

# Role of Microbiology in Nursing

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**Abstract:** Microorganisms as the name suggests are microscopic organisms which have an ability to adapt according to environment for instance, commensals change pathogenic in certain changed environment. The adaptation of microorganisms to certain treatments or medicines remains a challenge for a healthcare professional like a nurse. Microbiology touches life of a nurse while he/she works in a medical health care setting.

Microbiology helps a healthcare professional to have better understanding of these microorganisms so that a patient whose immune system lowers down and is always at risk of being affected by any microbe, can remain safe and healthy when he is in the hands of a nursing professional.

Microbiology helps a nursing professional to understand the basic concepts of reproduction, morphology, biochemical characteristics and genetics. Microbiology makes aware about new diseases and modern molecular identification methods. The role of microorganism in development of certain medications and vaccinations cannot be ignored either.

**Keywords:** Microbiology, nursing, puerperium, patients,

## INTRODUCTION

Everyday nurses' encounter with microbial world while working in medical health care settings. They are engaged in managing all aspects of out-patient's health and infection control in the hospitals. The microbial world is integral part of the healthcare settings. We all are aware of the fact that microbiology is a science of microscopic organisms which are invisible to our naked eyes. These microorganisms are present on and around human body ...all times and they maybe pathogenic which gives rise to various diseases and commensals which help a person in remaining disease free. The study of microbiology will help a nurse in understanding vast world of these microscopic organisms and establish a fact that they are connected with human world in many ways.

Medical microbiology deals with the study of microorganisms responsible for various diseases of low to high intensity and it can be divided into:

1. Bacteriology, which deals with study of unicellular bacteria.
2. Virology, which facilitates study of viruses.
3. Parasitology, which involves unicellular to multicellular parasites.
4. Mycology, that deals with various fungal microorganisms

Microbiology is an integral part of nursing studies and is significant part of nursing profession. It provides the basic foundation to the nursing profession. The successful implementation of the microbiology in nursing profession is an indicator of deep understanding of interaction of microbial world with human beings.

Nurses take care of various groups of patients, including those with contagious infections so it is necessary for them to have good knowledge of microorganisms. In this case knowledge of medical microbiology would help them to *understand the causative organism* of disease and patient's normal flora as some of them may turn pathogenic under specific conditions. For example, E coli which is a microorganism which is found in intestine and helps in absorption of Vitamin K and a human body provides a nutrient rich environment to it. But it turns pathogenic in certain situations like weak immune system or in post-surgery this microbe may get transplanted at different place in the body. In such situation it would turn harmful to the body and produce symptoms of disease like, urinary tract infection.

A nurse must learn to identify these bacteria so that appropriate medicines could be given to the patient and treatment is done accordingly. Bacteria usually tend to adapt themselves with the change in environment and resist some antibiotics or may be sensitive to other antibiotics. The knowledge of microbiology *helps in treatment* with suitable antibiotics. At times when an individual is not responding to chemotherapeutic agent given for treatment, *antibiotic sensitivity test* is performed to know the specific antibiotic which could be used in treatment.

Microbiology helps a nursing professional to understand the basic concepts of reproduction, morphology, biochemical characteristics and genetics. Microbiology makes aware about new diseases and modern molecular identification methods. The role of microorganism in development of certain medications and vaccinations cannot be ignored either.

### Why microbiology is needed in nursing?

Nurses are involved in managing all aspects of patient's health and infection control in the hospitals. Nurse must know microbiology to take care of patient and to protect oneself from pathogenic microorganisms. Nurses utilise concepts of microbiology while giving patient care or doing procedures.

**To prevent spread of infection:** Nurses should have knowledge about the *mode of spread of infection*. Some of the infections are spread by contact (touch), air (air-borne), droplets (sneezing, coughing), some by eating contaminated food or drink (food borne), sexual contact (STDs), by arthropod bite (vector born) and others by contaminated blood transfusion, etc. This knowledge would help a nurse to look for specific control of spread of infection. If a nurse knows how the disease producing organism enters into the body, how they are discharged from the body and how they spread from person to person, the knowledge would help a nurse to use particular *measures to save community and hospital spread of infection* e.g. in tuberculosis case a negative pressure room works in a positive way for patient health.

**To maintain sterile field:** A nurse must know procedures used to create and *maintain a sterile field* in the hospitals and these are based on the knowledge of microbiology. For instance, in operation theatres sterile field is very necessary, so a nurse must know how to create it and maintain it so that the post-operative infections could be avoided.

One of the most important things is *handwashing*. This simple yet over looked act can prevent or reduce the chances of spreading infections. Hand washing technique reduces load of microorganisms on hands of a nurse which further helps in restricting risk of hospital acquired infection.

The knowledge of microbiology can further help a nurse to use sterile equipment which are a necessary part of invasive procedures done on patients. The *principles of asepsis* are based on microbiology. The knowledge of sterilisation techniques is mandatory for a nurse. The *proper disposal of biomedical waste* is equally important and knowledge of microbiology helps in this field also. The segregation of waste in different bins according to their origin is very important step before sending for disposal in order to avoid environmental pollution.

**To collect specimens:** Nurse must recognise the importance of *proper collection of specimens* to be sent for bacteriological examination to obtain accurate results. For instance, she has to be familiar with the various infectious disease and their route of infection so as to collect clinical specimen from a proper site like, pustule or blood or stool etc. Nurse must recognise the importance of proper collection of specimens to be sent for bacteriological examination to obtain accurate results.

**To implement immunisation schedule in hospitals:** A nurse also plays an important role in *immunization to control threats* of various diseases like diphtheria or MMR etc. So they must have knowledge of various antisera and vaccines used in preventing the dreadful diseases. The immunisation schedules and the cold chain used to deliver the vaccines from the production to the administration should be known to a nurse. The *knowledge of immunology* that is a part of microbiology, helps a nurse in this. Knowledge of immunology makes a nurse well prepared for vaccination and protection of vaccines by using cold chain.

### Role of nurses in different units: Implementation of microbiology in nursing

Some of the places in a health care settings are discussed here to understand the importance of microbiology in nursing care.

**Infectious disease or communicable disease wards:** Patients having same or similar type of disease are admitted here, like rabies ward or gastroenteritis ward and nurse takes care of these patients by following precautions to not to transmit the infection to other patients. She uses *aseptic methods* while giving nursing care.

#### Burns' unit

Initially a burn wound is sterile but within a short time the microorganisms starts colonising in it. The nurse takes all precautions while caring this type of patient so that there should not be, more and more contamination of the wound. She follows not only aseptic techniques but also uses *sterile equipment* while looking after such patients.

**Operation theatres:** Before operation, it is duty of a nurse to ensure that the atmosphere of the operation theatre (OT) is free of microorganisms. It is done by the process of *fumigation of the operation theatre* from time to time. The Identification of microorganism helps in targeted treatment. The sterility of an OT is checked by culturing swabs taken from different sites of an operation theatre. There should not be growth of any organism on culture plates after overnight incubation at 37°C. Nurse should assure that all procedures on a patient are done under sterile conditions.

#### Obstetric units

The wound infection of birth canal after child birth or abortion is a major cause of maternal mortality rate. The reason is that the infection spreads and causes *peritonitis or phlebitis*. The nurse can play a role during antenatal care, help during delivery or after giving birth for 6 weeks period called *puerperium*. She follows not only aseptic techniques but also uses sterile equipment while

looking after such patients. The nurse can play a role while the female needs antenatal care, help during delivery or after giving birth for six weeks called as puerperium.

**Intensive care nursery:** In intensive care nurseries especially experienced staff is employed who has good knowledge of incubators, gastrostomy feeding, exchange transfusion, respirator and umbilical catheters which are necessary for infants. Nurses must keep a check to maintain *sterile atmosphere* in these intensive care nurseries.

**Central sterilisation unit** or CSSU in a hospital must work efficiently so that proper sterile conditions are maintained in a health care setting. A nurse must have sound knowledge about the *sterilisation methods and controls of sterilisation* so that good quality could be maintained while nursing care. Proper disposal of biomedical waste generated in healthcare settings helps in checking environmental pollution and associated health hazards.

#### It helps:

##### 1. To combat infectious diseases

Not only cross infection could occur during a hospital stay but there is danger of patient's normal flora turning pathogenic in immunocompromised individuals. So knowledge of microbiology helps in combating infectious diseases.

##### 2. To collect clinical specimen from appropriate site of infection

It is required for bacteriological investigation that which organism is responsible for infection,

##### 3. Targeted treatment

Mutational changes in microorganisms make treatment difficult, therefore, identification of specific pathogen and administration of recommended antibiotic treatment for a particular duration is must based on knowledge of microbiology.

##### 4. To create and maintain a sterile field

**Sterilisation and disinfection** procedures are used to create and maintain a sterile field in healthcare setting

##### 5. To implement Asepsis

Principles of asepsis are followed to control and prevent transmission of infection and to follow these, mode of entry and exit of an infection must be known to a nurse.

##### 7. To dispose of biomedical waste

If the biomedical waste is not disposed of wisely and carefully it may lead to eruption of some dreadful disease. Therefore proper disposal of biomedical waste is must which is based on principles of microbiology.

#### Conclusion

Nurses should have knowledge of microbiology because it plays major role in patient care along with implementation of proper disposal of biomedical waste. In a nutshell:

Knowledge of microbiology tells about the mode of spread of infection. This knowledge would help a nurse to look for specific control of spread of infection.

Knowledge of medical microbiology would help them understand the causative organism of disease and patient's normal flora because some of them may turn pathogenic under specific conditions.

A nurse must know procedures used to create and maintain a sterile field in the hospitals based on the knowledge of microbiology.

The principles of asepsis are based on microbiology.

The knowledge of sterilisation techniques is required for a nurse as the equipment and tools used in healthcare industry have to be free from any microorganism. A nurse must have sound knowledge about the sterilisation methods and controls of sterilisation so that good quality could be maintained while providing nursing care. This is based on knowledge of microbiology.

The proper disposal of biomedical waste which is generated in a healthcare setting, is equally important and knowledge of microbiology helps in this field also.

Nurses must keep a check to maintain sterile atmosphere in these intensive care nurseries, burn's unit, operation theatre, etc.

It is clear from the above mentioned facts that in order to provide effective nursing care, sound knowledge of microbiology is required. It must be attained through nursing training with knowledge of microbiology.

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