
Course: Aseptic Technique

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Disclosures

Insert any affiliations that should be disclosed here.

Audience

All health care workers.

Accreditation

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Course Objectives

After reading this course the health care provider will be able to:

- be familiar with the definition of sepsis and infectious agent
- understand the various modes of transmission of infection
- describe the definitions of asepsis and aseptic technique
- list various uses of aseptic technique
- describe various forms of aseptic techniques
- understand the various principles of aseptic technique in operating room
- describe the benefits of aseptic technique

What is sepsis?

Sepsis simply means the presence of infection caused by some micro-organism along with signs and symptoms. Three factors must present for an infection to occur:

- I. An infectious agent like bacterium, virus, fungus etc.
- II. Transmission of infectious agent from one person to another
- III. A susceptible host, in which infectious agent can cause sepsis or infection [1]

Infectious agent

An infectious agent is any micro-organism capable of causing infection. There are several groups of such micro-organisms. Examples of some of them include:

- Bacteria e.g. streptococci, staphylococci, mycobacterium etc.
- Viruses e.g. hepatitis B, C viruses, AIDS virus etc.
- Fungi e.g. candida albicans, yeast etc.
- Protozoans e.g. amoeba, tapeworms etc. [1]

Routes of transmission of infectious agents

Following are the some modes of transmission of an infection:

1-Direct transmission- it includes:

Direct contact- here infection may be transmitted by direct contact from skin to skin, mucosa to mucosa or mucosa to skin of the same or another person. Examples of direct contact are:

- Touching, kissing
- Sexual intercourse
- Continued closed contact

Examples of diseases transmitted by this route include:

- Sexually transmitted disease (STDs)
- AIDS
- Leprosy
- Skin and eye infections

Droplet infection- it refers to the direct projection of a spray in the form of salivary and nasopharyngeal droplets or secretions during coughing, sneezing, speaking and spitting, and talking into the surrounding environment.

Examples of diseases transmitted by this route include:

- Respiratory tract infections
- Eruptive fevers
- Common cold
- Diphtheria
- Whooping cough and tuberculosis

Contact with soil- following diseases can be transmitted by contact with soil:

- Tetanus
- Hook worm disease
- Mycosis

Inoculation into skin and mucosa e.g.:

- Rabies
- Hepatitis

Transplacental transmission- TORCH infections can be transmitted via this route from mother to baby.

2-Indirect transmission- it includes:

Vehicle-Borne- it implies transmission of an infectious agent through the agency of matter, food, ice, blood, serum, plasma or other biological products. Diseases transmitted via this route include:

- By food and water e.g. acute diarrheas, typhoid fever, cholera, polio, hepatitis A and food poisoning
- By blood e.g. Hepatitis B , malaria, syphilis and Chaga's disease

Vector-Borne- a vector refers to an arthropod or any living carrier that causes infectious agents to reach the susceptible host e.g.

- Malaria is transported by anopheles mosquito
- Plague is transported by rat

Others modes of indirect transmission include:

- Air- Borne
- Fomite –Borne
- Unclean hands and fingers [1]

What is asepsis and aseptic technique?

Asepsis simply means prevention of spread of infection. The technique used by the health care staff to prevent the spread of infection is called as Aseptic Technique. The purpose of asepsis is to achieve an environment that is free of infectious micro-organisms. Each healthcare facility has its own set of procedures for achieving asepsis. Some common examples of such health care centers include surgery rooms, clinics, and outpatient care centers [2].

What is aseptic technique used for?

As mentioned earlier that aseptic technique is used in various health care settings to prevent the spread of harmful micro-organisms. The main goal of this procedure is to prevent harmful micro-organisms from spreading and causing infection. There is another technique called as clean technique which is applied to prevent the further spread of micro-organisms between other people and places. The aseptic technique decreases infection risks for the patient directly at the source. The common uses of Aseptic technique are:

- Asepsis surgery equipment in operating room
- Asepsis during vaginal delivery
- Asepsis during dialysis
- Asepsis while passing urinary catheters
- Asepsis during maintenance of intravenous (IV) lines
- Other draining devices [3]

Various forms of Aseptic Techniques

Following are the various forms of aseptic technique [4]:

- **Disinfection**-destruction of infectious agent is termed as disinfection and the agents which are used to destroy these agents are called as disinfectants or germicides. Terminal disinfection is carried out at the termination of illness and after the patient has left the sick room. Concurrent disinfection is applied at the bed side of the patient during the course of illness of patient [4].
- **Sterilization**- it means the destruction of living organisms of all types. Its various methods include:
 - **Heat (electrical or gas heat)**- contaminated material subjected to boiling water for a few minutes destroy all pathogenic organisms except the spore bearing organisms or the viruses of infectious hepatitis, which are, however destroyed by steam.
 - **Steam** –it is used in three ways:
 - Current steam- here the steam is generated at ordinary atmospheric pressure (at temperature of 100C) and is allowed to escape.
 - Saturated steam- here steam is generated by boiling water in closed vessel, and steam accumulates under pressure.
 - Superheated steam- it can be generated in two ways:
 - If steam is heated without raising the pressure, the temperature of steam is highly raised; it is called superheated steam.
 - It may also be generated by boiling saline solution which boils at higher temperature than ordinary water [3].
 - **Chemical treatment**- various types of chemicals are used for asepsis. These include:
 - **Bacteriostatic agents (antiseptics)** - they inhibit the growth of various micro-organisms.

- ***Insecticides***-these destroy the insects.
 - ***Deodorants***- they remove or destroy the offensive smell by oxidizing the products and by decomposing and absorbing them; but do not destroy the organism. e.g. phenyl used in the drain acts as a deodorant.
 - ***Hydrocyanic acid gas***- it is the most effective fumigant, requiring very careful handling.
- **Radiation**– it is also the form of sterilization [5]
 - **Cleaning of equipment** is a primary form of aseptic technique. Various equipments like needles should always be disposed of between patients. Reusing needles and other disposable equipment can be a source of spreading infection. Other types of equipment must be cleaned properly through various types of aseptic techniques described above.
 - **Simple hand washing** is another very simple but an important form of aseptic technique. It must be ensured that all medical staff washes their hands before and after any procedure as it helps to prevent the spread of micro-organisms that can cause infections in patients.
 - **The centers for disease control and prevention (CDC) provides** some other basic rules for prevention of infection. These are:
 - Practical training of medical staffs on aseptic techniques
 - Use of an antiseptic like chlorhexidine for post-catheter care
 - Use of antimicrobial ointment on IV line exits
 - Proper bandaging after operation
 - Wearing masks to prevent germs from spreading from the oral cavity to the air [5,8].

Aseptic technique in the operating room

As described earlier that asepsis means the absence of pathogenic microorganisms on tissue. Surgical aseptic technique is applied to maintain asepsis and minimize the chances of introducing pathogens into a surgical wound. It prevents the patient from the effect of healthcare associated infections like:

- Delayed recovery

- Longer hospitalization
- Increased pain and
- Increased morbidity

Surgical asepsis can be achieved in the operating room by using aseptic (sterilized) instruments kept within a sterile field. A sterile field is made by ensuring that:

- The patient, operating table and instrument trolleys are fully covered in sterile drapes
- All equipment and instruments are sterile
- All staff operating within the operating room have performed a surgical scrub
- All staff operating within the operating room are wearing sterile gowns and gloves

Sterilization removes or destroys all micro-organisms including spores. Use of sterile disposable items or instruments by the Hospital Sterilization and Disinfection Unit can help improve the antisepsis of the clinical settings [6].

Pre-operative requirements

There are various pre-operative requirements that must be fulfilled to prevent sepsis. These include:

- The following examinations should be carried out before opening of any sterile glove, gown or instrument set:
 - packaging content label is new or not
 - packaging integrity is maintained or not
 - expiry date of the material
 - sterilization indicator is present or not
 - the package is dry or not (this is checked to prevent contamination of the sterile field and to ensure sterility of the item)

- The sterile packs will be opened on clean and dry surfaces (to prevent contamination of the sterile field)
- Always perform a surgical scrub prior to donning a sterile gown and gloves as it reduces the number of micro-organisms present on the staff member's skin.
- Sterile surgical gown and gloves should be donned from a surface other than the working sterile field (as this prevents water being dripped onto the working sterile field) and checked for integrity immediately after donning (to identify any holes).
- A closed gloving method is required as in this method the gloves are handled through the fabric of the gown sleeves and it ensures that no skin is exposed and provides the most assurance against contamination.
- Only the following must be thought sterile on the surgical gown and gloves:
 - fingertip to the elbow
 - Chest to the level of the sterile field (the scrub practitioner cannot constantly observe the back of the gown, so it is deemed unsterile. Perspiration may gather under the arms, and the collar touches the skin of the scrub practitioner. The gown is considered unsterile below the level of the sterile trolley.
- The sterile field must be prepared as close as possible to the time of use with minimal movement of staff as it prevents the contamination of the sterile field [6,7].

During the procedure

Precautions by the scrub practitioner

The scrub practitioner must consider the following precautions:

- Constantly observe the sterile field. (to prevent contamination of the sterile field)
- Do not leave sterile field unattended at any time (to prevent contamination of the sterile field)

- Keep the conversation to a minimum in the surgical area (to prevent airborne contamination).
- Try to keep less number of personnel in the theatre or around the surgical field (to prevent airborne contamination).
- Keep the movement (including the opening and closing of doors) around the sterile field to a minimum (to prevent airborne contamination).
- Non-perforating devices must be used to secure equipment to the sterile field (to prevent creating holes in the sterile drapes).
- Cover the non-sterile equipment with sterile barriers before keeping them in or over the sterile field (to prevent contamination of the sterile field).
- Scrub staff must remain close to the sterile field (to avoid contaminating the sterile gown).
- Scrub staff should pass back-to-back or face-to-face while changing positions (to avoid contaminating the sterile gown).
- Scrubbed staff must avoid changing levels (to avoid contaminating the sterile gown).
- A wide space must be observed between scrubbed staff and non-scrubbed staff (to avoid contaminating the sterile gown) [6,7]

Precautions by unsterile staff

The unsterile staff must be taken following precautions:

- To prevent the contamination of the sterile field, unsterile staff must face the sterile field on approach
- To prevent contamination of the sterile field, unsterile staff must not touch or lean over the sterile field
- To prevent contamination of the sterile field, unsterile staff must not walk between two components of the sterile field [7].

When extra items are needed to be added to the sterile field, the packaging should be checked to confirm that:

- Whether it is therequired item or not.
- Whether the package integrity has been properly maintained or not.
- Whether thesterilization indicator is present or not.
- Whether it has exceeded its expiry date or not.
- Whether the packaging is wet or not.

Other precautions carried out during procedure include:

- To prevent the contamination of the sterile field, give the sterile items directly to the scrub practitioner and do not flipped onto the sterile field.
- When sharp items are offered they must be given directly to the scrub practitioner or opened onto a designated container. This will prevent a sharps injury.
- Always lift the sterile items straight up from their packaging and do not drag over the packaging edges because the edges of sterile enclosures are considered unsterile.
- The scrub practitioner may use a sterile forcep to take individual sterile items from their packaging (a sterile forcep may be used as an extension of the scrub practitioner's hand to ensure a margin of safety between fields).
- To prevent contamination of the object, keep the heavy sterile items on a separate surface to open them.
- The scrub practitioner must keep sterile receptacle away from the operation table or place it near the edge of the sterile field while receiving a solution onto the sterile field (to prevent contamination of the sterile field).
- The circulating practitioner must examine the contents of the solution and the expiry date and solutions must be poured slowly with label uppermost (it is to prevent the label and expiry date being obscured in the event of spillage). Any remaining fluids should be discarded (as reuse of opened containers may contaminate the solutions) [6].

How to deal with contamination?

Carry out following steps to deal with contamination:

- Immediately take action about any contamination of the sterile field.
- If you find that the sterility of a drape or a piece of equipment is in question, consider it to be contaminated.
- To prevent further contamination of the sterile field, remove the contaminated equipment from the sterile field.
- To create a new sterile field, perform re-draping if the sterile drapes become contaminated.
- To prevent further contamination of the sterile field, sterile gloves must be changed if a perforation occurs [7].

Documentation

- Enter the labels from sterile instrument sets or from single items processed within HSDU onto the Trust's Tracking System.
- Put on these labels on sets or supplementary instrument when they are returned to HSDU (the records kept for the decontamination process must be able to prove retrospectively that the instrument has passed through each stage of the sterilization process. Records need to be kept for traceability purposes [7].

Benefits of aseptic technique

Following are the main benefits of aseptic technique:

- It will prevent you from getting a disease from the patient e.g. careful handling of sharps while operating on a hepatitis B patient can prevent you from getting this infection.
- It will prevent the patient from getting an infection from the medical staff or instruments before, during and after the procedure [8].

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