in the process, not the perpetrators.

Several things above are some of the important factors to consider nurses regarding their duties. Of course, regarding the purpose of increasing patient safety in hospitals.

SUMMARY

Nurses as one of the health workers who provide nursing care for patients in the hospital in their services have a longer contact time with patients for 24 hours when compared to other health workers, then with a long time contact with the patient does not rule out the possibility of a occurrence The higher incidence or medical error carried out by a nurse in providing health services in hospitals. So that a nurse in carrying out service tasks needs to understand the concept of patient safety, so that when conducting nursing care starting from the assessment, determination of nursing diagnoses, interventions, taking action and evaluation does not occur medical errors. Nurses as one of the important elements in hospitals should also be given policies in the form of self-development, training, education and the like to develop their knowledge

The application of patient safety in hospitals is strongly influenced by the role of nurses, must carry out activities that support the achievement of patient safety. As a provider of nursing services, nurses adhere to established service standards operasional. Implement good communication with patients and their families. Sensitive, proactive and solve problems against unexpected events. Accurately document all nursing care provided to patients and families. Apply ethical principles in the provision of nursing services. Provide education to patients and families about the care provided. Implementing reliable health team collaboration in providing health services.

FORMATIVE TEST

1. The nursing assessment on a 75-year-old woman reveals shuffling gait, decreased balance, and instability. On the basis of the patient's data, which one of the following nursing diagnoses indicates an understanding of the assessment findings?
    a. Acute pain
    b. Activity intolerance
    c. Impaired bed mobility
    d. Risk for falls
    e. Chronic pain

2. A couple is with their adolescent daughter for a school physical and state they are worried about all the safety risks affecting this age. What is the greatest risk for injury for an adolescent?
    a. Poisoning and child abduction
    b. Home accidents
    c. Automobile accidents, suicide, and substance abuse
    d. Physiological changes of aging
    e. Outpatient accidents

3. A 60-year-old woman is being discharged home with her husband after surgery for a hip fracture from a fall at home. When providing discharge teaching about home safety to this patient and her husband, the nurse knows that:
    a. Most accidents in the older adult are caused by lifestyle factors
    b. Teaching home safety is difficult to do in hospital setting
    c. Assessment focuses on environmental factors only
    d. A safe environment promotes patient activity
    e. A safe behavior

4. At 3 am the emergency department nurse hears that a tornado hit the east side of town, what action does the nurse take first?
    a. Evacuate patients per the disaster plan
    b. Determine how to restore essential services
    c. Prepare for an influx of patients
    d. Move patient to the city
    e. Lead patient to listening

5. A nurse is carring for a newly admitted client who has a documented history of falls. Which of the following in the priority action by the nurse?
    a. Survey the client's belongings
    b. Complete a fall risk assessment
    c. Complete a fall risk assessment
    d. Complete a physical assessment
    e. Complete a evaluation

GLOSSARY

1. CVC = Central Venous catheter
2. HAI's = Hospital Aquaried Infection
3. ICU = Intensive Care Unit
4. SOP = Standard Operasional Procedure

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UNIT 3
CONCEPTS OF MICROBIOLOGY AND PARASITOLOGY

LEARNING OBJECTIVE

1. Students can explain the definition of microorganisms
2. Students can describe the life cycle of microorganisms
3. Students can understand how microorganisms reproduce
4. Students can decide how to transmit microorganisms
5. Students can give an overview of the field of microbiology

1. Concepts of Microbiology and Parasitology

The word microorganism is a term that is familiar to the world of health. Microorganisms or microbes are living organisms that are very small (less than 0.1 mm in diameter) and can only be observed using a microscope. Some microorganisms are composed of one cell (unicellular) and some are composed of several cells (multicellular). Microorganisms = micro-organisms = microbes = microbes = germs. Organisms that belong to the class of microorganisms are bacteria, archaea, fungi, protozoa, microscopic algae, and viruses. Viruses, bacteria, and archaea belong to the class of prokaryotes, while fungi, protozoa and microscopic algae belong to the group of eukaryotes. Microbiology (in Greek *micros* = small, *bios* = life, and *logos* = science) is the science of microscopic living organisms. Microbiology is a multidisciplinary science because this science covers several fields, the division can be based on the type of microbiology (taxonomic approach) or based on functional activity. Based on the taxonomic approach, microbiology is divided into virology, bacteriology, mycology, phycology, and

protozoology. The study of microorganisms includes aspects of: morphology, physiology, reproduction, etiology and genetics. The history of microbiology began with the invention of the microscope by Robert Hooke in 1664, an English mathematician, natural historian, and microscopy expert. Through his microscope which consisted of two simple lenses, Hooke was able to illustrate the structure of the fruiting bodies of a type of mold. Although Robert Hooke could see cells with the aid of his microscope, he could not see microorganisms clearly due to the absence of a staining method (Black & Black, 2018).

The first person to see bacteria was Antoni van Leeuwenhoek (1632-1723), a Dutch amateur microscope maker. In 1684, Leeuwenhoek used his own magnifying glass-like single-lens microscope to observe various microorganisms in natural products. Leeuwenhoek referred to the objects he observed as animalcules (small animals) which he obtained from leftover food stuck to his teeth and rainwater, and later became known as bacteria and protozoa. In the following years, many other observations confirmed Van Leeuwenhoek's, but progress in understanding the properties and benefits of microorganisms was slow until the next 150 years. Only in the 19th century, after the production of microscopes increased rapidly, human curiosity about microorganisms began to develop again. Until the mid-19th century many scientists and philosophers believed that living things arose spontaneously from non-living matter. They believed that maggots could emerge from rotting material, snakes and rats could emerge from moist soil, and flies could emerge from manure. The theory of spontaneous generation was refuted after an Italian scientist named Francisco Redi demonstrated his discovery that maggots did not come from rotting meat. Redi's findings showed the presence of maggots on the rotten meat in the uncovered tube, whereas in the closed tube no maggots were found.

2. Life Cycle, Growth and How Microorganisms Reproduce

Growth is the process of increasing the size or substance or mass of an organism, for example, for macro creatures it is said to grow when it gets taller, bigger, or heavier. In single-celled organisms, growth is more defined as colony growth, namely the increase in the number of colonies, the larger the size of the colony or the substance or mass of microbes in the colony is increasing. Growth in microbes is defined as an increase in the number of microbial cells themselves.

There are two types of growth, namely nuclear division without being followed by cell division resulting in an increase in cell size and nuclear division followed by cell division.

The hallmark of bacterial reproduction is binary fission, in which two daughter cells of the same size can be produced from one bacterial cell, so the bacterial population increases geometrically. The time interval it takes for a cell to divide or for the population to double is known as the generation time. Majority Bacteria have a generation time ranging from one to three hours, *Escherichia coli* has a fairly short generation time, around 15-20 minutes, while *Mycobacterium tuberculosis* has a generation time of around 20 hours. According to Seager dkk. (2021) this generation time is very dependent on the adequacy of nutrients in the growth medium, as well as the physical conditions for the growth of microorganisms.

a. Factors affecting the growth of microorganisms

Factors that affect the growth of microorganisms are divided into two factors, namely physical factors, and chemical factors, including nutrients in the culture media.

- Physical factors include temperature, pH, osmotic pressure, and light
- Chemical factors include nutrients and culture media.

Temperature

Temperature determines the activity of enzymes involved in chemical activity. An increase in temperature of 10oC can increase activity by 2 times. At very high temperatures irreversible protein denaturation will occur, whereas at very low temperatures the enzyme activity will stop. Bacteria can grow at a wide range of temperatures from near freezing to near the boiling point of water. Bacteria that grow best in the middle of this range are referred to as mesophiles, which includes all human pathogens and opportunists. There are three types of bacteria based on their level of tolerance to environmental temperature, namely:

1) psychrophiles, namely microorganisms that like to live in cold temperatures, can grow best at optimum temperatures below 20oC
2) mesophyll, namely microorganisms that can live optimally at moderate temperatures, having an optimum temperature between 20-50oC

3) thermophiles, namely microorganisms that grow optimally or like high temperatures, these microorganisms often grow at temperatures above 40oC. This type of bacteria can live in hot places, even in hot springs. This type of bacteria was discovered in 1967 in yellow stone park, this bacterium lives in hot springs with a temperature of 93-94oC.

PH

Increasing and decreasing the concentration of hydrogen ions can cause ionization of groups in proteins, amino and carboxylates, which can cause protein denaturation which interferes with cell growth Acidophilic microorganisms, grow in the optimal pH range of 1.0-5.3, neutrophil microorganisms, grow in the pH range optimal 5.5-8.0, alkalophilic microorganisms, grow in the optimal pH range of 8.5-11.5, while extreme alkalophilic microorganisms grow in the optimal pH range > 10.

Osmotic pressure

Osmosis is the movement of water across a semipermeable membrane due to an imbalance of dissolved materials in the media. In a hypotonic solution, water will enter the microorganism's cell, whereas in a hypertonic solution, water will leave the microorganism's cell, causing the plasma membrane to shrink and detach from the cell wall (plasmolysis), the cell is metabolically inactive. Microorganisms that can grow in a hypertonic environment with high sodium levels are known as halophiles, for example, bacteria in the sea. Microorganisms that can grow at very high salt concentrations (> 33% NaCl) are called extreme halophiles, for example, *Halobacterium halobium*.

Oxygen

Based on the need for oxygen, known as aerobic and anaerobic microorganisms. Aerobic microorganisms require oxygen to breathe, while anaerobic microorganisms do not require oxygen to breathe, in fact the presence of oxygen will inhibit their growth. Facultative anaerobic microorganisms, use oxygen as respiration and fermentation as an alternative but with a low growth rate. Microaerophilic microorganisms can grow well with less than 20% oxygen.

Radiation

The source of radiation on earth is sunlight which includes visible light, ultraviolet radiation, infrared light, and radio waves. Radiation that is harmful to microorganisms is ionizing radiation, which is radiation of very short and energetic wavelengths that causes atoms to lose electrons (ionization). At low levels ionizing radiation can cause mutations that lead to death, whereas at high levels it is lethal.

Nutrition

Nutrients are substances that are necessary for biosynthesis and formation of energy. There are two types of microorganism nutrition, namely macroelements and microelements. Macroelements are nutritional elements needed in large quantities (grams). Macroelements include carbon (C), oxygen (O), hydrogen (H), nitrogen (N), sulfur (S), phosphorus (P), potassium (K), magnesium (Mg), calcium (Ca), and iron (Fe). C, H, O, N, and P are required for the formation of carbohydrates, fats, proteins, and nucleic acids. K is required by several enzymes to synthesize proteins, and Ca+ plays a role in the resistance of bacterial endospores to heat. Microelements are nutritional elements needed in small amounts (in mg to ppm doses), including manganese (Mn), zinc (Zn), cobalt (Co), Nickel (Ni), and copper (Cu). Microelements are sometimes part of enzymes or cofactors that help catalyze and form proteins. culture media. According to Hamad (2012) the nutrient material used for the growth of microorganisms in the laboratory is called a culture medium. Knowledge of the normal habitat of microorganisms is very helpful in the selection of suitable media for the growth of microorganisms in the laboratory. Based on its consistency, culture media are grouped into three types, namely liquid media, solid media, and semisolid media.

b. Microorganism growth phase namely lag phase, log phase, stationary phase, and death phase.

The lag phase is the adaptation phase, namely the adjustment phase of microorganisms in a new environment. The characteristic of the lag phase is that there is no increase in cell number, only an increase in cell size. The length of the lag phase depends on the conditions and the initial number of microorganisms and the growth medium.

The log phase is the phase in which the microorganism grows and divides at maximum speed, depending on the microorganism's genetics, the nature of the

medium, and the growth conditions. New cells are formed at a constant rate and the mass increases exponentially, therefore the log phase is also called the exponential phase.

The stationary phase is when the growth of microorganisms stops and there is a balance between dividing cells and the number of dead cells. In this phase there is an accumulation of toxic waste products. In most cases cell turnover occurs in the stationary phase.

The death phase is a state in which the number of dead cells increases, and the causative factors are the unavailability of nutrients and the accumulation of toxic waste products.

3. Methods of Transmission and Prevention of Microorganisms

In 1858, the German scientist Rudolf Virchow put forward the theory of biogenesis, according to which all living cells could arise only from living cells that existed before them. This theory was supported by the French scientist Louis Pasteur in 1861. Pasteur demonstrated that microorganisms present in air can contaminate sterile solutions, but air itself cannot create microorganisms. Pasteur filled several short-necked bottles with beef stock and then brought them to a boil. Several bottles were left open and the broth allowed to cool. While several other bottles were closed while the broth was boiling. After a few days, the opened bottle found many contaminants of microorganisms, while the closed bottle did not find any microorganisms. Pasteur showed that microorganisms are found in non-living things, solids, liquids, and air. Pasteur also demonstrated that microorganisms could be destroyed by heating and that heating methods could be devised to block microorganisms from exposure to a nutrient environment. This discovery is the basis of aseptic technique, namely a technique to prevent contamination of unwanted microorganisms, which is currently the standard work in the laboratory, as well as the standard for medical and nursing actions. Robert Koch (1842-1910), a German physician. Koch discovered the rod-shaped bacterium Bacillus anthracis in the blood of cows that had died of anthrax. Koch grew the bacteria on nutrient media and injected the bacteria into healthy cows. These cows then become sick with the bacteria in healthy cows. This cow then became sick with the bacterial culture that was isolated earlier and both cultures contained the same bacteria. Koch's discovery proved that bacteria are the cause of disease. Based on his

discovery, Koch was the first to discover the concept of the relationship between infectious diseases and microorganisms known as Koch's Postulates which are now the gold standard for determining infectious diseases. Koch's postulates include:

a. Germs must always be found in sick animals, but not in healthy animals
b. The germ must be isolated and cultured in the form of pure culture outside the animal's body
c. The pure culture of the bacteria must be capable of causing the same disease in experimental animals. These germs can be isolated from experimental animals

Microorganisms for Human Life

Microorganisms are found everywhere and their interactions with fellow microorganisms or other organisms can be safe and beneficial or detrimental (Chagas dkk., 2018). Microorganisms tend to be associated with disease, infection, or decay. However, most microorganisms contribute to the balance of environmental ecosystems, especially for human welfare.

The role of beneficial microorganisms for human welfare:

a. Plant pest control.
   Plant pest control using natural enemies of plant pests continues to be developed to reduce the negative impact of using pesticides. For example, the use of *Bacillus thuringiensis* bacteria to control *Crocidolomia binotalis* which is a pest of cabbage plants.
b. Industry and mining. Development of biodegradable polymers to overcome the problem of environmental pollution due to plastic waste which is difficult to decipher. For example, the use of *Alcaligenes euthropus* bacteria as a producer of poly-3-hydroxy alkanoate (PHA) and poly-β-hydroxy butyrate (PHB), which are raw materials for making plastics that are easily decomposed. The cellulose enzyme used in the paper industry is produced by *Trichoderma viridae*.
c. Food. One of the useful bacteria in the food sector is *Lactobacillus bulgaricus* which is used for making yogurt. Utilization of *Streptococus lactis* and *Streptococcus cremoris* bacteria in the manufacture of cheese and butter.
d. Health.

Several types of microorganisms such as Pseudomonas and Propionibacterium produce vitamin B12 (cobalamin); *Ashbya gossypii* fungus fermentation process produces vitamin B2 (riboflavin); The manufacture of synthetic antibiotics and vaccines is also the result of the utilization of microorganisms. A small number of microorganisms are pathogenic. Natural microorganisms in our body are called normal microorganisms or normal flora. Although not pathogenic, under certain circumstances can be pathogenic and cause infectious diseases. For example, *Staphylococcus aureus* and *Escherichia coli* can cause diarrhea, *Candida albicans* yeast can cause vaginal discharge, *Aspergillus flavus* mold which produces aflatoxin can poison food, protozoa *Toxoplasma gondii* which causes toxoplasmosis, human immunodeficiency virus which causes HIV/AIDS, and so on.

1. Definition of Parasites

The word “parasite” comes from the Greek, namely *para* which means beside and *sitos* which means food. Based on this meaning, a parasite is an organism whose food needs either in its entire life cycle or part of its life cycle depend on other organisms. The organism that provides food to the parasite is known as the host or hosts. Other sources say the organism that hosts or supports the parasite is called the host or hosts. The branch of biology that studies parasitic organisms is called parasitology. Basically, parasitism is a reciprocal relationship between one organism and another for its survival, where one organism is harmed by another organism. Parasitology is a special development or a special branch of Biology called ecology. Ecology is the science that studies the interaction between biotic factors (living things) and abiotic factors (non-living, such as soil, water, rocks, and others). Medical parasitology is the study of all parasitic organisms in humans. Parasites included in medical parasitology are protozoa, worms, and some arthropods.

2. Ways of Life and Breeding of Parasites

According to their place of life in the human body, parasites are divided into endoparasites and ectoparasites:

a. Endoparasites are parasites that live in the human body, for example: in the blood, muscles, and intestines, for example, *Plasmodium sp*.
b. Ectoparasites are parasites that live attached to the outside of the skin and sometimes enter the tissues under the skin, for example, *Sarcoptes scabei*.

Meanwhile, according to the level of dependence, parasites are divided into obligate parasites and facultative parasites.

a. Obligate parasites are parasites that cannot live if they are not attached to the host, for example, *Plasmodium spp*.
b. Facultative parasites are parasites that under certain conditions can live alone in nature, not relying on the host, for example, *Strongyloides stercoralis*.
c. Non-permanent parasites are parasites that move from one host to another. Examples: mosquitoes, bed bugs.

According to the degree of parasitism, parasites are divided into:

a. Commensalism is a relationship in which an organism benefits from another organism but the organism is not harmed.
b. Mutualism is a relationship between two types of organisms in which both benefit.
c. Symbiosis is a permanent relationship between two organisms and cannot live separately.
d. A predator (predator) is a parasite that kills its prey first and then eats it. One of the ecological rules that is always related to parasites is their ability to spread (distribution). Exit from the host's body which is infected or known as dissemination, is needed by parasitic organisms because it is an attempt to preserve its offspring, through efforts to find and infect the host. In terms of finding and infecting hosts, the hosts can be of the same or different strains. Thus, the parasite or parasite-free life stage will be faced with different problems having to leave the body of the host it was originally infected with. Among other things: in the face of external environmental conditions that are completely different from when he inhabits (parasitizes) his host. These environmental conditions are very inhospitable, so the

chances of parasitic organisms finding and infecting the host are very low. The next consequence is that the parasite survival rate is also low. Thus, the parasite must develop a method (strategy) so that its survival rate becomes high. The high survival rate is a guarantee for the preservation of offspring.

There are 2 types of environment that the parasite must consider in order for the parasite's survival rate to be high.

1. macro environment
2. micro environment.

The micro environment is the condition on and/or inside the host's body which is the habitat for the parasite, and the macro environment is the condition outside the host's body which is the habitat for the host. In the microenvironment, the parasite must be able to adapt first by overcoming or avoiding the host's reaction that tries to fight and destroy it. This microenvironment can be in the form of the outermost layer of the host cell (host cell membrane) or outside the host cell or also in body fluids or in a matrix which is the building block of host tissues and organs. Parasites that live temporarily or permanently in the outermost layer of the host cell (host cell membrane) are referred to as intracellular parasites. In general, intracellular parasites are very small in size (microscopic) and their size is more limited by the size of the host cell. In contrast to intracellular parasites, extracellular parasites that live temporarily or permanently outside host cells or also in body fluids or in a matrix which is the building block of host tissues and organs, have body sizes ranging from microscopic to macroscopic in size. Based on the description of parasites and parasitism as previously explained, Parasitology not only studies parasite biology, the diversity of parasite life cycles, how parasites infect hosts, but also studies migration and maturation (sexual maturation) of parasites in the host's body, the pathological effects of parasites on hosts, reactions the host, and its response to the parasite, the way out of the host's body, and the spread of the parasite. Thus, apart from the branch of ecology, in parasitology there is the development of another branch of biology, namely Immunology (the study of immunity). In parasitology, the main emphasis that needs to be understood is the reaction of the host and its response to the presence of the parasite and conversely also the reaction of the parasite and its response to the host's immune response. The following will discuss material on the effect of

parasites on the host, the host's response to the parasite, and the life cycle of the parasite. Most parasites that live in the host's body do not cause disease (non-pathogenic parasites), but in medical parasitology we will focus on parasites (pathogens). that cause disease in humans. Host is where the parasite lives.
There are several types of hosts, including:

a. Definitive host is the host where the living parasite grows to maturity and reproduces sexually.
b. The intermediate host is where the parasite grows into an infective form that is ready to be exchanged with the host (human).
c. Reservoir hosts are animals that contain parasites that are a source of infection for humans.
d. The paratenic host is an animal that contains an infective stage of the parasite, and this infective stage can be transmitted to an adult in the definitive host. Parasite relationship with the host and cause disease symptoms is called infection. Diseases caused by parasites are called parasitosis. Vectors are species (usually insects) that can transmit parasites to humans and animals. After explaining the various types of relationships between hosts and parasites, in the following, we will show the effects that parasites bring to hosts and the reactions that develop in the host's body due to parasite invasion.

The damage produced by pathogenic parasites in host tissues can be explained in the following two ways, namely:

a. Direct effect of the parasite on the host Mechanical injury, which can be caused by pressure from the parasite due to larger growth, for example: hydatidiform cysts causing duct obstruction. the damaging effect of a toxic substance on Plasmodium falciparum, producing a toxic substance that can cause intractability and other symptoms. The uptake of nutrients, fluids, and metabolites by parasites can produce disease through competition with the host for nutrients.
b. Indirect effects of the parasite on the host Immunological reactions, tissue damage can be caused by the host's immunological response, e.g.: nephritis syndrome after Plasmodium infection. Excessive proliferation of certain tissues due to invasion by some parasites can also cause tissue damage in humans, e.g., liver fibrosis after deposition of ova from Schistosoma.

4. Mode of Transmission of Parasitic Organisms

Parasite transmission depends on the source or reservoir of infection, and the mode of transmission (Johnson dkk., 2019).

a. Source of infection
   1) Humans, humans are the largest source or intermediary for parasitic infections (for example, taeniasis, amoebiasis, etc.). A condition in which the infection is passed from one person to another is called anthroponisis.
   2) Animals, in many parasitic diseases, animals act as a source of infection. A condition in which the infection is passed from animals to humans is called a zoonosis (e.g., hydatidiasis).

b. Mode of transmission of a parasite from one host to another, caused by a particular form of the parasite is known as the infectious stage. The stages of infection in various parasites are transmitted from one host to another in the following ways:
   1) Oral route Consumption of food, water, vegetables, or places contaminated by the stage of parasitic infection. This mode of transmission in some parasites is known as the fecal-oral route (e.g., cysts of *Giardia intestinalis* and *Entamoeba histolytica*, eggs of *Ascaris lumbricoides* and *Trichuris trichura*).
      a) Consuming raw or undercooked meat. Infection can be transmitted orally by ingestion of raw or undercooked meat containing infective parasites (e.g., pork containing cysticercus cellulose, *Taenia solium* larval stage).
      b) Consuming undercooked or raw fish and crabs Infection can also be transmitted by consuming raw or undercooked fish and crabs containing the infective stage of the parasite (for example: crabs containing the infective parasite stage, crabs or freshwater shrimp containing the metacercaria *Paragonimus westermani*, fish containing metacercaria Clonorchis sinensis, and others).
      c) Consuming raw or immature water. Infection can be transmitted through raw food or uncooked water that hides the infective form of the parasite (e.g., chestnut water, etc. contains metacercariae in *Fasciolopsis buski* and *Fasciola hepatica*).

2) Penetration of skin and mucous membranes Infection is transmitted by:
   a) Penetration of the skin by filariform larvae (filariformy larvae) in hookworms,
   b) *Strongyloides stercoralis* in contact with soil contaminated with feces.
   c) Skin puncture by cercariae on *Schistosoma japonicum*, *S. mansoni*, and *S. haematobium* in contact with infected water. The part of the skin that is penetrated is a thin part of the skin, for example: around the fingers, perianal skin, and perineal skin.
3) Inoculation of arthropod vectors Infection can also be transmitted by inoculation into the blood via mosquitoes, such as malaria and filariasis.
4) Sexual contact Trichomoniais can be transmitted through sexual contact. Entamoebiasis can be transmitted through anal or oral sexual contact, such as among homosexuals

5. Medical Parasitology in Medical Parasitology Concept

Each important parasite is discussed regarding morphology, geographic distribution, mode of infection, life cycle, host/parasite relationship, pathology and clinical manifestations of infection, laboratory diagnosis, treatment and prevention/parasite control measures. In the following, some of these criteria are presented.

a. Morphology

   Morphology includes the size, shape, color, and position of the different organelles in the parasite at different stages of its development. It is important in laboratory diagnosis that helps to identify various stages of development and distinguish between pathogenic and commensal organisms. Example: *Entamoeba histolytica* and *Entamoeba coli*.

b. Geographic distribution

   Some of the parasites are found mainly in the tropics. The distribution of the parasite depends on:

   1) Host specificity, for example: *Ancylostoma duodenale* requires humans as hosts, while *Ancylostoma caninum* requires dogs as hosts.

2) Eating habits, for example, consumption of raw or undercooked meat or vegetables predisposes to Taeniasis.
3) The ease with which parasites escape from the host, parasites released from the body along with feces and urine are distributed more quickly than parasites requiring vectors or direct body fluid contact for transmission.
4) Environmental conditions that support survival outside the host's body, namely temperature, presence of water, humidity, and so on.
5) The existence of a suitable host, parasites that do not require an intermediate host (vector) for transmission are more widely distributed than parasites that require vectors.

c. Parasite life cycle

The life cycle is the route a parasite takes from entering the host inside the host to exiting the host and re-entering it. A parasite can involve one or more hosts, involving one or more as intermediate hosts. The parasite life cycle consists of two main phases, the phase inside the body and the phase outside the human body. The life cycle of parasites in the body provides information about symptoms and disorders due to parasitic infections, as well as methods of diagnosis and selection of the right drug. Parasite cycle outside the body, provides important information relating to epidemiology, prevention, and control.

d. Prevention (preventive)

Several preventive measures can be taken against any parasite that infects humans. This action is designed to break the chain of transmission cycle and is very important for the successful eradication of the disease by the parasite.

These steps include:

1) Reduction of sources of infection. Diagnosis and treatment of parasitic diseases is an important component in preventing the spread of infectious agents.
2) Drinking water and food sanitation control.
3) Proper waste disposal.
4) Use of insecticides and other chemicals used to control vector populations.

5) Protective clothing that prevents vectors from landing on the surface of the body and introducing pathogens during blood-sucking.
6) Good personal hygiene.
7) Avoid unsafe sexual practices.

SUMMARY

Microbiology is the study of microorganisms which include single-celled and multi-celled organisms, which include: viruses, bacteria, fungi, protozoa, and other very small organisms. The use of microscopy and staining of microorganisms is one of the techniques to observe the picture of the structure of microorganisms. Microbiology is important because it helps understand and treat and prevent disease, it is also important economically because of its impact on the environment, research, and biotechnology.

Parasites are organisms that live on the host. Parasites that live in the human body can be carried by vectors. Parasites that cannot live without a host are called obligate parasites, while those that can live without a host are called facultative parasites. Parasites that live outside the human skin are called ectoparasites, while those that live inside the human body are called endoparasites. There are several relationships such as mutualism, commensalism, or parasitism between the parasite and the host. This relationship can produce various effects and usually the host tends to react. In general, protozoa, worms, and arthropods are the most frequently encountered medical parasites

FORMATIVE TEST

1. The etiology of typhoid fever or typhus is....
   A. *Streptococcus aureus*
   B. *Candida albicans*
   C. *Shigella dysentriae*
   D. *Salmonella typhi*
   E. *Escherichia coli*

2. Microbiological requirements for medical devices (catheters, injection syringes) are....
   A. Clean and dry
   B. Sterile and non-pyrogenic
   C. Non-corrosive
   D. Tightly closed
   E. Non-toxic

3. Types of infections that can occur in a hospital environment are....
   A. Predisposition
   B. Nosocomial
   C. Complications
   D. Sepsis
   E. Resistance

4. Transmission of infection from one host to another, caused by certain parasites can be done in the following ways, except....
   A. oral-fecal
   B. sexual contact
   C. vector inoculation
   D. parenteral
   E. oral

5. Parasite cycle outside the body, providing important information related to
   A. prevention
   B diagnostic methods
   C. parasite symptomatology
   D. parasite pathology
   E. curative

GLOSARRY

1. The lag phase is the adaptation phase, namely the adjustment phase of microorganisms in a new environment. The characteristic of the lag phase is that there is no increase in cell number, only an increase in cell size.
2. The log phase is the phase in which the microorganism grows and divides at maximum speed, depending on the microorganism's genetics, the nature of the medium, and the growth conditions.
3. The stationary phase is when the growth of microorganisms stops and there is a balance between dividing cells and the number of dead cells. In this phase there is an accumulation of toxic waste products.

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UNIT 4
CONCEPT OF STERILIZATION AND DISINFECTION

LEARNING OBJECTIVE

1. Students can explain the meaning of sterilization and disinfection
2. Students can apply the goals of sterilization and disinfection
3. Students can classify levels of disinfection

1. Definition of Sterilization

Sterilization is a step or action to prevent contamination or transmission of infectious diseases. Sterilization refers to the word sterile (holy pests) is a state of being free from all microbes, both pathogenic and non-pathogenic. Sterilization is an action to make an object sterile. Sterilization in microbiology is the process of removing all forms of microbial life, including bacteria, viruses, microplasma, and spores present on/in an object. This process involves the use of biocidal agents or physical processes with the aim of killing or eliminating microorganisms. The target of an inactivation method depends on the method and the type of microorganism, that is, it depends on the nucleic acid, protein, or membrane of the microorganism. Meanwhile, sterilants are chemicals used for sterilization. To be effective, sterilization must be preceded by careful cleaning (either mechanically or manually) to remove all foreign material from objects prior to sterilization. Sterilization is the process of processing a tool or material with the aim of killing all microorganisms including endospores on a tool/material. Sterilization is the safest and most effective way to manage medical devices that come into contact with blood or subcutaneous tissue that are normally sterile. Sterilization is a way to free

something (tools, materials, media, etc.) from microorganisms whose presence is not expected, either pathogenic or pathogenic. Or it can also be said as a process to free an object from all microorganisms, both vegetative forms and spore forms (Jain & Jain, 2019)

A. Purpose of Sterilization

a. Prevent infection
b. Prevent food from spoiling
c. Preventing contamination of microorganisms in industry
d. Prevent contamination of the materials used in carrying out pure cultures

B. Method of Sterilization

Before the sterilization process begins, let's pay attention to the requirements for sterilizing medical devices:

a. Equipment sterilization related to physical patient care by heating at ± 121°C for 30 minutes or at 134°C for 13 minutes and must refer to the instructions for using the sterilizer used.
b. Sterilization must use environmentally friendly disinfectants.
c. The sterilizer must use personal protective equipment and master safe sterilization procedures.
d. The end result of the sterilization process for the operating room and isolation room must be free from living microorganisms.

Before the sterilization process, there are things that need to be considered in sterilization, namely:

a. Sterilizer (tools for sterilization) must be ready to use, clean and still
b. Equipment to be sterilized must be wrapped and labeled clearly stating the type of equipment, quantity, and date of sterilization.
c. The arrangement of tools must be based on the principle that all parts can be sterile
d. Do not add tools to the sterilizer before the sterilization time is over
e. Move the sterile tool into place with a sterile match
f. When cooling a sterile instrument, it is not permissible to open the wrapper, if it is opened, it must be re-sterilized (World Health Organization & WHO Patient Safety, 2009)

We can oserve the sterilization procedure as follows:

a. Decontamination
   Is one of the methods used to reduce the number of microorganisms on inanimate objects (tools) so that they are safe to use.
b. Washing
   A method used to remove/clean contaminants (dust, soil, feces, blood, pus or pus and a large number of microorganisms) found on the tools or materials being washed. Doing the washing before the process of disinfection and sterilization is very necessary and must be required.
c. Disinfection: A method used to kill/remove/destroy microbes but in this process not all microbes can be removed. (Mohapatra, 2017)
   The sterilization method selected must be suitable for the item to be sterilized to avoid damage. Manufacturer's recommendations should be followed when determining the method of sterilization for each item. The use of one sterilization equipment is an alternative in managing the sterilization process which cannot be carried out.

Types of equipment that can be sterilized include:

a. Equipment made of metal, such as tweezers, scissors, speculum, and others.
b. Equipment made of glass, such as syringes (syringes), chemical tubes and others.
c. Equipment made of rubber, such as catheters, gloves, gastric estimators, drains and others.
d. Equipment made of ebonite, for example, canule rectum, tracheal cannula, and others.
e. Equipment made of enamel, for example, crooked (nierbekken), basins and others.
f. Equipment made of porcelain, such as bowls, cups, plates, and others.
g. Equipment made of plastic, such as infusion hoses and others.
h. Equipment made from woven fabrics, such as gauze, tempori, operating sheets, clothes, bed sheets, pillowcases, and others.

Sterilization can be done through physical and chemical means. The chemical sterilization method is carried out using chemicals, while the physical sterilization method can be carried out by applying heat, both dry heat and wet

heat, radiation, and filtration. There are a variety of sterilizers suitable for healthcare facilities including steam sterilization (autoclaving), dry heat sterilization, and low temperature sterilization processes (ethylene oxide, peracetic acid, and plasma hydrogen peroxide).

a. Dry heat sterilization

Dry heat sterilization functions to kill organisms by oxidizing cell components or denaturing enzymes. This method cannot be used for rubber or plastic materials. Dry heat sterilization is used minimally in healthcare facilities today. This method requires a higher temperature when compared to wet heating sterilization.

Heating with hot air (oven). Tools that can be done in this way are metal objects, materials such as powder, talc, Vaseline, and glass. Equipment to be sterilized must be washed, brushed, and disinfected first, then dried with a cloth, and arranged according to its use, and it is necessary to provide indicators for each tool that has a different use. If you use wrapping, you can use aluminum foil. The oven must be preheated to the required temperature. Then the tool is inserted and the degree of heating is observed (temperature 170oC for one hour or 140oC for two hours). For cooling, when the temperature reaches 100oC, do not open the oven because the glassware will shatter in the sudden cooling

Heating with a flame (flambing) can be used directly, is simple, fast, and can guarantee sterilization, only its use is limited to a few tools, such as equipment made of metal, glass (pipette), and porcelain.

The advantages of dry heat sterilization include:

1) capable of sterilizing equipment in closed or non-porous containers.
2) capable of sterilizing complex equipment, while being assembled.
3) able to sterilize equipment that is not possible to do dry sterilization with steam or on equipment that may be damaged/rusted by moisture steam sterilization.
4) relatively simpler than mechanical sterilization

While the disadvantages of dry heat sterilization are:

1) a long time, starting from heating, the sterilization process, to cooling the sterilized equipment.
2) there may be damage to the packaging materials or some of the items themselves as a result

3) high temperature used.
4) monitoring and control of sterilization conditions in sterilized packages can be very time consuming.
5) Because of the high temperatures, dry heat sterilizers provide the greatest potential for personal injury after contact with the sterilizing part or the device being processed, compared to other sterilization processing facilities.

b. Wet heat sterilization

Wet heat using temperatures above 100oC is done with steam, namely using an autoclave, a device similar to a pressure cooker with pressure regulator and safety. The principle of the autoclave is that coagulation occurs faster in a wet state than in a dry state. This sterilization process with an autoclave can kill microorganisms by denaturing or coagulating proteins in enzymes and cell membranes of microorganisms. This process can also kill bacterial endospores. Steam sterilization involves the use of pressurized steam, applied at a certain temperature for the right time. Sterilization occurs as condensation heat is transferred to the load causing it to heat up rapidly. Sterilized equipment must be wrapped and packaged and completely dry prior to removal from the autoclave and this procedure must be kept in place to monitor the sterilization process. Heating time depends on the steam pressure used, as well as the size and type of object to be sterilized. In this way the vegetative and spore forms will die, thus achieving complete sterilization.

Wet heat sterilization by boiling. Moist heat sterilization can be carried out by immersion in boiling water. This method has long been done by people. Boiling water at a pressure of 1 atmosphere, a temperature of 100oC, can kill vegetative bacteria within 5-15 minutes, spore forms will die within 1-6 hours. Bacterial endospores are generally resistant to this method of boiling. Wet heat sterilization is used for heat sensitive materials, for the food industry at a temperature of 60-80oC, milk at 63oC for 30 minutes. Wet hot boiling time is 15-30 minutes and it would be better if 1-3% Na2CO3 solution was added, because it has the power to destroy spore walls. Tools that are often sterilized in this way include: test tubes, glass objects, and petri dishes. In everyday life, the method of disinfection by boiling is used to disinfect milk bottles or teats for drinking.

2. Definition of Disinfection

Disinfection is an action intended to reduce the number of pathogenic microorganisms on instruments by eliminating and/or killing pathogens. Bacterial spores are not always killed by disinfection, but their numbers can be reduced as a result of the cleaning process. Disinfection is considered as intermediate level infection control. Disinfectants are chemical substances used to kill pathogenic microbes attached to medical equipment, for example, tools used in operating rooms, operating tables, and so on. Meanwhile, antisepsis is the process of preventing infection by inactivating or killing micro-organisms by chemical means. Materials that are antiseptic are called antiseptics. These antiseptics do not damage host tissue and are not as toxic as disinfectants. Substances that can kill microorganisms generally have names with the ending-side (cide), for example, fungicides, bactericides, germicides, and others.

Some important things that need to be considered in terms of disinfection include:

a. Disinfection can be done by chemical or thermal (heat) means. Heat disinfection, when applied to heat-resistant tools, the results will always be better than using chemical disinfection.
b. Disinfection by any means is not as good as sterilization, namely when applied to equipment used in invasive procedures. If sterilization is possible, then sterilization is preferable to high-level disinfection.
c. Disinfection should be preceded by mechanical or manual cleaning.
d. The disinfection method selected must be suitable for the particular equipment and suitable for the intended use of the equipment.

The effectiveness of disinfection depends on several things, including:

a. the amount or load of microorganisms present on the equipment to be disinfected.
b. biocidal action of the disinfectant or disinfectant process (chemical concentration, pH, temperature, water quality, and humidity).
c. duration of exposure or effective contact between the biocidal agent and the microorganism (presence of fissures, lumens, joints).
d. biocidal agents and appropriate apparatus for the item being disinfected. A number of

The ideal disinfection criteria need to be considered, including:

a. Acts quickly to inactivate microorganisms at room temperature
b. Its activity is not affected by organic matter, pH, temperature and humidity
c. Not toxic to animals and humans
d. Not corrosive
e. Colorless and leaves a stain
f. No smell
g. It is biodegradable/easy to decompose
h. Stable solution
i. Easy to use and economical
j. Broad spectrum activity

A. Types of Disinfection

There are 3 levels of disinfection (Company, 2021)

1. High-level disinfection, killing all organisms except bacterial spores;
2. Moderate level of disinfection, kills bacteria, most fungi except for bacterial spores
3. Low-level disinfection, kills most bacteria, some viruses, and some fungi, but cannot kill resistant microorganisms, such as tubercle bacilli and bacterial spores.

High-Level Disinfection by boiling

a) Start counting the time when the water starts to boil
b) Boil for 20 minutes in a closed pot
c) All tools must be submerged
d) Do not add any tools to boiling water
e) Use the tool as soon as possible or store it in a closed and dry container that has been treated with DTT, a maximum of one week
f) According to the standard time required for changing the disinfection conditions by thermal means using hot water circulation of 70oC for 100 minutes, or 75oC for 30 minutes, or 80oC for 10 minutes, or 90oC for 1 minute.

High-Degree Disinfection by steaming

a) Steam the tool for 20 minutes
b) Lower the heat so that the water is still boiling
c) The time is calculated from the moment the steam comes out
d) Do not use more than 3 steam pots
e) Dry in a DTT container

High-Level Disinfection with chemicals

a) Chemical disinfectant for HLD
b) Chlorine 0.1%, Formaldehyde 8%, Glutaraldehyde 2%
c) Perform decontamination by washing and rinsing then dry
d) Soak all tools in a disinfectant solution for 20 minutes
e) Rinse with water that has been boiled and air dried
f) Use immediately or store in a dry container

Moderate Disinfection Level (MDL)

Moderate disinfection kills bacteria, most fungi except for bacterial spores.

Low Level Disinfection (LLD)

Low-level disinfection can kill most bacteria, some viruses, and some fungi but not resistant microorganisms such as tubercle bacilli and bacterial spores.

Low level disinfectants can be divided into 2 groups:

1) The first class of disinfectants that do not kill the HIV and Hepatitis B viruses: Klorhexidine (Hibitane, Savlon)., Cetrimide (Cetavlon, Savlon)., Phenols (Dettol). Example for Savlon solution, prepare: Savlon and measuring cup. Method: A bucket/basin filled with enough water 0.5% savlon solution 5 cc savlon put in 1 liter of water 1% savlon solution 10 cc savlon put in 1 liter of water Use 0.5% savlon for washing hands 1% savlon for soaking equipment
2) The second group of disinfectants kills the HIV and Hepatitis B viruses.
    a) Disinfectants that release chlorine. Examples: Sodium hypochlorite (bleach, eau de javel), Chloramine (Sodium tosylchloramide, Chloramine T) Sodium Dichloroisocyanurate (NaDDC), Calcium hypochlorite (chlorinated soda, bleaching powder)
    b) Disinfectants that release Iodine, for example: Povidone Iodine (Betadine, Weak Iodine) Alcohol: Isopropyl alcohol, methylated spirit,

ethanol. Aldehydes: formaldehyde (formalin), glutaraldehyde (cidex). Other groups, for example: Virkon and H2O2 Chemical disinfection is the application of liquid chemicals to remove most pathogenic microorganisms (except bacterial spores) found on inanimate objects or surfaces. Liquid disinfection has lower antimicrobial power than other sterilizers. Some examples of devices that are chemically disinfected are non-sterilizable endoscope devices, environmental surfaces, intravenous access devices, and specimen preservation. Disinfectants that are often used in the disinfection process include: Alcohol (ethyl and isopropyl alcohol) is a fast bactericidal, can function as a tuberculocidal, fungicide, and eradicate viruses, but does not function as sporicidal, and can denature proteins through its ability to dehydrate. The optimum concentration is 60-90% by volume.

Alcohol can be used for:

a. Sanitize the surface of the ampoule/vial before accessing it.
b. Disinfect cleaned surfaces (after initial cleaning with detergent and water), e.g., trolleys, counter tops, laboratory benches where necessary.
c. terilize the surface of some equipment, for example: stethoscope diaphragm, resuscitation mannequin.
d. Assists in drying some equipment surfaces.
e. Sterilize the skin before invasive procedures (see 'skin antisepsis').

Phenol (carboxylic acid) Phenol is widely used as a disinfectant and antiseptic. The phenol group is known to have antimicrobial activity which is bactericidal but not sporicidal. The effectiveness of phenol as a disinfectant at a concentration of 2-5% by denaturing proteins and damaging bacterial cell membranes and being active at acidic pH. Currently phenol is rarely used as an antiseptic because it can irritate the skin. The phenolic compound that is often used is cresol. Bisphenol Bisphenol is a compound derived from phenol. An example of bisphenol is hexachlorophene, an ingredient in Hisohex lotion, used as a microbial control procedure in surgical procedures in hospitals. Staphylococcus and Streptococcus are sensitive to hexachlorohene. Another type of bisphenol is triclosan, an ingredient in antibacterial soaps and toothpaste. The range of activity of triclosan is known to be quite wide, especially for Gram-positive bacteria and fungi. Biguanidines, for example, chlorhexidine, have a wide range of activity and

are used in the control of microorganisms on the skin and mucous membranes. The combination of chlorhexidine with detergent or alcohol is widely used to clean the skin and hands of clients, as well as medical teams before surgery. Halogens In particular, iodine and chlorine are fairly effective antimicrobials. Iodine is the oldest and most effective antiseptic against many types of bacteria, endospores, fungi, and some viruses. Iodine exists as a tinctura, which is a solution with an alcoholic solvent and as an iodophor. Iodophor has the antimicrobial properties of iodine, but is colorless and less irritating to skin and tissues. Chlorine (sodium hypochlorite) Sodium hypochlorite has broad spectrum antimicrobial activity, but is not active against organic matter. Its germicidal ability is due to hypochlorous acid which is formed when chlorine is added to water. Hypochlorous acid will oxidize proteins so that cell membranes are damaged and inactivation of microorganism enzymes occurs. Hypochlorites are unstable in dilution, corroding metallic materials and so they are not used for storage purposes. The treatment is carried out for at least 30 minutes. It is used for disinfection of water (chlorine), disinfection of laundry items, dental equipment, and clean environmental surfaces. Glutaraldehyde (relatively less irritating) 2% solution of glutaraldehyde (Cidex), glutaraldehyde is bactericidal, tuberculoid and virucidal within 10 minutes and is sporicidal within 3-10 hours. Glutaraldehyde is also the recommended disinfectant for high-level disinfection of heat-sensitive endoscopes (e.g., arthroscopes, hysteroscopes, laparoscopes and their accessories, cystoscopes and all other instruments entering a sterile location in the body), and preservation of dead bodies.

Low level disinfectant procedures:

a. Prepare tools (plastic containers according to size, disinfectant soap, 70% alcohol solution, dry cloth, or tissue paper
b. Do hand hygiene
c. Use personal protective equipment
d Rinse the medical device using running water
e. Soap equipment with disinfectant soap then dry
f. Spray 70% alcohol on gauze/tissue paper, wipe the equipment used
g. Remove personal protective equipment
h. Store in a clean and dry place

SUMMARY

Sterilization is a way to free something (tools, materials, media, etc.) from microorganisms whose presence is not expected, both pathogenic and pathogenic. Or as a process to free an object from all microorganisms, both vegetative and spore forms. In principle, sterilization can be done in 3 ways, namely mechanically, physically, and chemically. Errors in carrying out the sterilization process can be fatal because there will be disease transmission from one individual to another or even an acute infection of a susceptible host.

Disinfection is the process of removing all pathogenic microorganisms from non-living objects with the exception of bacterial endospores. Based on the type, disinfection is divided into three, namely high-level disinfection, medium-level disinfection, and low-level disinfection. Disinfection can be done in four ways, namely disinfection by washing, disinfection by rubbing, disinfection by soaking and disinfection by drying. There are various types of disinfectants, namely alcohol, glutaraldehyde, biguanide, phenol, and chlorsilenol. According to the process, the way disinfectants work is denaturation of microorganism proteins, deposition of proteins in protoplasm, oxidation of proteins, disrupting enzyme systems and processes, and modification of cell walls or membranes.

FORMATIVE TEST

1. Sterile is....
   A. Free from microorganisms
   B. Free from disease microorganisms
   C. Free of bacteria and viruses, not spores
   D. Spore-free
   E. Free from parasites

2. This method is used to preserve blood components, tissue preparations are....
   A. administration of formalin
   B. moderate heating
   C. cooling

D. warm up
E. giving ice

3. Hospital equipment made of metal that can be sterilized:
   A. Tweezers, syringes, chemical tubes, metal catheters
   B. Canule rectum, tracheal cannula, endotracheal cannula
   C. Tweezers, scissors, speculum, match.
   D. Metal catheter, gloves, gastric probe
   E. Metal catheters, rectal canules, tracheal canules

4. Absence of all forms of microbial life including spores, known as:
   A. Sanitation
   B. Disinfection
   C. Sterilization
   D. Decontamination
   E. Asepsis

5. Efforts to kill pathogenic microorganisms on tools and preparations, both routinely and not routinely carried out are called:
   A. Sterilization
   B. Asepsis
   C. Disinfection
   D. Disinfectant
   E. Decontamination

GLOSARRY

1. HLD = High Level Disinfection
2. MLD = Moderate Level Disinfection
3. LLD = Low Level Disinfection

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UNIT 5
HOSPITAL INFECTION ASSOCIATE (HIA'S)

LEARNING OBJECTIVES

1. Students can explain the definition of Healthcare-Associated Infections/HAIs).
2. Students can understand the risk factors for Healthcare-Associated Infections/HAIs).
3. Students can implement efforts to prevent Healthcare-Associated Infections/HAIs).

1. Definition of Healthcare Associated Infections

The WHO (World Health Organization) definition of HAIs (Health care Associated Infections) or HAIs is an infection in a patient in a hospital or other health care setting that has not yet appeared or is not in the incubation period when the patient first enters or occurs while the patient is being treated at home sick for more than 48 hours, which did not appear on admission. Infections acquired by patients during the period of treatment in hospitals or health facilities that only appear after the patient has been discharged, as well as infections in hospital staff (Rojas-García dkk., 2018). The most common types of HAIs that occur are blood stream infection (BSI), urinary tract infection (UTI), surgical site infection (SSI), pneumonia or ventilator associated pneumonia (VAP) and gastrointestinal (GI) nosocomial infection. The center for Disease Control and Prevention (CDC) defines HAIs as infections acquired by patients receiving treatment for other conditions or infections acquired by health workers while performing health care duties (Erb dkk., 2017).

Another definition of nosocomial comes from the Greek, from the word *nosos* which means disease and *comeo* means caring. *Nosokomion* means a place to treat/hospital. So, nosocomial infections can be interpreted as infections that occur in hospitals. Nosocomial infection is a cross infection that occurs in nurses or patients while being treated in a hospital. The most common types are surgical wound infections and urinary tract and lower respiratory tract infections (pneumonia). The highest rates occur in special care units, surgical and orthopedic wards and obstetric services (cesarean section). The highest levels are experienced by elderly patients, those with decreased immunity (HIV/AIDS, use of tobacco products, use of chronic corticosteroids), TB that is resistant to various drugs and those with severe congenital diseases. Meanwhile, according to (Ministry of Health RI, Guidelines for Hospital Sanitation in Indonesia, (Bardi dkk., 2021).

a. At the time the patient was admitted to the hospital, there were no clinical signs of the infection under study.
b. At the time the patient was admitted to the hospital, he was not in the incubation period of the infection.
c. These special signs of infection begin to appear at least 3 x 24 hours after starting the treatment period.
d. Infection in the same location but caused by different microorganisms.

2. Risk Factors

WHO divides several risk factors that increase the risk of HAIs into two, the first is which is a risk factor that exists even though the available facilities are adequate:

a. Prolonged and improper use of invasive equipment;
b. High risk procedures;
c. Lowered immune state and severity of underlying disease in the patient; − Improper application of isolation standards and techniques. Several risk factors are more specific to settings with limited facilities:
d. Adequate environmental hygiene;
e. Inadequate infrastructure;
f. Inadequate equipment;
g. Lack of Human Resources (HR);

h. Lack of knowledge and application of the basics of infection prevention;
i. wrong procedure;
j. Lack of knowledge regarding the safety of injection techniques and blood transfusions;
k. There are no local or national guidelines.

There are also HAIs risk factors which divide it into two, namely, intrinsic factors and extrinsic factors. Factors including intrinsic include: Severity of the underlying disease, endogenous flora, age, genetic syndromes, immunocompromised conditions and malnutrition. The use of invasive equipment (mechanical ventilators, central venous catheters and urinary catheters), irrational use of antibiotics and overcrowded environments are extrinsic risk factors

3. Prevention Efforts

Efforts to prevent the occurrence of HAIs must be able to protect patients, visitors, and staff, because they are at risk for contracting infectious diseases. Prevention and control of HAIs is carried out by cutting the chain of transmission, namely by cutting:

a. Sources of transmission: focus on sources of pathogenic microbes and how to eliminate these sources.
    1) The environment as a source of transmission: prevention with environmental hygiene and sanitation.
    2) Officers as a source of transmission: health condition of officers, hand washing.
    3) Food/drink as a source of transmission: processing and presentation must be hygienic.
    4) Medical equipment as a source of transmission: carry out a good disinfection and sterilization process.
    5) Other sufferers as a source of infection: isolating the source of infection
b. The object of transmission of patients who are in the room/ward must be protected by carrying out protective isolation, using personal protective equipment (PPE) for officers, limiting the entry and exit of officers in the room/ward of treatment, and visitors must have a permit.

c. Ways of transferring pathogenic microbes Prevention of the transfer of pathogenic microbes from sources of transmission to patients, namely by: using PPE for officers, every procedure and medical action must be with the right indications (Alli, 2008).
d. Decontamination, namely efforts to reduce or eliminate contamination by microorganisms in people, equipment, materials, and space through disinfection and sterilization by physical and chemical means.
e. Aseptic, action taken in health services to describe the efforts made to prevent the entry of microorganisms into the body. This aseptic measure aims to reduce or eliminate the number of microorganisms, both on the surfaces of living and nonliving objects so that medical devices can be used safely.
f. Antiseptic, which is an effort to prevent infection by killing or inhibiting the growth of microorganisms on the skin and other body tissues.
g. Washing, namely removing all foreign objects by flowing water.
h. Disinfection, namely the act of reducing or eliminating the number of disease-causing microorganisms by physical and chemical means. This disinfection can be done at a high level such as by boiling or by dissolving it with certain chemicals. However, this action still leaves bacterial endospores.
i. Sterilization, namely the action to eliminate all microorganisms including endospore bacteria. Sterilization must be carried out for tools that come in direct contact with the bloodstream or other body fluids and tissues. Sterilization can be done using high pressure steam (autoclave), dry heating (oven), chemical and physical sterilization.

SUMMARY

Infectious diseases acquired in hospitals some time ago were referred to as Nosocomial Infections (Hospital Acquired Infections) now the mention has been changed to Healthcare-Associated Infections or “HAIs” (Healthcare-Associated Infections), with a broader meaning, namely the incidence of non-communicable infections. only from hospitals, but also from other health care facilities.

This infection can be prevented by various efforts that can be made by nurses and disking with adequate infrastructure and policies from related health services. These preventive efforts must be made to improve patient safety during treatment.

FORMATIVE TEST

1. A nurse needs to identify the occurrence of HAIs in her patient, what do nurses need to pay attention to?
   a. At the time the patient was admitted to the hospital, clinical signs of the infection under study were found.
   b. At the time the patient was admitted to the hospital, he was not in the incubation period of the infection.
   c. These special signs of infection begin to appear at least 1 x 24 hours after starting the treatment period.
   d. Infection in a different location but caused by the same microorganism.
   e. There were no complaints reported by the patient and family.

2. Efforts to prevent the occurrence of HAIs include decontamination. What steps are taken for decontamination?
   a. The act of eliminating contamination by microorganisms of persons, equipment, materials and spaces through disinfection and sterilization by physical and chemical means.
   b. Actions taken in health services to describe the efforts made to prevent the entry of microorganisms into the body.
   c. Infection prevention measures by killing or inhibiting the growth of microorganisms on the skin and other body tissues.
   d. The act of removing all foreign matter by running water.
   e. The act of reducing or eliminating the number of disease-causing microorganisms by physical and chemical means.

3. Nurses disinfect before administering parenteral medications to their patients. What do nurses do?
    a. Infection prevention measures by killing or inhibiting the growth of microorganisms on the skin and other body tissues.
    b. The act of eliminating contamination by microorganisms of persons, equipment, materials and spaces through disinfection and sterilization by physical and chemical means.
    c. The act of reducing or eliminating the number of disease-causing microorganisms by physical and chemical means.
    d. Actions taken in health services to describe the efforts made to prevent the entry of microorganisms into the body.
    e. The act of removing all foreign matter by running water.

4. Nurses need to pay attention to risk factors for HAIs, including external factors, including:
    a. High risk procedures;
    b. Lowered immune state and disease severity;
    c. Wrong procedure;
    d. Inadequate infrastructure;
    e. Lack of infection prevention knowledge.

5. Nurses provide education to sufferers and families about antiseptic actions that need to be carried out while in the hospital. The following statements about antiseptics are true:
    a. Efforts for sufferers and families to maintain personal hygiene while in the hospital environment.
    b. The act of removing all foreign matter by running water.
    c. Efforts are made to increase the body's immunity while in the hospital environment to prevent infection.
    d. Measures to prevent the entry of all bacteria into the body while in the hospital.
    e. Efforts to kill or inhibit the growth of microorganisms on the skin and other body tissues.

GLOSARRY

1. HAIs: Health care Associated Infections) or HAIs is an infection in a patient in a hospital
2. BSI : Blood stream infection
3. UTI : Urinary tractus infection
4. SSI : Surgical site infection
5. VAP: Ventilator associated pneumonia
6. GI : Gastro intestinal

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UNIT 6
INFECTION PREVENTION AND CONTROL

LEARNING OBJECTIVES

1. Students can explain the meaning of infection prevention and control
2. Students can understand the chain of infection transmission
3. Students can break the chain of transmission

1. Definition of Infection Prevention and Control

Infection prevention and control is an effort to ensure protection for everyone against the possibility of contracting infection from sources in the public and when receiving health services in various health care facilities. Infection Prevention and Control is an effort to prevent and minimize the occurrence of infection in patients, staff and visitors (Asokan dkk., 2019).

The risks and activities in the Infection Control Prevention program may differ from hospital to hospital, depending on the hospital's clinical activities and services, patient population served, geographic location, number of patients and number of staff. Program priorities should reflect the identified risks, global developments and local communities, and the complexity of the services provided.

Implementation of the infection prevention and control program is managed by the Infection Control Prevention Committee/Team determined by the Hospital Director. In order for IPC activities to be carried out effectively, policies and procedures, staff training and education are needed, methods for identifying the risk of infection proactively in individuals and the environment and coordination with all parts of the hospital (Peter dkk., 2018).

The focus of infection prevention and control standards includes: Implementation of Prevention of Infection Control in Hospitals, Infection Control Prevention Program, risk assessment, medical equipment and/or medical

consumables, environmental hygiene, linen management, infectious waste, infection risk food services in construction and renovation, infection transmission, hand hygiene, quality improvement and educational programs, education, education and training.

2. Purpose

The goal of an infection prevention and control program is to identify and reduce the risk of infection being acquired and transmitted among patients, staff, healthcare workers, contract workers, volunteers, students and visitors (Asokan dkk., 2019).

1. Implementation of Prevention of Infection Control in Hospitals

1) Infection Control Prevention Standard 1 (Indonesia, 2017)

Hospital establishes an infection control prevention committee/team to conduct assessment, planning, implementation, monitoring, and evaluation of infection control prevention activities in the hospital as well as providing resources to support infection prevention and control programs.

2) Infection Control Prevention Standard 1.1

The hospital director establishes a PPI Committee/Team to manage and supervise infection control prevention activities according to the type of service, needs, workload, and/or hospital classification according to laws and regulations. The IPC Committee/Team is led by a medical professional who has clinical experience, infection prevention and control experience and leadership so that they implement, and can direct, measure change.

The qualifications of the Chairperson of the Prevention Committee/Team for infection control can be met through education and training, certification, or a license. The infection control prevention committee/team involves clinical and non-clinical staff, including infection control prevention nurses, staff in facility maintenance, kitchen, housekeeping, laboratories, pharmacists, epidemiologists, statisticians, microbiologists, sterilization staff (CSSD) as well as general staff. It depends on the size of the hospital and the complexity of the services according to the laws and regulations. The infection control Prevention Committee/team establishes mechanisms and coordination including communicating with all parties

in the hospital to ensure the program is running effectively and continuously. Coordinating mechanisms are established periodically to carry out infection control prevention programs by involving hospital leaders and infection control prevention committees/teams. The coordination includes:

a) Establish criteria for defining health care-associated infections;
b) Establish methods of data collection (surveillance);
c) Create a strategy to deal with infection control Prevention risks, and reporting them;
d) Communicating with all units to ensure that the program is ongoing and proactive.

The hospital determines infection control prevention nurses, namely nurses who work full time and based on the number and qualifications according to the size of the hospital, the complexity of activities, the level of risk, program coverage and laws and regulations. The nurse's educational qualifications are at least Diploma in nursing and have attended nurse training in infection control prevention.

3) Elements of Infection Control Prevention 1

a) The hospital director has established infection control prevention regulations including an overview.
b) The director of the hospital has established an infection control prevention committee/team to manage and supervise PPI activities in the hospital.
c) The hospital has implemented a coordination mechanism that involves hospital leadership and infection control prevention committees/teams to carry out infection control prevention programs according to the aims and objectives.
d) The hospital director provides resource support for the implementation of infection control prevention activities including but not limited to the aims and objectives.

4) Elements of Assessment of Infection Control Prevention 1.1

a) The hospital assigns full-time infection control prevention nurses based on the number and qualifications according to the size of the hospital, complexity of activities, level of risk, program coverage and in accordance with statutory regulations.

b) There is evidence that infection control prevention nurses supervise all infection prevention and control activities in the hospital.

2. Infection Control Prevention Program

1) Infection Control Prevention Standards

The hospital develops and implements an integrated and comprehensive infection control prevention program to prevent infection transmission related to health services based on a proactive risk assessment every year.

2) Purpose and Objectives of Infection Control Prevention

In principle, the incidence of HAIs can be prevented if health care facilities consistently implement the PPI program. The implementation of infection prevention and control in health care facilities aims to protect patients, health workers, visitors who receive health services and the public in their environment by breaking the cycle of transmission of infectious diseases through isolation precautions consisting of standard and transmission-based precautions.

a) The eleven standard precautions that must be applied in hospitals are: (1) Hand hygiene (2) Personal protective equipment (3) Decontamination of patient care equipment (4) Environmental control (5) Waste management (6) Linen management (7) Protection medical staff (8) Placement of patients (9) Respiratory hygiene/coughing and sneezing etiquette (10) Safe injecting practices (11) Safe lumbar puncture practices.
b) Transmission Precautions
   Precautions based on transmission as an add. Standard Precautions are carried out before the patient is diagnosed and after the type of infection has been diagnosed. The types of precautions based on transmission are as follows: (1) Through contact (2) Through droplets (3) Through the air (Airborne Precautions).

3) Elements of Assessment of Infection Control Prevention 2

a) The hospital establishes an infection control prevention program policy consisting of standard precautions and transmission precautions according to the aims and objectives above.

b) The hospital evaluates the implementation of the infection control prevention program.

3. Risk Assessment

1) Infection Control Prevention Standard 3

The hospital conducts a proactive assessment every year as a basis for compiling an integrated infection control prevention program to prevent infection transmission related to health services.

2) Purpose and Objectives of Infection Control Prevention 3

The risk of infection varies between hospitals, depending on the size of the hospital, the complexity of its services and clinical activities, the patient population served, geographic location, patient volume, and number of staff. The hospital proactively annually conducts an infection control risk assessment of the level and trend of health service infections which will become the priority focus of the Infection Control Prevention Program in efforts to prevent and reduce risk.

The risk assessment includes but is not limited to:

a) Epidemiologically important infections for which surveillance data is available;
b) Process activities in areas with a high risk of infection;
c) Services that use equipment that is at risk of infection;
d) High risk procedures/actions;
e) Clean and dirty linen distribution services;
f) Tool sterilization services;
g) Surface and environmental cleanliness;
h) Linen/laundry management;
i) Waste management;
j) Provision of food; And
k) Management of the mortuary

Surveillance data is collected at the hospital periodically and analyzed quarterly. This surveillance data includes:

a) Respiratory tract such as procedures and actions related to intubation, mechanical ventilation assistance, tracheostomy, and others;
b) Urinary tract such as catheters, rinsing urine, etc.;

c) Intravascular invasive devices, verifer venous channels, central venous channels, and others
d) Location of surgery, treatment, wound dressing, aseptic procedures, etc.;
e) Diseases and organisms that are important from an epidemiological point of view such as Multidrug Resistant Organisms and virulent infections;
f) The emergence of new infectious diseases or re-emerging infectious diseases in the community (Emerging and or Re-Emerging Disease).

Based on the results of the infection control risk assessment, the PPI Committee/Team compiles a hospital infection control prevention program every year. The infection prevention and control program must be comprehensive, covering the risk of infection for patients and staff including:

a) Identification and handling:
   (1) Epidemiologically important infection issues such as surveillance data
   (2) Infections that may affect patients, staff, and visitors:
b) Cross-unit strategy: activities in areas with high risk of infection;
c) Hand hygiene;
d) Supervision to increase the safe use of antimicrobials and ensure the safe preparation of drugs;
e) Investigation of outbreaks of infectious diseases;
f) Implementation of vaccination programs for staff and patients:
g) Tool sterilization services and services that use equipment that is at risk of infection;
h) Surface cleaning and environmental hygiene;
i) Linen/laundry management;
j) Waste management;
k) Provision of food;
l) and Management in the mortuary.

The hospital also conducts a comparative review of incidence rates and trends in other equivalent hospitals. Knowledge related to infection control through clinical practice guidelines, antibiotic monitoring programs, infection control prevention programs and limiting the use of unnecessary invasive devices have been applied to significantly reduce infection rates. Program managers implement evidence-based interventions to minimize the risk of infection.

Ongoing monitoring of identified risks and risk reduction interventions is monitored for effectiveness, including progressive and ongoing improvements, and whether program objectives need to be changed based on the successes and challenges that emerge from the monitoring data.

3) Elements of Assessment of Infection Control Prevention 3

a) The hospital has proactively carried out an annual infection control risk assessment of the level and trend of health care infections according to points a)–k) on the aims and objectives and then used the data to make and determine priorities/focus on the infection control Prevention Program
b) The hospital has carried out periodic data surveillance and analyzed every quarter covering a)–f) in the aims and objectives.

4. Medical Equipment and/or Consumable Medical Materials

1) Infection Control Prevention Standard 4

The hospital reduces the risk of infection associated with medical devices and/or medical consumables by ensuring proper hygiene, disinfection, sterilization, and storage.

2) Purpose and Objectives of Infection Control Prevention 4

Procedures/actions that use consumable medical equipment and/or medical materials, can be the main source of pathogens that cause infection. Errors in cleaning, disinfecting, or sterilizing, as well as improper use or storage can pose a risk of infection transmission.

Health workers must follow the standards set in carrying out cleaning, disinfection, and sterilization. The level of disinfection or sterilization depends on the category of medical equipment and/or medical consumables:

a) Grade 1–Critical: Objects inserted into normally sterile tissue or into the vascular system and requiring sterilization.
b) Grade 2–Semi-critical: Items that touch mucous membranes or non-intact skin and require high-level disinfection.
c) Level 3–Non-critical: Items that touch intact skin but not mucous membranes, and require low-level disinfection.

Additional cleaning and disinfection is required for medical equipment and/or medical consumables used on patients isolated as part of transmission-based precautions. Cleaning, disinfection, and sterilization can be performed in the CSSD area or, in other areas of the hospital, under supervision. Cleaning, disinfection, and sterilization methods are standardized and uniform in all areas of the hospital. Staff processing medical devices and/or BMHP must receive training. To prevent contamination, clean and sterile medical equipment and/or BMHP are stored in designated storage areas, clean and dry and protected from dust, moisture, and drastic changes in temperature. Ideally, medical equipment and medical consumables are stored separately and sterile storage areas have limited access.

3) Elements of Assessment of Infection Control Prevention 4

a) The hospital has implemented sterilization processing according to statutory regulations.
b) Staff who process medical equipment and/or medical consumables have been given training in cleaning, disinfection and sterilization and have received supervision.
c) Methods of cleaning, disinfection and sterilization are carried out uniformly in all areas of the hospital.
d) Clean and sterile medical equipment and/or consumable medical materials are stored properly in designated storage areas, clean and dry and protected from dust, moisture, and extreme changes in temperature.
e) If sterilization is carried out outside the hospital, it must be carried out by an institution that has quality certification and there is cooperation that guarantees compliance with the sterilization process according to the invitation.

4) Infection Control Prevention Standard 4.1

The hospital identifies and establishes a process for managing expired medical devices and/or medical consumables and reusing single-use devices when permitted.

5) Purpose and Objectives of Infection Control Prevention 4.1

The hospital establishes regulations to carry out the process of managing consumable medical equipment and/or medical goods that have expired. The hospital determines the reuse of disposable medical equipment and/or consumable medical items in accordance with statutory regulations and professional standards. Some disposable medical devices and/or BMHP can be used again with certain specific requirements. The hospital establishes provisions regarding the reuse of disposable medical devices in accordance with statutory regulations and professional standards including:

a) Reusable tools and materials;
b) The maximum number of reuses for each specific tool;
c) Identification of damage due to use and cracks that indicate the tool cannot be used;
d) The process of cleaning each tool immediately after use and following a clear protocol;
e) Inclusion of patient identification on consumable medical materials for hemodialysis;
f) Recording of consumable medical materials that are reused in the medical record; and
g) Evaluation to reduce the risk of infection of reused consumable medical materials.

There are 2 (two) risks if you reuse disposable tools. There is a high risk of infection and there is also a risk that the performance of the equipment is insufficient or cannot guarantee its sterility and function. Monitoring is carried out on the process for giving or withdrawing approval for the reuse of reprocessed single-use medical devices. The list of single-use items approved for reuse is regularly checked to ensure that it is accurate and up-to-date.

6) Measurable Elements of Infection Control Prevention 4.1

a) The hospital determines medical equipment and/or BMHP that can be reused including a)–g) in the aims and objectives.
b) The hospital uses a standardized process to determine when re-used medical equipment and/or BMHP is unsafe or unfit for reuse.

c) There is evidence of monitoring, evaluation, and follow-up on the implementation of reuse of medical equipment and/or BMHP including a)–g) in the aims and objectives.

5. Environmental Hygiene

1) Infection Control Prevention Standard 5

The hospital identifies and implements recognized IPC standards for cleaning and disinfection of surfaces and environments.

2) Purpose and Objectives of Infection Control Prevention 5

Pathogenic germs on surfaces and throughout the environment play a role in the occurrence of hospital-acquired illness in patients, staff, and (hospital-acquired illness) visitors. The environmental cleaning and disinfection process include routine environmental cleaning, namely daily cleaning of patient rooms and treatment areas, waiting rooms and other public spaces, staff workspaces, kitchens, and so on.

The hospital defines the frequency of cleaning, the cleaning equipment and fluids used, the staff responsible for cleaning, and when an area requires more frequent cleaning. Terminal cleaning is carried out after patient discharge; and may be increased if the patient is known or suspected to have a communicable infection as indicated by infection prevention and control standards. The results of the risk assessment will determine which high-risk areas require additional cleaning and disinfection; for example, the operating room area, CSSD, neonatal intensive care unit, burn unit, and other units. Environmental cleaning and disinfection is monitored for example, complaints and praise from patients and families, using fluorescent markers to check for residual pathogens.

3) Elements of Assessment of Infection Control Prevention 5

a) The hospital implements surface and environmental cleaning and disinfection procedures according to Infection Control Prevention standards
b) The hospital carries out additional cleaning and disinfection in high-risk areas based on the results of the risk assessment
c) The hospital has monitored the environmental cleaning and disinfection process.

6. Linen Management

The hospital implements linen/laundry management according to PPI principles and laws and regulations

1) Purpose and Objectives of Infection Control Prevention 6

Linen and laundry handling in hospitals includes collection, sorting, washing, drying, folding, distribution and storage. The hospital identifies areas where staff are required to wear PPE according to ICP principles and laws and regulations.

2) Elements of Assessment of Prevention of Infection Control 6

a) There is a linen/laundry management work unit that organizes management in accordance with statutory regulations.
b) ICP principles are applied to linen/laundry management, including sorting, transportation, washing, drying, storage and distribution.
There is evidence of supervision by IPCN on linen/laundry management in accordance with the Prevention of Infection Control principles.
c) Including if carried out by parties outside the hospital.

7. Infectious Waste

1) Infection Control Prevention Standards 7

Hospitals reduce the risk of infection through the management of infectious waste in accordance with laws and regulations

2) Infection Control Prevention Standard 7.1

The hospital determines the management of the mortuary and post-mortem room in accordance with statutory regulations

3) Infection Control Prevention Standard 7.2

The hospital determines the safe management of sharps and needle waste.

4) Purpose and Objectives of Prevention of Infection Control. 7, Prevention of Infection Control 7.1, Prevention of Infection Control 7.2

Every day hospitals produce a lot of waste, including infectious waste. Improper disposal of infectious waste can pose a risk of infection in the hospital. This is evident in the disposal of body fluids and materials contaminated with body fluids, the disposal of blood and blood components, and the disposal of waste from morgues and post mortem locations. The government has regulations related to handling infectious waste and liquid waste, while hospitals are expected to implement these provisions to reduce the risk of infection in hospitals.

The hospital carries out proper waste management to minimize the risk of infection through the following activities:

a) Management of infectious body fluid waste;
b) Handling and disposal of blood and blood components;
c) Processing of corpses and post-mortem examinations;
d) Liquid waste management;
e) Reporting of exposure to infectious waste.

One of the dangers of needle stick injuries is the transmission of blood-borne diseases. Improper management of sharps and needle waste is a safety concern for staff. Work habits greatly affect the risk of injury and potential exposure to disease. Identifying and carrying out practice activities based on valid evidence (evidence based) reduces the risk of injury due to needle sticks and sharp objects. Hospitals need to educate staff on how to safely handle sharps and needles. Proper disposal is by using a special storage container (safety box) that can be closed, puncture-proof, and leak-proof both at the bottom and on the sides in accordance with laws and regulations. This container must be available and easy to use by staff and the container must not be too full. Disposal of unused needles, scalpels and other sharps waste if not done properly will pose a risk to public health in general and especially to them working in waste management. Disposal of containers containing sharps waste at sea, for example, would pose a risk to society as containers could be damaged or opened. The hospital establishes adequate regulations covering all stages of the process, including identification of the type and proper use of containers, disposal of containers, and surveillance of the disposal process.

5) Elements of Assessment of Infection Control Prevention 7

a) The hospital has implemented hospital waste management to minimize the risk of infection which includes a)–e) on the aims and objectives.
b) Handling and disposal of blood and blood components according to regulations, monitored and evaluated, and followed up.
c) Reporting of exposure to infectious waste is in accordance with regulations and monitoring, evaluation and follow-up is carried out.
d) If waste management is carried out by parties outside the hospital, it must be based on cooperation with parties who have permits and quality certification in accordance with statutory regulations

6) Measurable Elements of Infection Control Prevention 7.1

a) Processing of corpses and post-mortem examinations in accordance with regulations.
b) There is evidence that morgue and post-mortem rooms have been managed in accordance with statutory regulations. There is evidence of monitoring and evaluation, as well as follow-up of adherence to the principles of Infection Control Prevention
c) In accordance with statutory regulations.

7) Infection Control Prevention Standard 7.2

The hospital determines the safe management of sharps and needle waste.

8) Purpose and Objectives of Infection Control Prevention 7.2

One of the dangers of needle stick injuries is the transmission of blood-borne diseases. Improper management of sharps and needle waste is a safety concern for staff. Work habits greatly affect the risk of injury and potential exposure to disease. Identifying and carrying out practice activities based on valid evidence (evidence based) reduces the risk of injury due to needle sticks and sharp objects.

Hospitals need to educate staff on how to safely handle sharps and needles. Proper disposal is by using a special storage container (safety box) that can be closed, puncture-proof, and leak-proof both at the bottom and on the sides in accordance with laws and regulations. These containers must be readily available and easy for staff to use and they must not be overfilled. Disposal of unused needles, scalpels and other sharp waste if not done properly will pose a

risk to public health in general and especially to those working in waste management. Disposal of containers containing sharps waste at sea, for example, would pose a risk to society as containers could be damaged or opened.
The hospital establishes adequate regulations including:

a) All stages of the process including identification of the type and proper use of the container, disposal of the container, and surveillance of the disposal process.
b) Reports of needle sticks and sharp objects.

9) Measurable Elements of Infection Control Prevention 7.2

a) Sharps and needles have been collected, stored in a container that is not transparent, does not leak, has a yellow color, is labeled as infectious, and is used only once in accordance with statutory regulations.
b) If the management of sharps and needles is carried out by parties outside the hospital, it must be based on cooperation with parties who have permits and quality certification in accordance with statutory regulations.
c) There is documentary evidence of waste sharps and needles.
d) There is evidence of implementation of supervision and monitoring by ICPN on the management of sharps and needles in accordance with ICP principles, including when carried out by parties outside the hospital.
e) There is evidence of implementation of monitoring of compliance with PPI principles according to regulations.

8. Food Service

1) Infection Control Prevention Standard 8

The hospital reduces the risk of infection associated with the provision of food services.

2) Purpose and Objectives of Infection Control Prevention 8

Food storage and preparation can lead to illnesses such as food poisoning or food infection. Food-related illnesses can be very dangerous and even life-threatening in patients who are already weakened by illness or injury. Hospitals must provide food and nutritional products safely, namely storing and preparing food at certain temperatures that can prevent the development of bacteria. Cross

contamination, especially from raw food to cooked food is one source of food infection.

Cross contamination can also be caused by contaminated hands, table surfaces, mats for cutting food, or cloths used to wipe table surfaces or dry dishes. In addition, the surface used for preparing food; cutlery, cooking utensils, pots and pans used to prepare food; and also, the trays, plates and cutlery used for serving food can also pose a risk of infection if not properly cleaned and sanitized.

The kitchen building must be in accordance with the provisions which include the flow from food ingredients entering until the food is finished, a place for storing dry and wet food ingredients with the required temperature, a place for processing preparation, a place for processing, distribution and distribution in accordance with laws and regulations including floor cleanliness.

Based on the foregoing, hospitals must establish regulations that include:

a) Food services in hospitals starting from the management of food ingredients, kitchen sanitation, food, cooking utensils, and cutlery to reduce the risk of infection and cross-contamination;
b) Building standards, kitchen facilities and pantry in accordance with laws and regulations, including when food is taken from other sources outside the hospital.

3) Elements of Assessment of Infection Control Prevention 8

a) The hospital stipulates regulations regarding food service in the hospital
b) There is evidence of the implementation that food storage, processing, distribution/portioning, and distribution of food are in accordance with statutory regulations.
c) There is evidence of storage of food and nutritional products with due observance of environmental health including sanitation, temperature, lighting, humidity, ventilation, and security to reduce the risk of infection.

9. Risk of Infection in Construction and Renovation

1) Infection Control Prevention Standard 9

Hospitals reduce the risk of infection in facilities related to mechanical and engineering controls as well as during demolition, construction and building renovations.

2) Purpose and Objectives of Infection Control Prevention 9

Mechanical and technical controls (mechanical and engineering controls) such as positive pressure ventilation systems, biological safety cabinets, laminary airflow hoods, thermostats in refrigerators, and water heaters for sterilizing dishes and kitchen utensils are examples of the important role environmental control standards must be implemented to create good sanitation which further reduces the risk of infection in the hospital. Demolition, construction, renovation of buildings in any area of the hospital can be a source of infection. Exposure to construction dust and debris, noise, vibration, dirt, and other hazards can pose a potential hazard to lung function and the safety of staff and visitors.

The hospital uses risk criteria to address the impact of renovations and new building construction on air quality requirements, infection prevention and control, equipment standards, noise and vibration requirements, and emergency procedures. To reduce the risk of infection, hospitals need to have regulations regarding infection control risk assessment (ICRA) for demolition, construction and renovation of buildings in any area of the hospital which includes:

a) Identification of the type/type of project activity construction with the criteria;
b) Identification of patient risk groups;
c) Matrix of infection control between patient risk groups and type of activity construction;
d) Project to define class/level of infection;
e) Measures to control the level/class of infection;
f) Monitoring of implementation.

Therefore, hospitals should have mechanical and engineering controls for facilities which include:

a) Positive pressure ventilation system;
b) Biological safety cabinet;
c) Laminary airflow hoods;
d) The thermostat in the refrigerator;
e) and water heaters for sterilizing dishes and kitchen tools.

3) Elements of Assessment of Infection Control Prevention 9

a) The hospital implements minimum mechanical and engineering controls for the facilities listed in a)–e) for the purposes and objectives.

b) The hospital implements an infection control risk assessment (ICRA) which at least includes a)–f) in the aims and objectives.
c) The hospital has carried out an infection control risk assessment (ICRA) on all renovations, construction, and demolition in accordance with regulations

10. Transmission of Infection

1) Infection Control Prevention Standard 10

The hospital provides ICP for barrier precautions and isolation procedures for communicable diseases to protect immunocompromised patients and transfer patients with airborne diseases within the hospital and out of the hospital as well as short-term placement if the hospital does not have rooms with negative pressure (natural and mechanical ventilation).

2) Infection Control Prevention Standard 10.1

The hospital develops and implements a process for managing outbreaks of air-borne infectious diseases.

3) Purpose and Objectives of Prevention of Infection Control 10, Prevention of Infection Control 10.1

The hospital establishes isolation regulations and provides safety barriers and provides facilities. Regulations are set based on how the disease is transmitted and how to treat infectious patients or immuno-suppressed patients. Isolation regulations also provide protection to staff and visitors as well as the patient environment. (Also see PP 3) Airborne precautions are important to prevent transmission of long-lasting infectious bacteria in the air.

Patients with “airborne” infections should be placed in a negative pressure room. If the building structure does not allow building a room with negative pressure then the hospital can circulate air through a HEPA (high efficiency particulate air) filter system at a rate of at least 12 air changes per hour.

The hospital should establish a program to treat patients with “air-borne” infections in a short time if the HEPA system is not in place, including if there are many patients admitted with infectious infections. Proper cleaning of rooms every day during the patient’s stay in the hospital and cleaning again after the patient is

discharged must be carried out according to infection control standards or guidelines.

4) Measurable Elements of Infection Control Prevention 10

a) The hospital provides and places rooms for patients (immunocompromised) by law. with corresponding low immunity by regulation.
b) The hospital carries out the process of transferring airborne diseases patients in the hospital and outside the hospital in accordance with laws and regulations including in the emergency room and other rooms
c) The hospital has placed patients with “air-borne” infections in a short time if the hospital does not have rooms with negative pressure in accordance with statutory regulations, including in the emergency room and other rooms.
d) There is evidence of routine negative pressure room monitoring and patient placement.

5) Measurable Elements of Infection Control Prevention 10.1

a) The hospital implements a patient management process in the event of an outbreak of an airborne infectious disease.
b) The hospital provides an isolation room with negative pressure in the event of an outbreak in accordance with statutory regulations.
c) There is evidence that staff are educated about the management of infectious patients in the event of an outbreak of an air-borne infectious disease.

11. Hand Hygiene

1) Infection Control Prevention Standard 11

Hand hygiene using soap and disinfectants is an effective means of preventing and controlling infection.

2) Infection Control Prevention Standard 11.1

Gloves, masks, eye protection and other personal protective equipment are available and used appropriately when required.

3) Purpose and Objectives of Prevention of Infection Control 11 and Prevention of Infection Control 11.1

Hand hygiene, using personal protective equipment, and disinfectants are effective means of preventing and controlling infection. Therefore, it must be available at every patient care center that requires this item. The hospital establishes provisions regarding the places where this personal protective equipment must be available and conducts training on how to use it. Soap, disinfectant, towels/tissues, and other tools for drying are placed at the location where hand washing is carried out and hand disinfection procedures are carried out

4) Elements of Assessment of Infection Control Prevention 11

a) The hospital has implemented hand hygiene which includes when, where, and how to wash hands using soap (hand wash) and/or with disinfectant (hand rubs) as well as the availability of hand hygiene facilities.
b) Soap, disinfectant, and disposable tissues/towels are available at hand washing stations and places for hand disinfection.
c) There is evidence of the implementation of hand hygiene training for all employees including contract workers.

5) Measurable Elements of Infection Control Prevention 11.1

a) The hospital implements the use of personal protective equipment, a place that must provide personal protective equipment, and training on how to use it.
b) Personal protective equipment has been used properly and correctly.
c) The availability of personal protective equipment is sufficient in accordance with regulations.
d) There is evidence of training on the use of personal protective equipment for all employees including contract workers.

12. Quality Improvement and Educational Programs

1) Infection Control Prevention Standard 12

Infection control prevention activities are integrated with the PMKP Quality Improvement and Patient Safety) program by using epidemiologically important indicators for the hospital.

2) Purpose and Objectives of Infection Control Prevention 12

Hospitals use indicators as information to improve PPI activities and reduce the rate of health care-associated infections to as low a level as possible. Hospitals can use indicator data and information and compare with rates and trends in other hospitals. All service departments/units are required to participate in setting priorities that are measured (Riley, 2021) at the hospital level and the PPI program service department/unit level.

3) Elements of Assessment of Infection Control Prevention 12

a) There is an integrated data management system regulation between surveillance data and quality indicator data in the Quality Management Committee/Team

   There is evidence of regular meetings between the Quality Management Committee/Team and the Infection Control Prevention Committee/Team

b) to coordinate and be documented.

   There is evidence of submission of results of data analysis and recommendations of the Infection Control Prevention Committee/Team

c) to the Quality Management Committee/Team every three months.

13. Education, Education and Training

1) Infection Control Prevention Standard 13

The hospital conducts education about PPI to clinical and nonclinical staff, patients, patient families, and other officers involved in patient care.

2) Purpose and Objectives of Infection Control Prevention 13

For the IPC program to be effective, it is necessary to educate clinical and non-clinical staff about the ICP program when they are new to the hospital and

repeat it regularly. Education is attended by clinical and non-clinical staff, patients, patient families, traders, and visitors. Patients and families are encouraged to participate in the implementation of the ICP program.

Training is provided as part of the orientation to all new staff and regular retraining is carried out, or at least when there are changes to the policies, procedures and practices that guide the Infection Control Prevention program.
In education also presented the findings and trends in the size of the activity.

Based on the above, the hospital should establish an Infection Control Prevention training program which includes training for:

a) orientation of new employees, both clinical and non-clinical staff at the hospital level and in-service units;
b) clinical staff (care-giving professionals) periodically;
c) nonclinical staff;
d) patient and family;
e) and visitors.

3) Elements of Infection Control Prevention Assessment 13

a) The hospital establishes a training and education program on Infection Control Prevention which includes a)–e) in the aims and objectives.
b) There is evidence of implementation of training for all clinical and non-clinical staff as part of new employee orientation on IPC program regulations and practices.
c) There is evidence of implementation of education for patients, families, and visitors

SUMMARY

Infection prevention and control can reduce the risk of infection. Implementation of infection prevention and control programs. There are 13 infection control prevention standards including implementation of infection control prevention in hospitals, infection control prevention programs, risk assessment, medical equipment and/or consumable medical materials, environmental hygiene, linen management, infectious waste, food service, risk of infection in construction and renovation, infection transmission, hand hygiene, quality improvement and educational programs, education, education and training. Implementation of the

Infection Control Prevention program is managed by the PPI Committee/Team determined by the Hospital Director. PPC activities are carried out according to established policies and procedures. Evaluation of the implementation of Infection Control Prevention is carried out to identify reductions in infection cases and assess the effectiveness of Infection Control Prevention activities that have been implemented

FORMATIVE TEST

1. The nurse will carry out the activity of giving IM injections to patients using gloves. The nurse performs ICP activities at the standard:
   a. ICP program
   b. Environmental Hygiene
   c. Use of medical consumables
   d. Garbage manager
   e. Hand hygiene

2. The hospital manages linen according to PPI principles. Which of the following statements is true regarding linen handling?
   a. Linen is used only once
   b. Linen has its own transportation system
   c. Unsupervised linen management
   d. The process of cleaning linen must be sterilized
   e. Linen must be changed three times a day

3. The management of syringes that have been carried out must be managed properly. The following statements regarding the management of needles:
   a. The needle is placed in a closed box
   b. Dispose of needles in impermeable containers
   c. The needle is discarded with the alcohol cotton used
   d. The needle disposal site should be given a red color
   e. Needle disposal is done at certain times

4. The hospital has food service delivery standards to reduce infection, including:
    a. Food preparation at a certain temperature
    b. Food equipment uses a certain type
    c. Cutlery needs to be sterilized
    d. Food does not pose a risk of infection
    e. Cutlery can be disinfected with 70% alcohol

5. Prevention of infection in the hospital by wearing Personal Protective Equipment (PPE). The nurse will do the infusion, what ICP should be used?
    a. Mask, apron, and gloves
    b. Mask and gloves
    c. Just gloves
    d. Mask only
    e. Masks, aprons

GLOSARRY

1. ICP : Infection Control Prevention
2. HEPA: High efficiency particulate air
3. (ICRA : Infection control risk assessment (ICRA)
4. PPE :Personal Protective Equipment

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UNIT 7
NURSING HEALTH

LEARNING OBJECTIVES

1. Students can understand about nursing health
2. Students can apply activities about body alignment
3. Students can apply the needs of nutrition
4. Students can evaluate the need for rest

1. Concept of Nursing Health

a. Definition

Nursing health has a goal to improve health conditions. Nursing health discussed in this section is body alignment, nutrition, and rest. Good body mechanics starts with proper posture, meaning that there is a balance between groups and body parts in good alignment (position). Correct posture is the same in all standing, sitting, and lying positions. Good posture makes the body function properly in all activities. Nursing health related to nutrition is an element needed for body processes and functions. Energy needs are obtained from various nutrients, such as: carbohydrates, proteins, fats, water, vitamins, and minerals. Rest and sleep are basic needs that absolutely must be met by everyone, with adequate rest and sleep the new body can function optimally.

The health care system is an important part of improving health status. It is part of the health service system provided to the community. According to (Chan & Wong, 2020), in providing health services one must look at the level of health services to be provided, namely:

a. Health Promotion

   At this level health education is needed, for example, in improving nutrition, living habits, improving environmental sanitation and so on. such as providing good household water, improving how to dispose of garbage, sewage, waste water, personal hygiene, recreation, sex education, preparation for entering pre-marital life and preparation for menopause. This business is a service to health care in general.

b. Specific Protection

   The special protection referred to in this stage is the protection given to people or groups who are at risk of contracting a particular disease. This special protection may also be called artificial immunity. Immunization program as a form of health protection services. Prevention of accidents in public places and workplaces. Use of condoms to prevent transmission of HIV/AIDS, use of gloves and masks when working as health workers.

b. Early Diagnosis and Prompt Treatment

Prompt Treatment Early diagnosis and appropriate and prompt treatment are the first steps when someone becomes ill. The sooner treatment is given to the patient, the more likely it is to recover. Early diagnosis and appropriate and fast treatment can reduce medical costs and prevent defects that may arise. Some of the early detection efforts include looking for sufferers in the community by means of examinations, looking for all people who have been in contact with sufferers of the disease who have been in contact with sufferers of infectious diseases, providing health education to the community so that they can recognize the symptoms of the disease at an early level and immediately look for them. treatment.

a. Disability Limitation. Inadequate and perfect treatment can result in the person concerned being disabled or disabled.
b. Rehabilitation. Rehabilitation is a stage that is recovery in nature. Aimed at groups of people who are recovering so that it is hoped that they will completely recover from illness so that they can return to normal activities. This rehabilitation consists of:
   1) Physical rehabilitation, trying to get the patient to get as much physical improvement as possible.

2) Mental rehabilitation, is an effort to improve personal and social relationships in a satisfactory manner. This condition of improvement usually coincides with the occurrence of physical disabilities so that mental guidance is also carried out so that the patient survives in society.
3) Vocational social rehabilitation, efforts to improve so that patients who have recovered are still able to work to meet the common needs of the community.
4) Aesthesis rehabilitation is a repair effort made to restore a sense of beauty, even though the function of the organ itself cannot be restored. For example: the use of false eyes.

2. Body Alignment

a. Definition

Posture is the geometric arrangement of body parts in relation to other body parts. The parts that are learned from posture are the joints, tendons, ligaments, and muscles. If the four parts are used properly and there is balance, it can make the body function optimally, such as in the correct sitting, standing, and lying positions. Good posture promotes good hand function, reduces the amount of energy used, and maintains a balance between the renal and gastrointestinal circulations.

Body mechanics is the coordination effort of the musculoskeletal and nervous systems to maintain proper balance (England & Improvement, 2019). Basically, body mechanics is how to use the body efficiently, that is, it does not require a lot of energy, is coordinated, and is safe in moving and maintaining balance during activities. The correct use of body mechanics can improve the body's function of the musculoskeletal system, reduce energy expenditure, and reduce fatigue. The need to move is urgently needed because movement can fulfill basic human needs and protect oneself from accidents, such as falling.

b. Principles of Body Mechanics

The principles used in body mechanics are as follows:

1) Gravity

   Gravity is the first principle that is considered in doing body mechanics correctly, namely viewing gravity as an axis in the movement of the body.

   There are three factors to consider in gravity:

   a) Center of gravity (center of gravity), the point that is in the middle of the body.
   b) The line of gravity is an imaginary vertical line through the center of gravity.
   c) Self-support base (base of support), is the basis on which a person is in a resting position to support/hold the body.

2) Balance

   Balance in the use of body mechanics is achieved by maintaining the position of the line of gravity between the center of gravity and the pedestal.

3) Weight

   The use of body mechanics, which is very concerned is the weight or the weight of the object to be lifted because the weight of the object will affect the mechanics of the body.

c. Basic Movement in Body Mechanics

Body mechanics and ambulation are part of the needs of human activity. Before body mechanics, there are several basic movements that must be considered, including:

1) Movement (ambulating)

   Correct movement can help in maintaining body balance. For example, the balance when people stand and when people walk will be. A person who is standing will be more stable than someone who is walking because when walking there is a displacement of the base of support from one side to the other and the center of gravity always changes in the position of the feet. When walking, there are two phases, namely the weight-bearing phase and the swinging phase, which will produce smooth and rhythmic movements.

2) Holding (squatting)

   In making changes, the holding position is always changing. For example, the position of a person sitting will be different from someone who is

squatting, and certainly different from a bent position. Gravity is something that needs to be considered to provide the right position in holding. In holding, it is very necessary to have the right foundation to prevent body abnormalities and make it easier for the movement to be carried out.

3) Pulling

Pulling correctly will make it easier to move objects, there are things to pay attention to before pulling objects. Among them are height, the location of the object (preferably in front of the person who will be pulling), the position of the legs and body in pulling (such as leaning forward from the pelvis), thrusting the palms and upper arms under the patient's center of gravity, the upper arms and elbows placed on the surface where sleep, such as hips, knees and ankles bent.

4) Lifting

Lifting is a way of movement using upward traction. When performing this movement, use the large muscles of the heels, upper thighs, lower legs, abdomen, and hips to reduce back pain.

5) Rotating (pivoting)

Rotating is a movement to rotate the limbs by relying on the spine. A good twisting motion is to pay attention to the three elements of gravity in the movement so that it doesn't have a bad effect on body posture.

d. Factors Influencing Body Mechanics

1) Health status

Changes in health status can affect the musculoskeletal system and the nervous system in the form of decreased coordination. These changes can be caused by disease, reduced ability to carry out daily activities, and others.

2) Nutrition

One function of nutrition for the body is to help the process of bone growth and cell repair. Lack of nutrition for the body can cause muscle weakness and facilitate disease. For example, a body that is deficient in calcium will be more prone to fractures.

3) Emotions

Psychological conditions affect changes in individual behavior so that they can be a cause of decreased body mechanics and good ambulation.

Someone who experiences feelings of insecurity, lack of enthusiasm, and low self-esteem will easily experience changes in body mechanics and ambula.

4) Situations and habits
   Situations and habits that a person does, for example, often lifting heavy objects, will cause changes in body mechanics and ambulation.
5) Lifestyle
   Changes in one's lifestyle can cause stress and will most likely lead to carelessness in activities, which can disrupt coordination between the musculoskeletal and nervous systems. This will eventually result in changes in body mechanics.
6) Knowledge
   Good knowledge of body mechanics will encourage someone to use it properly, so that it will reduce the energy that has been expended. Conversely, insufficient knowledge in the use of body mechanics will put a person at risk of experiencing impaired coordination of the musculoskeletal and nervous systems.

e. Impact of Body Mechanics

Correct use of body mechanics can reduce excessive energy expenditure. Errors in using body mechanics can have the following effects:

1) There is tension to facilitate the onset of fatigue and disturbances in the musculoskeletal system.
2) The risk of accidents in the musculoskeletal system. If someone is wrong in squatting or standing, it will facilitate the occurrence of disorders in the musculoskeletal structure. For example, abnormalities in the vertebrae.

f. Instructions Positioning the patient in bed

1) A mattress that is suitable for the patient is not too hard/soft and can support body curvature
2) Ensure good body alignment using support devices in areas that need to be supported. Provide support devices for stressed areas
3) Not all patients require identical support
4) Plan a systematic schedule for position changes for 24 hours.
5) Bed base is clean, dry, and smooth.

6) The patient's extremities can move freely.
7) Keep elbows, hips and knees slightly flexed to maintain body alignment.
8) Support the body's natural body curvature is good.
9) Avoid placing one part of the body, especially with the body prominences, directly on top of the other.
10) Prevent excessive pressure on the popliteal surface to prevent interference with the nerves and blood vessels around it.
11) Using support devices to maintain alignment.
12) Before changing the patient's position, assess the patient's ability to move and ask for help from others if needed.
13) Do ROM exercises
14) Make a daily schedule for exercises, extensions to prevent flexion.
15) Use the appropriate method to move the patient's extremities.
16) Always provide information before carrying out the procedure.

3. Nutrition

a. Definition

Understanding Nutritional Needs Nutritional needs are very important needs in helping the process of growth and development in infants and children, considering the benefits of nutrition in the body can help the process of growth and development of children, and prevent the occurrence of various diseases due to lack of nutrition in the body such as lack of energy and protein, anemia, iodine deficiency, zinc (Zn) deficiency, vitamin A deficiency, thiamin deficiency, potassium deficiency and others which can hinder the process of child development (Akram dkk., 2020).

Nutritional needs for each person are different, which is related to differences in the genetic and metabolic fields. However, for all infants and children, the basic goals of meeting these nutritional needs include achieving satisfactory growth and avoiding acute or chronic illness, as well as supporting the development of physical and mental abilities and should also provide reserves to deal with any stress

b. Components of Nutrients in nutrition

Complete intake of nutrients contained in nutrition is still needed by children as long as the growth and development process continues. The body still needs all the main nutrients, namely carbohydrates, fats, proteins, fiber, vitamins and minerals. Meanwhile, according to (García-Montero dkk., 2021), states that nutritional components are generally divided into two groups, namely macro groups and micro groups. The macro nutrients consist of calories and H2O (water), the calories come from carbohydrates, protein, and fat, while the micronutrients consist of vitamins and minerals.

1) Carbohydrates An energy source that is easily available at every meal, carbohydrates must be available in sufficient quantities because a lack of carbohydrates is around 15% of the available calories, which can cause hunger and decreased body weight and vice versa.
2) Fat Is a nutrient that plays a role in transporting fat-soluble vitamins A, D, E, K.
3) Protein is a basic nutrient that is useful in the formation of cell protoplasm, besides that the availability of protein in sufficient quantities is important for the growth and repair of tissue cells and as a solution for osmotic balance.
4) Vitamins are organic compounds that are used to catalyze cell metabolism which can be useful for growth and development and can maintain organisms, vitamins needed:
    a) Vitamin A (retinol), is a vitamin that must be available in sufficient quantities to have an effect on the ability to function the eye.
    b) Vitamin B complex (thiamin), which is soluble in water but not soluble in fat if the deficiency will cause beriberi.
    c) Vitamin B2 (riboflavin), is a slightly water-soluble vitamin, this vitamin must be available in sufficient quantities, otherwise it will cause photophobia.
    d) Vitamin B12 (cyanocobalamin), is a slightly water-soluble vitamin, this vitamin is very good for the maturation of red blood cells in the bone marrow, if a deficiency causes anemia.
    e) Vitamin C (ascorbic acid), is a water-soluble vitamin that is easily oxidized and accelerated by heat or light, 11 a deficiency of this vitamin can lead to a long-wound healing process.

f) Vitamin D, is a fat-soluble vitamin and will be stable in hot conditions, useful in regulating the absorption and deposition of calcium and phosphorus.
g) Vitamin E, is a fat-soluble vitamin and is unstable to ultraviolet light which can function in minimizing carotene oxidation.
h) Vitamin K, is a fat-soluble vitamin that can function as the formation of prothrombin.
i) Water is a very important nutritional requirement, considering the relatively high need for infants, 75-80% of body weight compared to adults, which is only 55-60%.
j) Mineral Is a component of nutrients available in the micro group, which consists of calcium, chloride, chromium, cobalt, copper, fluorine, iodine, iron, magnesium, manganese, phosphorus, potassium, sodium, sulfur and zinc. All of them must be available in sufficient quantities

4. Rest

a. Definition of rest

Rest is a relaxed state without any emotional stress and not only in a state of inactivity, but also taking a short break. These conditions require calm. The word rest means refreshing or dian after doing hard work, a state to let go of tiredness relaxing to refresh yourself or a state of getting away from all boring things

b. Rest characteristics

Six characteristics associated with rest:

1) Feeling that everything can be overcome.
2) Feel welcome.
3) Know what's going on.
4) Freedom from the annoyance of inconvenience.
5) Have some satisfaction with activities that have a purpose.
6) Knowing there is help when needed.

The need for rest can be felt if the characteristics mentioned above are met. This can be found if the patient feels that all his needs can be met, there is supervision, and acceptance and action given by health workers so that they can provide peace. If the patient does not feel the six criteria mentioned above, then

his need for rest has not been met so that action is needed to increase the fulfillment of his need for rest and sleep. For example, listening carefully to the patient's personal concerns and trying to alleviate them where possible.

Patients who have a feeling of not being accepted, may not be able to rest in peace. Therefore, health workers continue to be sensitive to patient concerns. The patient's recognition of what will happen is another condition that is important to know so that the patient can rest. The existence of ignorance will cause disruption to the rest of patients with anxiety at different levels. Health workers must help provide an explanation to the patient.

Efforts to achieve patients feel accepted and get satisfaction, the patient must be involved in carrying out various activities that have a purpose. This can make patients feel accepted and valued about the competence that exists in them. The patient will feel safe when he knows that he will receive the help he needs. Patients who feel isolated and unsupported will not be able to rest. Therefore, health workers must be able to create an atmosphere so that patients do not feel isolated by involving the patient's family and friends. The patient's family and friends may increase the patient's need for rest by engaging in everyday tasks and making difficult decisions.

The need for sleep in humans depends on the level of development. The following table summarizes human sleep needs based on.

c. Needs Sleep

The need for sleep in humans depends on the level of development. The following table summarizes human sleep needs by age. (Suni, 2023)

Age	Developmental Level	Kind of need for sleep
0-1 month	Newborn	14-18 hours/day
1-18 months	Infancy	12-14 hours/day
18 months–3 years	childhood	11-12 hours/day
3-6 years	Preschool period	11 jam/hari
6-12 years	school period	10 hours/day
12-18 years	Adolescence	8.5 hours/day
18-40 years	Adulthood	7-8 hours/day
18-40 years	Middle age youth	7 hours/day
60 years and over	Old adult hood	6 hours/day

1) The definition of sleep

   Sleep is an unconscious condition where the individual can be awakened by the appropriate stimulus or sensory. Sleeping conditions, minimal activity, varying awareness, changes in physiological processes, and decreased response to external stimuli.

2) Physiology of Sleep

   Physiology of sleep is the regulation of sleep activities which involves a relationship between cerebral mechanisms that alternately activate and suppress brain centers to be able to sleep and wake up. This system regulates all levels of activity in the central nervous system, including regulation of alertness and sleep. Centers for the regulation of alertness and sleep activity are located in the mesencephalon and upper pons.

3) Type of Sleep

   Based on the process, there are two types of sleep. The first type of sleep is caused by decreased activity in the reticular activating system. This type of sleep is called slow wave sleep because the brain waves are very slow or it is called nonrapid eye movement (NREM) sleep.

   a) Slow wave sleep (slow wave sleep)/nonrapid eye movement (NREM). This type of sleep is known as deep sleep with slower brain waves or also known as deep sleep.

      Stages of NREM sleep:

      Stage I

      This stage is the transitional stage between waking and sleeping with the following characteristics; relaxed, still aware of the environment, feeling sleepy, eyeballs move from side to side, pulse and respiration rate slightly decreased, and can wake up immediately as long as this stage lasts about 5 minutes.

      Stage II

      Stage II is the stage of light sleep and body processes continue to decline with the following characteristics: eyes are generally sedentary, heart rate and respiratory rate decrease, body temperature decreases, metabolism decreases, and lasts for a short time and ends 10-15 minutes.

Stage III

This stage is the sleep stage characterized by slow pulse, respiratory rate, and other body processes. This is caused by the dominance of the parasympathetic nervous system, making it difficult to wake up.

Stage IV

This stage is the stage of deep sleep characterized by decreased heart and respiratory rates, infrequent movement, difficulty awakening, rapid eye movement, decreased gastric secretion, and decreased muscle tone.

b) Paradoxical sleep/rapid eye movement (REM) sleep

This type of sleep can take place during the night's sleep which occurs for 5-20 minutes, an average of 90 minutes. The first period occurs for 80-100 minutes. However, if the condition of the person is very tired, then sleep is very fast, even this type of sleep does not exist. The characteristics of REM sleep are as follows.

1) Usually accompanied by active dreams.
2) More difficult to awaken than during deep NREM sleep.
3) Muscle tone during deep sleep is severely stretched, indicating strong inhibition of spinal projections of the reticular activating system.
4) Heart rate and respiration become irregular.
5) In the peripheral muscles, there are some irregular muscle movements.
6) Eyes close and open quickly, pulse is fast and irregular, blood pressure increases or fluctuates, gastric secretion and metabolism increase.
7) Sleep is for mental and emotional balance, it also plays a role in learning, memory, and adaptation.

SUMMARY

Nursing health provides an understanding for health workers about the need to regulate body posture in order to function optimally. Efforts to prevent disease from occurring are carried out through 5 levels of prevention, namely health promotion, specific protection, early diagnosis, prompt treatment and rehabilitation. Nutritional needs in everyday life are needed to support the health of the human body. Nursing health also regulates the rest and sleep needed to maintain health.

REVIEW QUESTIONS

1. The nurse will find a patient who complains of an uncomfortable position. The nurse helps the patient to get into a comfortable position. What do nurses need to pay attention to in body mechanics to provide a comfortable position?
   a. Patient room facilities
   b. Bed conditions
   c. Disease conditions
   d. Patient balance
   e. Level of consciousness

2. Nurses provide adequate nutritional intake to patients. Actions taken by the nurse in accordance with the level of prevention efforts:
   a. Health promotion
   b. Specific protection
   c. Early diagnosis
   d. Prompt treatment
   e. Rehabilitation

3. Nurses provide education to groups of industrial workers to use personal protective equipment to prevent work accidents. The nurse's actions are in accordance with preventive measures:
   a. Health promotion
   b. Specific protection
   c. Early diagnosis

d. Prompt treatment
e. Rehabilitation

4. The nurse provides balanced nutrition to the patient, the nurse pays attention to fat intake, the function of fat in food is:
   a. Energy sources
   b. Transporter of vitamins A, D, E, K.
   c. Formation of cell protoplasm
   d. Catalysts of growth and development
   e. Media transport results of metabolism

5. Nurses provide education about sleep for patients. The following statements are true about the benefits of sleep:
   a. Usually not accompanied by active dreams.
   b. Easier to awaken than during deep sleep.
   c. Heart rate and breathing become irregular.
   d. In peripheral muscles, no muscle movement occurs.
   e. Eyes do not quickly close metabolism increases**.**

GLOSARRY

1. REM : Rapid eye movement
2. NREM: Non rapid eye movement
3. ROM : Rang of motion

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UNIT 8
PATIENT SAFETY GOALS

OBJECTIVE LEARNING

1. Students can explain the goals of patient safety
2. Students can describe the patient identification requirements
3. Students can formulate ways to assess the patient's risk of falling

1. Patient Safety Goal Definition

Patient Safety Goals are a requirement to be implemented in all hospitals accredited by the Hospital Accreditation Commission. The preparation of this target refers to the Nine Life-Saving Patient Safety Solutions from WHO Patient Safety (2007) which is also used by the PERSI Hospital Patient Safety Committee (KKPRS PERSI), and from the Joint Commission International (JCI). The intent of the Patient Safety Goals is to promote specific improvements in patient safety. The objectives highlight problematic areas of health care and describe evidence and consensus-based solutions based on evidence and expertise on these issues. Recognizing that good system design is intrinsically to provide safe and high-quality health care, the general objective is to focus on comprehensive solutions wherever possible. According to Mulfiyanti dkk. (2022) in six goals of patient safety are the achievement of the following:

Target 1: Accuracy of patient identification

Elements of Assessment Target I

1. Patients are identified using two patient identifiers, may not use the patient's room number or location.

2. Patients are identified prior to administration of drugs, blood, or blood products.
3. Patients are identified before taking blood and other specimens for clinical examination.
4. Patients are identified before administering treatment and actions/procedures.
5. Policies and procedures direct the implementation of consistent identification in all situations and locations.

Target 2:

1. Complete orders verbally and via telephone or written inspection results in full by the recipient of the order.
2. Complete verbal and telephone orders or the results of the inspection are read back in full by the recipient of the order.
3. The order or inspection results are confirmed by the giver of the order or the party delivering the inspection results
4. Policies and procedures direct the implementation of consistently verifying the accuracy of oral or telephone communications. (Angela dkk., 2020)

Target 3: Improving the safety of high-alert medicine

Elements of Assessment Target 3

1. Policies and/or procedures are developed to include the identification process, location determination, labeling, and concentrate electrolyte storage.
2. Implementation of policies and procedures.
3. Electrolyte concentrates are not in-patient care units unless clinically necessary and measures are taken to prevent inadvertent administration in these areas according to policy.
4. Concentrated electrolytes stored in patient care units must be clearly labeled and stored in restricted areas.(Schepel, 2018)

Target 4: Certain-location, right-procedure, right-operating patients

Elements of Assessment Target 4:

1. The hospital uses a clear and understandable sign to identify the surgical site and involves the patient in the marking process.

2. The hospital uses a checklist or other process to verify the right preoperative location, the right procedure, and the right patient and that all necessary documents and equipment are available, correct, and functional.
3. A fully equipped operating team implements and records "before incision/time-out" procedures right before the commencement of a surgical procedure/action.
4. Policies and procedures are developed to support a uniform process to ensure the right location, the right procedure, and the right patient, including medical and dental procedures performed outside the operating room (Muzn & Sineen, 2022).

Target 5: Reduce the risk of health service-related infection

Elements of Assessment Target 5

1. The hospital adopts or adapts the latest published and generally accepted hand hygiene guidelines (e.g., from WHO Patient Safety).
2. The hospital implements an effective hand hygiene program.
3. Policies and/or procedures are developed to direct the ongoing reduction of the risk of health care-associated infections.

Target 6: reduce the risk of patients falling

Purpose and Objectives Target 6

The number of cases of falls is quite significant as a cause of injury for hospitalized patients. In the context of the population/community served, the services provided and the facilities, hospitals need to evaluate a patient's risk of falling and take action to reduce the risk of injury if a fall occurs. The evaluation may include a history of falls, medications and a review of alcohol consumption, gait and balance, and any walking aids used by the patient. The program must be implemented by the hospital (Saudia Arabia, 2021).

SUMMARY

Six Patient Safety Goals:

1. Accuracy of patient identification
2. Improved effective communication
3. Increasing the safety of drugs that need to be watched out for (high-alerts)
4. Ensure right-site, right-procedure, right patient surgery
5. Reducing the risk of infection related to health services
6. Reduction of patient's risk of falling

FORMATIVE TEST

1. Patient safety goals are:
   a. Wrong surgical site
   b. Reducing the risk of infection…
   c. Increased risk of falling
   d. Passenger identification error
   e. Less the risk infection

2. The aims and objectives of patient safety are:
   a. Encourage specific improvements in patient safety
   b. Encourage improvement needs
   c. Spur an increase in demand
   d. Improve patient safety activities
   e. Improve needs patient

3. Effective communication, which is timely, accurate, complete, clear and understandable by patients, will reduce errors and result in increased patient safety. The aims and objectives of the target...
   a. Target 1
   b. Target II
   c. Target III
   d. Target IV
   e. Target V

4. Wrong location, wrong procedure, wrong patient at the time of operation. This error is the result of ineffective communication between the team, not involving the patient in marking the location, there is no procedure for verification, this is the intent and purpose of the target:
    a. Target 1
    b. Target II
    c. Target III
    d. Target IV
    e. Target V

5. Correctly identifying patients is the first patient safety goal. To implement patient safety goals, the hospital establishes standards in identifying all services in providing health services to patients. In patient identification, what standards are used by the hospital?
    a. Name and age of the pass
    b. Name and date of birth
    c. Name and patient room number
    d. Name, medical record number and date of birth
    e. Name, age. Patient room

GLOSARRY

JCI: Joint Commission International

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UNIT 9
PRACTICE OF PATIENT SAFETY MANAGEMENT: APPLICATION OF PRINCIPLES AND IMPLEMENTATION OF COMMUNICATION PREVENTION EFFORTS

LEARNING OBJECTIVES

1. Students can carry out washing hands properly
2. Students can use Personal Protective Equipment (PPE)
3. Students can use goggles
4. Students can wear masks
5. Students can wear gloves
6. Students can wear protective gowns
7. Students can wear protective shoes
8. Students can remove personal protective equipment (PPE)
9. Students can do disinfection
10. Students can perform sterilization

1. Practice of Hand Washing

a. Definition

Hand washing is the act of cleaning hands using soap and running water or hand rub with an antiseptic (alcohol-based) in infection prevention and control. Hand hygiene is carried out by washing hands with soap and running water if hands are clearly dirty or exposed to body fluids, or using alcohol (alcohol-based hand rubs) if hands are not visibly dirty. Officers' nails must always be clean and short, without artificial nails, without wearing ring jewelry.

b. Purpose of washing hands

1. Reducing the number of microorganisms on hands.
2. Reducing the risk of transferring microorganisms to the client.
3. Lower the risk of cross-contamination between clients.
4. Reducing the risk of transferring infectious organisms to nurses and clients.

c. Hand washing procedure

Wash hands with plain/antimicrobial soap and rinse with running water, when:

a) If the hands look dirty, are in contact with the patient's body fluids, namely blood, bodily fluids, secretions, excretions, the skin is not intact, change the verband, even if you are wearing gloves.
b) When hands move from a contaminated area of the body to another clean area, even on the same patient.
c) Indication of hand hygiene:
   1) Before patient contact;
   2) Before aseptic procedures;
   3) After contact with blood and body fluids;
   4) After patient contact;
   5) After contact with the environment around the patient
d) How to wash hands with soap and water
   See the picture below:

Figure 1. How to wash hands with soap and water

2. Use of Personal Protective Equipment (PPE)

a. Definition of Personal Protective Equipment (PPE)

Personal protective equipment is special clothing or equipment worn by officers to protect themselves from physical, chemical, biological/infectious substances.

b. Types of Personal Protective Equipment

PPE consists of gloves, masks/particulate respirators, eye protection (goggles), shields/face shields, hoods, protective gowns/aprons, sandals/closed shoes (boots).

Figure 2 Personal Protective Equipment (PPE)

c. Purpose of using PPE

Protect skin and mucous membranes from the risk of exposure to blood, body fluids, secretions, excreta, non-intact skin, and mucous membranes from patient to staff and vice versa.

d. Indications for use of PPE

If performing an action that allows the body or mucous membranes to be exposed to or splashed with blood or body fluids or the possibility of contamination of the patient from the staff.

e. Steps to Use Personal Protective Equipment

Steps to wear the correct Personal Protective Equipment

1) Put on special work clothes and shoes first
2) Wash hands using soap or hand sanitizer
3) Wear disposable surgical caps
4) Wear a medical protective mask (N95)
5) Put on inner gloves
6) Wear safety glasses
7) Put on disposable rubber gloves
8) Usage is complete

f. Steps to remove the correct Personal Protective Equipment

1) Change gloves
2) Remove protective clothing
3) Remove protective glasses
4) Remove the mask
5) Take off the hat
6) Remove gloves
7) Release complete

2.1 Use of Gloves

a. Types of gloves, namely:

1) Surgical gloves (sterile), worn when performing invasive or surgical procedures.
2) Examination gloves (clean), used to protect health care workers when carrying out examinations or routine work ⁻-22-
3) Household gloves, used when processing equipment, handling contaminated materials, and when cleaning contaminated surfaces.

b. Identify measures and types of gloves used

Figure 3. Types of Measures and Gloves

Activities/Actions	Need Gloves?	Glove Type
Blood Pressure Measurement	No	
Temperature measurement	No	
Inject	No	
Handling and cleaning of tools	Yes	Household
Handling of contaminated waste	Yes	Household
Cleaning blood/body fluids	Yes	Household
Blood draw	Yes	Inspection
Installation and withdrawal of infusion	Yes	Inspection
Examination of the mucosa (vagina, rectum, mouth	Yes	Surgery
Insertion and Removal of Implants, Urinary Catheters, IUDs and more (Wrapped in a sterile package and placed using a no-touch technique)	Yes	Surgery
Laparoscopy, vaginal delivery	Yes	Surgery
Laparoscopic surgery, cesarean section, or bone surgery	Yes	Surgery

c. How to put on non-sterile gloves

1) Wash hands
2) Take the gloves out of the box
3) Lightly touch the glove area on the wrist area (at the top edge of the cuff)
4) Put on the first pair of gloves
5) Take the second glove with the hand that is not wearing gloves, just lightly touch the glove area at the wrist (at the top of the cuff)
6) To avoid touching the skin of the forearm by the hand that has the glove on, fold the outer surface of the glove to be used, using the fold of the finger of the hand that has used the glove, then place the glove on both hands
7) Once gloves are on, avoid contact with anything other than what is indicated or conditions requiring the use of gloves

d. How to remove non-sterile gloves

1) Pinch the glove in the wrist area without touching the upper arm, then open the glove so that it turns the outside and inside of the glove

2) Hold the removed glove in the gloved hand. Slide the hand that is not wearing gloves between the forearm and the glove, then remove the second glove until the folded position covers the first glove
3) Dispose of gloves in the medical waste bin
4) Perform hand sanitization with soap or cleaning fluid.

e. How to wear sterile gloves

1) Perform hand sanitization with soap or cleaning fluid
2) Ensure packaging integrity. Open the non-sterile outer packaging without touching the sterile packaging inside
3) Place the sterile inner pack on a clean, dry flat surface, without touching the surface of the sterile pack. Open the package by touching the edge of the package then folding it face down, and leave the package open
4) Using the thumb and forefinger of one hand, hold the glove by the folded end
5) Insert the other hand into the glove in a single motion, leaving the crease of the glove at the wrist area
6) Take the second glove by tucking the fingers of the gloved hand into the cuff of the second glove
7) With one single motion, insert the ungloved hand into the second glove by avoiding contact/touch between the gloved hand and the area other than the glove to be worn (contact results in a lack of asepsis and requires a change of gloves).
8) If necessary, after putting on both gloves, adjust the position of the gloves on the fingers until the glove fits comfortably
9) Unfold the cuff by tucking the fingers of the other hand under the fold, avoiding contact, or touching surfaces other than the outer surface of the glove (contact leads to lack of asepsis and requires a change of gloves).
10) Do this for both gloves
11) Hands that have been wearing gloves may only touch areas and tools that have been sterilized and areas of the patient's body that have been disinfected

f. How to remove sterile gloves

1) Remove the first glove using the other hand. Open by folding the inside out to the joint area of the second finger (do not remove the entire glove)
2) Remove the second glove by folding the outer part using the hand that has partly removed the glove
3) Remove the gloves by folding the inside out until the gloves are fully open. Make sure the hands only touch the inside of the gloves
4) Dispose of gloves in the medical waste bin
5) Perform hand sanitization with soap or cleaning fluid

2.2 Wearing a Mask

a. Definition

Masks are used to protect the face and oral mucous membranes from splashes of blood and body fluids from patients or dirty air surfaces and protect patients-24-or airborne surfaces from staff when they cough or sneeze. The mask that is used must cover the nose and mouth and carry out a Fit Test (emphasis on the nose).

b. Mask type

1) Surgical masks, for surgical procedures or to prevent transmission through droplets.
2) Respiratory masks, to prevent airborne transmission.
3) Household masks, used in nutrition or kitchen.

c. Objective

Protect yourself in contact with at-risk patients

d. How to wear a surgical mask

1) Holding on to the rope (hook it to the ears if using a rubber strap or tie the rope behind the head if using a loose rope).
2) Tighten the second strap at the center of the head or neck.
3) Press the thin flexible clip (if there is one) according to the curve of the nasal bones with both tips of the middle or forefinger.
4) Correct so that the mask adheres tightly to the face and under the chin well.
5) Double check to make sure that the mask is attached properly.

e. How to wear a particulate respirator mask

Particulate respirator for health services N95 or FFP2 (health care particular respirator), is a special mask with high efficiency to protect a person from particles less than 5 microns in size that are carried through the air.

Figure 4. Respirator Mask

This protector consists of several layers of filters and must be worn tightly against the face without any leakage. This mask makes the wearer's breathing more difficult. Before wearing this mask, health workers need to do a fit test. Things to consider when doing a fit test:

1) The size of the respirator needs to be adjusted to the size of the face.
2) Check the side of the mask that is attached to the face to see any defects or layers that are not intact. If it is defective or there is an incomplete layer, it cannot be used and needs to be replaced.
3) Make sure the mask straps are connected and attached properly at all connection points.
4) Make sure the nose clip made of metal can be adjusted to the shape of the officer's nose.

The procedure for wearing a mask can be seen in the image below:

- Genggamlah respirator dengan satu tangan, posisikan sisi depan bagian hidung pada ujung jari-jari anda, biarkan tali pengikat respirator menjuntai bebas dibawah tangan anda

- Posisikan respirator dibawah dagu anda dan sisi untuk hidung berada diatas

- Tariklah tali pengikat respirator yang atas dan posisikan tali agak tinggi dibelakang kepala anda diatas telinga. Tariklah tali pengikat respirator yang bawah dan posisikan tali pada kepala bagian atas (posisi tali menyilang)

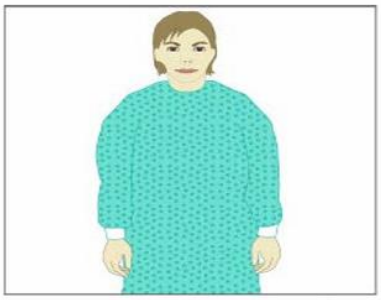
- Letakan jari-jari kedua tangan anda diatas bagian hidung yang terbuat dari logam. Tekan sisi logam tersebut (gunakan dua jari dari masing-masing tangan) mengikuti bentuk hidung anda.Jangan menekan respirator dengan satu tangan karena dapat mengakibatkan respirator bekerja kurang efektif

- Tutup bagian depan respiratordengan kedua tangan, dan hati-hati agar posisi respirator tidak berubah

2.3 Wearing a protective gown

The protective gown is used to protect the officer's clothing from possible exposure or splashes of blood or body fluids, secretions, excretions or to protect the patient from exposure to the officer's clothing in sterile procedures.

Figure 5. Gowns



Types of gowns:

a. The gown is not waterproof
b. Waterproof protective gown
c. Sterile gown
d. Non sterile gown

Indications for the use of protective gowns Actions or handling of tools that allow contamination or contamination of officer clothing, such as:

a. Clean the wound
b. Drainage action
c. Pouring contaminated liquid into a drain hole or WC/toilet
d. Management of massive bleeding patients
e. Surgical action
f. Dental care Immediately change gowns or work clothes if contaminated with patient body fluids (blood).

How to wear a sheath gown: Completely cover the torso from neck to knees, arms to wrists and tuck behind back. Tie at the back of the neck and waist.

2.4 Wearing Goggles (GOGGLES)

a. Objective

Protect eyes and face from splashes of blood, body fluids, secretions, and excretions (Ministry of Health RI, 2017).

Figure 6. Safety Goggles

b. Indication

During operations, delivery assistance and delivery procedures, dental and oral care, mixing liquid B3, handling corpses, handling contaminated linen in the laundry, in the CSSD decontamination room.

c. Procedure for using goggles

1) Make sure hands are cleaned before touching goggles
2) Check the condition of the goggles that will be used if there is damage then the goggles cannot be used
3) Place the goggles strap on the back of the head
4) Put the goggles frame over the eyes
5) Tighten the straps so that they form a tight connection between the frame and the skin of the face
6) Make sure the goggles are securely attached, not loose or wobbly

2.4 Use of Protective Shoes

The purpose of wearing protective shoes is to protect the officer's feet from spills/splatters of blood or other body fluids and prevent the possibility of being stabbed by sharp objects or falling medical devices, shoes must not have holes so that they function optimally.

Figure 7. Protective Shoes

Types of protective shoes such as boots or shoes that cover the entire surface of the foot. Indications for wearing protective shoes:

a. Handling of corpses
b. Waste handling
c. Operation action
d. Relief and Delivery Actions
e. Handling of linens
f. Washing equipment in the nutrition room
g. CSSD decontamination room

2.5 Use of Protective Caps

The purpose of wearing a protective cap is to prevent the fall of microorganisms that are in the hair and scalp of the officer to the sterile tools/areas or the patient's mucous membranes and vice versa to protect the head/hair of the officer from splashes of blood or body fluids from the patient.

Figure 8. Protective Hat

Indications for wearing protective caps:

a. Operation action
b. Relief and delivery action
c. CVL insertion
d. Tracheal intubation
e. Massive mucus suction
f. Medical equipment cleaning

3. Removing Personal Protective Equipment (PPE)

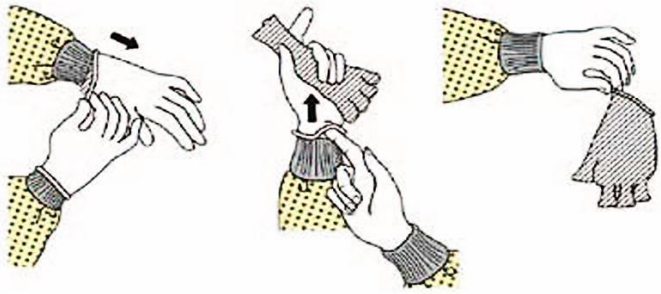
The steps for removing PPE are as follows:

a. Take off a pair of gloves
b. Do hand hygiene
c. Take off the apron
d. Remove face shield (goggles)
e. Take off the outer dress
f. Remove the head cover
g. Take off the mask
h. Remove gaiters
i. Do hand hygiene

a. Removing gloves, how to:

1) Remember that the outside of the glove is contaminated.
2) Grasp the outside of the glove with the other glove, then remove it.
3) Hold the removed glove with the gloved hand.
4) Slide the finger of the hand that is not wearing gloves under the glove that has not been removed at the wrist.
5) Remove the glove over the first glove.
6) Dispose of gloves in an infectious waste container.

Figure 9. Removing Gloves



b. Removing Goggles or Face Shield, how to:

1) Remember that the outside of the goggles or face shield has been contaminated.
2) To remove it, hold the rubber or goggle handle.
3) Place in the container provided for reprocessing or in an infectious waste container

Figure 10. Removing Protective Eyewear

c. Removing the protective gown, how to:

1) Remember that the gown front and sleeves are contaminated
2) Undo the dress straps.
3) Pull away from the neck and shoulders holding the inside of the gown only.
4) Turn over the gown.
5) Fold or roll into a roll and place in the container provided for reprocessing or disposal in an infectious waste container.

Figure 11. Removing the Gown

d. Removing the mask, how to:

1) Remember that the front of the mask is contaminated
2) Do not touch
3) Remove the bottom strap and then the top strap/rubber.
4) Dispose of in an infectious waste container.

Figure 12. Removing the Mask

4. Disinfection

a. Definition

Disinfection is a process for eliminating most pathogenic microorganisms, except for bacterial spores from an inanimate object.

b. How to Disinfect

Disinfection means killing or getting rid of organisms that can cause infection. Disinfection is usually carried out using chemical substances such as phenol, formaldehyde, chlorine, iodine, or sublimate. In general, disinfection is intended to kill the more sensitive vegetative cells but not heat-resistant spores.

The system most frequently used is the Centers for Disease Control and Prevention (CDC) guidelines published in 1981 and 1985 regarding hand washing and control of the hospital environment. This system consists of three levels:

1. High level disinfection
   High-level disinfection is a process that eliminates all but most of the bacterial endospore population. Some high-level disinfectants may also be classified as sterilants if prolonged contact kills all bacterial endospores.
2. Moderate disinfection
   Moderate disinfection causes inactivation of vegetative bacteria, including mycobacteria (*Mycobacterium tuberculosis*), most viruses and most fungi, but does not kill bacterial spores. Low-and medium-level disinfection is used for surfaces and non-critical items in healthcare.
3. Low level disinfection
   Low-level disinfection kills all vegetative bacteria and some viruses and fungi, but is not expected to kill mycobacteria or spores.

There are various methods of disinfection, as follows:

a. Mopping Method

This method of disinfection uses a disinfectant that is diluted in water, and is carried out by wetting the floor. The advantage of this method is that it is effective in reducing the number of floor germs, and can reach all corners of the floor room. However, this method has a weakness, namely that it can injure anyone who is not careful going through the wet areas, so it takes a relatively long time to dry.

b. Fogging Method (Fogging)

This method of disinfection is often carried out in various health facilities, such as health centers and hospitals in Indonesia. This disinfection uses a disinfectant, and by fogging the room using a fogger. The advantage of this method is that it can reach all rooms and corners of the room. Disinfectants in the form of mist can kill microorganisms in the air, walls, or floors. However, the weakness of this method is that it can cause stains or spots on the wall, and the officer must be exposed directly.

c. Ozonization

This method of sterilization uses O3 gas released from the tool. This gas can reduce air germs with the desired time variation. This tool can reach all corners of the room, but this tool can only kill non-pathogenic germs.

5. Disinfectant

Disinfectants are materials used to carry out disinfection. Often the term antiseptic is used as a synonym, but the terms disinfection and disinfection are usually applied to inanimate objects, such as floors, dishes, clothing.

This type of disinfectant is divided into two, namely:

1. Chemical disinfectant

   The use of chemical disinfectants for a long time can have a negative impact, because when used, chemicals can leave residues that have the potential to harm health (Wastiti et al. 2017). For this reason, it is necessary to look for other alternatives, namely by utilizing plants or what are called vegetable disinfectants.
2. Botanical disinfectant

   This plant-based disinfectant does not leave any residue because it is made from materials that exist in nature, so they evaporate easily.

6. How to Do Sterilization

Definition

An action to kill pathogenic germs and pathogens and their spores in medical and medical equipment by boiling, storm, high heat or using chemicals.

Figure 13. Sterilization

Objective

To guarantee the quality of medical devices, laboratories, and linen in a sterile condition and safe to use.

Preparation of tools and materials

1) Dry sterilizer connected to electricity 1 piece.
2) Wet sterilizer or autoclave 1 piece.
3) Dry heat sterilizer (OVEN)
4) 0.5% hypochlorite/chlorine solution.
5) Gloves 1 pair.
6) Brush
7) Basin
8) Dry towels

Work procedures

a. Decontamination

1) Wear gloves (See SOP on putting on and taking off handscoon).
2) Prepare a soaking tub filled with 0.5% chlorine solution by: Mixing 1 tablespoon of chlorine with 1 liter of water.
3) Stir the solution until dissolved.
4) Put medical devices that have been used and can be used again into the soaking tub by:
   a) Put medical devices one by one into the 0.5% chlorine immersion tub with a lighter.
   b) Leave it for about 10 minutes.

b. Washing and rinsing

1) Open the water faucet by turning it clockwise (non-rotating faucet models) with your right hand.
2) Take used equipment that has been decontaminated (be careful when handling sharp tools, such as scissors and sewing needles). In order not to damage objects made of plastic or rubber, do not wash them together with metal or glass utensils.
3) If possible, use a different method of soaking tubs by taking one by one *alkes* or laboratory equipment that has been decontaminated with a scab.
4) Carefully wash all sharp objects or those made of glass by:
   a) Using a brush with soap and water to remove residual blood and dirt by brushing slowly, in the same direction and repeatedly under running water until the remaining blood and dirt is clean on all surfaces.
   b) Open the hinges, scissors, and clamps by turning the screw slowly to the left until it is released.
   c) Thorough brushing especially at the joints and corners of the equipment by brushing slowly, in the same direction and repeatedly under running water until no blood or dirt stains are visible.
   d) Ensure that there is no residual blood and dirt left on the equipment by looking back and forth under sufficiently bright lighting.
   e) Repeat the above procedure for each object at least three times (or more if necessary) with water and soap or detergent.
5) Rinse the objects with clean water by means
6) Take one by one *alkes* and laboratory equipment.
7) Rinse one by one under running water.
8) Repeat the procedure for other objects. If the equipment is to be chemically high-level disinfected (e.g., in a 0.5% chlorine solution), place the equipment in a clean container and allow it to dry before starting the process (DTT) by:
   a) Prepare a clean and dry tray.
   b) Take the tools one by one according to their type (e.g., test tube with test tube, beaker glass with beaker glass).
9) Equipment to be high-level disinfected by steaming/boiling, or sterilizing in an autoclave/dry heat oven, does not need to be dried before the sterilization process begins.

10) While still using gloves, wash gloves with soap and water, then rinse thoroughly using clean water by:
    a) Place your gloved hands under running water.
    b) Take soap.
    c) Rub your hands thoroughly with soap until they are clean.
11) Take off gloves (see SOP for putting on and taking off handscoons).
12) Hang up the gloves and let them dry
13) Washing hands with soap and running water (see SOP for washing hands).

Sterilization Of Dry Heat Sterilization Instruments (Oven)

a. Open the oven door and place the items to be sterilized neatly. If possible, place them in a tray according to the classification of their use (e.g., heating set, parturition set, ENT set and others) in the following way: Arrange the tools to be sterilized in a closed instrument tub in the same position (unidirectional).
b. Inserting the prepared instrument tub into the oven.
c. Close the oven door by: Ensuring all equipment is properly inserted. Close the oven door tightly.
d. Wait until the temperature reaches 1700 C and leave for 60 minutes.
e. When finished, wait until the temperature drops, open the oven door, remove the sterilized tools using a sterile match by: Waiting about 15 minutes after the indicator light goes out, open the oven door slowly, take out the sterilized tool with the match.
f. To cool sterile equipment, it is forbidden to open the package or lid.

Sterilization Using Autoclove

a. Pour enough distilled water into the autoclave.
b. Pouring distilled water to a certain extent into the autoclave.
c. Arrange the test tubes or other glassware in the inner aluminum container in such a way that there is room for the free movement of water vapor between the tools during sterilization, place the container into the autoclave in the following way: the test tubes are taken one by one with a match, then stacked in an aluminum container that is already in the autoclave with a minimum distance of 0.5 cm with another tool.

d. Put the sterilizer cover on the sterilizer body and put the retaining bolts on the place that corresponds to the sterilizer cover, then tighten each nut together in the opposite place by rotating the bolts at an angle that crosses and rotates towards the right, only two bolt on the other side towards the right until it is tight and can't be rotated anymore.
e. Opening the safety valve regulator, in the open state the retainer is straight. Install the heater. Steam that forms at the base of the sterilizer will flow upward around the inner vessel and then downward between the flasks and tubes to the base of the vessel, forcing air from the bottom up through the flexible exhaust tube and safety valve.
f. If the water vapor starts to come out rapidly (causing a hissing sound) close the safety valve by pushing the regulator down so that it is level. The pressure in the sterilizer will rise and can be read on the pressure gauge.
g. Maintain the pressure at 1210C, by reducing heating as necessary to maintain the pressure by checking the pressure and temperature on the temperature and pressure indicating device.
h. Sterilize media and equipment by maintaining pressure 1 atm for 15-20 minutes by: letting the tool work for 15-20 minutes while being monitored at a pressure of 1 atm.
i. Monitor the pressure during the sterilization process by monitoring the numbers printed on the pressure indicator.
j. Turn off the heating and wait for the pressure to return to zero by: turning off the appliance by pulling out the power plug and letting it sit for 15 minutes while opening the lid.
k. When the pressure indication device has reached zero and the temperature has dropped far below 1000C, open the safety valve regulator by straightening it to remove any residual steam that remains inside. Loosen the nuts, remove the bolts, and lift the cover.
l. Throw away the remaining water in the sterilizer and dry all parts thoroughly by waiting until the device cools down and then wiping off the remaining water of approximately 1 cm with a clean cloth until dry.

Instrument Storage

a. Sterilized tools are removed from the autoclave or dry heat sterilizer.
b. Then the sterile tool is put into a glass cupboard in the sterile tool storage room according to the set box provided. The gauze is put in the cash register, the drum is stored on the instrument table.
c. Every day the tool is checked for the expiration date if it has passed the expiration date the tool is sterilized again.
d. The door to the cupboard/sterile room must always be closed.
e. Unauthorized personnel are not allowed to enter the sterile equipment area.
f. Note: Room temperature 18°C–22°C, Humidity 35%–75% and positive room air pressure

FORMATIVE TEST

1. The nurse will perform an oral mucosal examination in a patient with pulmonary TB. What type of gloves should the nurse use:
    a. Examination gloves
    b. Household gloves.
    c. Surgical gloves.
    d. Ordinary gloves.
    e. Nonsterile gloves

2. The nurse will wash hands, indications for hand washing are:
    a. Before leaving for the hospital.
    b. Before patient contact.
    c. Before eating.
    d. After eating.
    e. After performing the operand.

3. The correct length of time when washing hands with soap and water is:
    a. 20-30 seconds
    b. 30-40 seconds
    c. 40-60 seconds
    d. 50-60 seconds
    e. 60-70 seconds

4. Nurses will treat patients with TB Pau, nurses must wear masks. the right type of mask is:
    a. Surgical mask
    b. Respiratory mask
    c. Cloth mask
    d. Household masks
    e. Disposable mask

5. The nurse will wear a gown to treat the patient. Gown indication?
    a. Measuring blood pressure
    b. Administer parenteral medications
    c. Do a physical exam
    d. Carry out drainage measures
    e. Put infusion

GLOSARRY

PPE : Personal Protective Equipment
CSSD : Central sterile supply department

ANSWER UNITS 1–9

UNIT 1: A, D, C, C, B

UNIT 2: B, C, D, C, B

UNIT 3: D, B, B, D, A

UNIT 4: A, C, C, B, C

UNIT 5: B, A, C, D, E

UNIT 6: A, B, B, A, B

UNIT 7: D, A, B, B, C

UNIT 8: B, A, B, D, D

UNIT 9: A, B, C, A, D

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