Module 2: Standard & additional Precautions on infection prevention and control in health care facilities.

Session 6: Housekeeping, Laundry, Food and water Safety

6.1 Objectives

- By the end of this session participants will be able to:
  - Outline the principles and importance of effective environmental cleaning.
  - Explain contact/exposure time and it importance.
  - Identify cleaning methods
  - Describe how to clean low and high risk areas
  - Demonstrate the process of preparing disinfectant cleaning solution
  - Describe biological spill management.

6.2.1 Introduction

- The Housekeeping department cleans and disinfects all areas of the hospital, and are often the first line of defense against the transmission of germs and infections.
- This is especially important in areas where patient care is delivered.
- Dusty, soiled and environmental surfaces covered with microbial contamination is visually not appealing and may potentially become a reservoir for microbes, therefore, effective and efficient cleaning methods and schedules are necessary to uphold clean and healthy environments in healthcare settings.
- The Housekeeping Department manages the waste stream and disposal of all waste by approved methods.

6.2.2. Principles of Cleaning a Health Facility

- Use cleaning products based on their, efficacy, safety and cost
- Perform routine cleaning
- Base cleaning methods and written schedules on the type of surface and amount of dirt present
- Cleaning should always progress from the least soiled areas to the most soiled areas and from high to low areas
- Scrubbing is the best way to physically remove dirt, debris, and microorganisms
- Dry sweeping and dusting should be avoided in all clinical areas

6.2.2. Principles of Cleaning a Health Facility cont..

- High touch surfaces e.g., door handles, telephones, should be cleaned daily using damp dusting with disinfectant or wipes
- Tools used for cleaning and disinfecting should be cleaned, disinfected and dried between uses

Housekeeping services.

6.2.3 Low and High Risk Areas

Low risk areas	High risk areas
Offices	Operating theatre
Pharmacy	Delivery room
Physiotherapy	ICU
Kitchen	Neonatal unit
Radiology	Dental Clinic
	Isolation room
	Burns Unit

6.2.4 Cleaning Low Risk Areas

A. Walls and ceilings

- Clean using a damp cloth with water and detergent
- Ensure routine damp dusting
- Always allow surfaces to dry

B. Furniture

- Clean using damp cloth with water and detergent

C. Floors

- Clean regularly when needed using detergent and water
- Do not use dry brooms to avoid dust

6.2.5 Cleaning High Risk Areas

A. Sinks

- Use a cloth or brush with disinfectant cleaning solution
- Rinse with clean water

B. Toilets

- Wear utility gloves and rubber boots
- Scrub daily or as required using a cloth or brush and disinfectant cleaning solution

C. Waste containers

- Wear heavy duty rubber gloves
- Using a detergent solution, scrub to remove soil and organic material

D. Floors

Clean and disinfect the floor surfaces starting with the edges moving to the center.

6.2.3 Types of Chemicals used in housekeeping

A. Cleaning Solutions

- Cleaning solutions contain detergents that remove dirt and debris (organic material) from surfaces.
- Detergents do not kill pathogens, but rather assist in removing them from surfaces.
- It is important to protect cleaning solutions from contamination as they can easily become contaminated during the cleaning process. Ideally, cleaning solutions used in a facility are hospital-approved detergents.

B. Disinfectants

- **Disinfectants** inactivate or kill microorganisms on surfaces that have been cleaned.
- They are not intended for use as antiseptics. Like cleaning solutions, disinfectant solutions in buckets can easily become contaminated, which can transfer more microorganisms to surfaces.
- Replace these solutions frequently.
- To be effective, disinfectants should be diluted to the correct concentration and remain on the surface for the appropriate contact time.

B.Disinfectants cont....

- Commonly used disinfectants include:

- Detergents (liquid or powdered)
- Alcohols (60-80% ethyl or isopropyl) for small surfaces
- 0.5% Chlorine solutions made from chlorine products:
  - Sodium hypochlorite
  - Calcium hypochlorite
  - Sodium dichloroisocyanurate tablets
- Ethyl or isopropyl alcohol (70-90%)
- Phenolic germicidal detergent solutions

B.Disinfectants cont....

- Disinfectants containing hypochlorite can easily be found in low-resource settings.
- If using hypochlorite, prepare a fresh solution every day using a standardized dilution and keep prepared solutions in a labelled container with a lid (to protect from sunlight and debris).
- Discard the hypochlorite solution at the end of the day even if it has not been used.

Preparation of Chlorine Solution

- You must wear protective gear (gloves, apron)
- Must stir the chlorine solution, especially powdered chlorine as it will sink to the bottom and not provide a uniform solution
- Always wait 30 minutes before use (For Calcium hypochlorite)
- Always label the bucket “0.5% Chlorine Solution” and date and time made to guide when to make a fresh supply.

Preparation of Chlorine Solution

Using Chlorine Liquid:

$$\left[\frac{\%\ chlorine\ in\ liquid\ product}{\%\ chlorine\ desired}\right] - 1 =$$

Example:

To make a strong (0.5%) chlorine solution from 3.5% chlorine liquid:

$$\left[\frac{3.5\%\ chlorine\ liquid}{0.5\%\ chlorine\ desired}\right] - 1 = 7 - 1 = 6$$

Add **6 parts of water** each time you add 1 part of chlorine liquid

Cleaning methods

1.Wet mopping method is the most common and preferred method

- Single-bucket (basin) technique: One bucket of cleaning solution is used
- Double-bucket technique: Two buckets are used, one containing a cleaning solution and the other containing rinse water.
- Flooding followed by wet vacuuming method.

2.Spills of blood or other body fluids should be cleaned immediately using 0.5% chlorine solution.

Routine Cleaning

- An example of routine cleaning of a patient bed space in an open ward includes:

Terminal Cleaning

- If a patient room or bed becomes vacant, terminal cleaning is indicated.
- This is also called discharge cleaning in some countries.
- Terminal cleaning is meant to remove microorganisms that could contaminate the next patient occupying that space.
- It uses the same best practices as routine cleaning but is more detailed

Terminal Cleaning cont…

6.2.4 Biological Spill Management

- Areas contaminated with Blood and Body Fluid need to be cleaned and disinfected to prevent patient or healthcare personnel contact with infectious materials.
- Any staff managing spills of blood or body fluids or any other biological spill should protect themselves by wearing appropriate PPE.

- This equipment includes a lab coat with long sleeves, back-fastening gown or liquid-barrier coveralls, disposable gloves, disposable shoe covers, and safety goggles and mask or full face shield.
- Use of this equipment will prevent contact with contaminated surfaces and protect eyes and mucous membranes from exposure to splattered materials.

6.2.4 Biological Spill Management

- Within the healthcare facilities, biological spills are categorized as:
  - Spot -
  - Small – up to 10 cm
  - Large – greater than 10cm. Larger spills require a higher concentration of disinfectant because of the volume of the spill and a higher risk of transmission.

- Within the medical laboratory facilities, biological spills outside biological-safety cabinets will generate aerosols that can be dispersed in the air throughout the laboratory. There are 2 types of biological spill:

6.2.4 Biological Spill Management

1.A minor biological spill is one that the laboratory staff is capable of handling safely without the assistance of safety and emergency personnel. Minor biological spills involve:

- BSL1 materials or releases of a small volume of material inside a biological safety cabinet or other primary containment device.

2.A major biological spill is one that requires assistance of safety and emergency personnel. Major biological spills involve:

- Releases of BSL2 or higher materials outside of a biological safety cabinet, or spills of such materials that involve excessive splashing or aerosol formation.

B. Minor Biological Spills

- Alert people in the area of the spill to evacuate.
- Remove and disinfect any material that has been splashed on you and remove/disinfect grossly contaminated clothing.
- Secure the affected area and post biohazard-warning signs.
- Assess the situation and do the appropriate personal protective equipment for the clean-up operation.

Minor Biological Spills cont.

- Spill Clean-up Procedure:
  - Cover the spill with paper towels or other absorbent material to absorb the spill and prevent further aerosolization.
  - Pour disinfectant gently over the covered spill, working from the outside inwards.
  - Wait at least 15 minutes for the disinfectant to penetrate through the contained spill and achieve the required contact time for disinfection.
  - Using the appropriate tools (i.e., shovels, forceps), remove the absorbent material and place it in a biohazard bag for autoclaving and subsequent disposal.
- Repeat Spill Clean-up Procedure over the original spill area to ensure disinfection and clean-up.
- Notify your supervisor and Safety officer.

C .Major Biological Spill

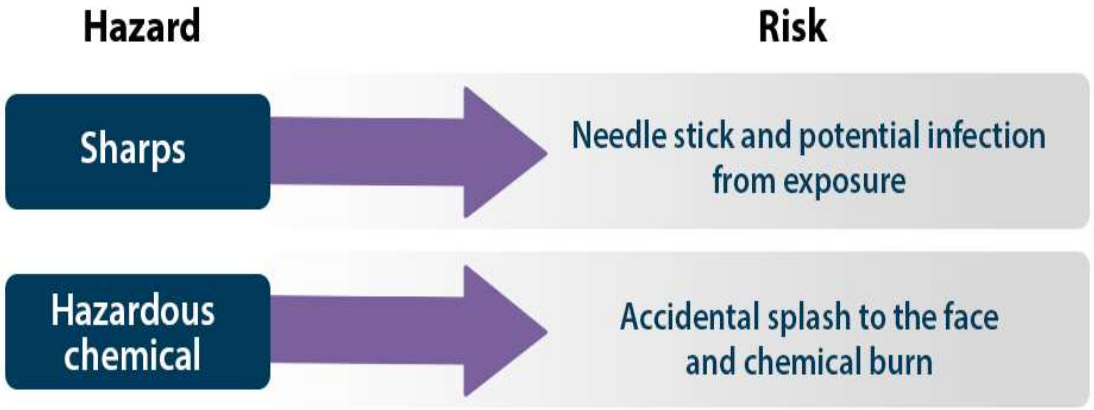
- Alert people in the area of the spill to evacuate and eliminate entrance of additional personnel via notification or posting of area.
- If any material has been splashed on you, if you have been exposed to the agent, or if any of your personal protective equipment has been breached, follow the Procedure for Exposure to Potentially Infectious Materials.
- Remove and disinfect any contaminated clothing.
- Notify your supervisor and Safety officer.

6.2.6 Risk Assessment of biological spill

- What was spilled? (i.e. Bacteria, yeast, pathogen, fungus)
- Type of spill: Liquid, aerosol, solid
- Amount that was spilled
- Location of the spill
- Is there a potential for release into the environment?
- Risk Group (RG) Assessment:

6.2.6 Risk Assessment of biological spill cont..

- RG1: Agents that are not associated with disease in healthy adult humans.
- RG2: Agents that are associated with human disease which is rarely serious and for which preventive or therapeutic interventions are often available
- RG3: Agents that are associated with serious or lethal human disease for which preventive or therapeutic interventions may be available (high individual risk but low community risk).



Source: Sandia National Laboratory Biosafety and Biosecurity Risk Assessment Technical Guidance Document, 2014

6.2.7 Session summary

- The healthcare environment can be a reservoir for potential pathogens. Environmental cleaning reduces the risk of potential pathogens in the healthcare environment.
- All Staff performing cleaning should understand the principles of cleaning.
- Staff performing cleaning duties should adhere to standard precautions, including hand hygiene and appropriate use of PPE.
- There is need to maintain awareness of the chemicals being used in the facility for cleaning and disinfection, and to understand the purpose and function of each chemical.

6.3 Laundry

- **6.3.1 Objectives**
- By the end of this unit, participants will be able to:
  - Outline the importance of proper handling and processing of soiled linen
  - Learn key steps for effective laundry cycle management
  - Describe key principles in handling and processing of linen
  - Explain the process of handling clean and soiled linen
  - Describe the minimum requirements for standard laundry services.

6.3.2 Introduction

- The Laundry Department washes and manages linens and other reusable items to prevent contamination and the spread of infection.
- Soiled linen poses potential threat to staff as well as patients.
- Implementing an effective laundry cycle management process for soiled linen is the way to prevent the spread of infection in healthcare environments.
- However, it is absolutely crucial that every step is monitored and standard precautions are followed, so as to significantly minimize the risk of infection.
- Laundry area layout should have separated clean and dirty areas with distinct flow of materials without mixing.
- Healthcare facilities can utilize - Inside laundry services with adequate equipment or with manual wash, or -outside laundry services on contract basis.

6.3.2. Definitions

- **Clean / Unused Linen:** any linen that has not been used since it was last laundered and that has not been in close proximity to a patient or stored in a contaminated environment.
- **Dirty / Used Linen:** all used linen other than infected linen that remains dry or without any stains.

6.3.2. Definitions cont…

- **Soiled / Infected Linen**: any used linen that is soiled with blood or any other body fluid or any linen used by a patient with a known infection (whether soiled or not).
- Soiled linen is a major vehicle for potentially harmful bacteria which can include bloodborne pathogens, MRSA and C. difficile, to spread beyond the source, and risk causing a serious infection outbreak in any healthcare environment
- **Infectious linen**: any linen that has been used by a patient who is known or suspected to be infectious.

6.3.3 Functions of a Laundry Department

- Collection or receiving used and soiled /infected linen
- Processing solid linen through laundry equipment: Sorting, sluicing and disinfecting, washing, extracting, drying, conditioning, ironing, pressing and folding
- Inspection and repair of damaged articles, mending and replacement those beyond repair
- Distributing finished linen to the respective user departments
- Maintenance and control of active and back-up interventions for processed linen
- Maintaining all type of registers for linen.

6.3.4 THE EIGHT KEY STEPS FOR EFFECTIVE LAUNDRY CYCLE MANAGEMENT

- **Step 1: Pre-sorting**
- The first stage of the process entails pre-sorting dirty linen by textile family at the point of collection.
- This means keeping cottons together with other cottons and doing the same with wools, synthetics, delicate and any other fabric needing to be processed.
- By doing this, each type of material can be washed using the most appropriate formula, with no risk of damage or contamination.

6.3.4 THE EIGHT KEY STEPS FOR EFFECTIVE LAUNDRY CYCLE MANAGEMENT CONT..

- **Step 2: Proper bagging transportation**
- Just as important as avoiding contamination of the linen itself is preventing contamination of the surrounding environment.
- Proper packaging and dedicated routes for dirty linen will help to avert this.
- Soiled wet linen should be placed in strong impervious plastic bags to prevent leakage.
- There must be separate trolleys for transporting clean and dirty linen.

6.3.4 THE EIGHT KEY STEPS FOR EFFECTIVE LAUNDRY CYCLE MANAGEMENT CONT..

- **Step 3: Sorting**
- Before cleaning, linen should be checked for sharp devices and other waste products that may risk harming the linen.

- **Step 4: Washing**
- Having sorted the linen, it is at this point that the right temperature and chemicals can be selected based on the fabric type.

6.3.4 THE EIGHT KEY STEPS FOR EFFECTIVE LAUNDRY CYCLE MANAGEMENT CONT..

- **Step 5: Drying & ironing**
- Both drying (eg: air dried in direct sunlight) and ironing should be performed as soon as possible after washing to prevent recontamination.
- If possible, keep the fabric off the ground and away from dust and moisture.
- For machine drying, ensure that the dryer is working as per standards and the heat generated is accurate.

6.3.4 THE EIGHT KEY STEPS FOR EFFECTIVE LAUNDRY CYCLE MANAGEMENT CONT..

- **Step 6: Packing clean linen**
- Similarly, once ironed, it is important that clean linen is packed securely to reduce the risk of contamination from the external environment.
- **Step 7: Post-wash transportation**
- Like the transportation of soiled linen prior to washing, it is vital that clean linen is transported to its point of use via pre-established clean linen routes.

6.3.4 THE EIGHT KEY STEPS FOR EFFECTIVE LAUNDRY CYCLE MANAGEMENT CONT..

- **Step 8: Storing of clean linen**
- Over time, it is the storage of clean linen that will ultimately protect it from damage by micro-organisms.
- Wood shelving should be replaced with alternatives such as metal or plastic to keep the risk of micro-organism growth in the wood itself to a minimum.
- Equally important is the need to use the linen which has been stowed away for the longest first, which will help to avoid prolonged storage.

Fig: Laundry cycle

6.3.8 Location of laundry department

- Ideally, it should be on the ground floor of an isolated building connected or adjacent to the water and power plant.
- Hospital laundry should be located away from the main service area of hospital.
- Close to boiler and water heating system.
- Large hospitals with 500 beds and above should establish their own mechanized laundry.
- Smaller hospitals should take the help of co-operative mechanized laundry.
- The laundry should be located in an area that has ample daylight and natural ventilation.

6.3.9 Facilities and space requirements

1. Space for heavy equipment like washing machine, squeezer etc.
2. Provision for supply of water and power.
3. Storage place for cleaning agents.
4. Space is also needed for sorting the soiled linen
5. Facilities to manually wash.
6. Clothes to dry in the sun.
7. Lines of cards to dry clothes in the sun.
8. Place for sewing, and mending area.
9. Place for ironing.
10. Desk to have registers and files.
11. Space in every ward for storing clean linen.

6.3.10 Methods and equipment for washing/cleaning

- **Manual Cleaning**
- Wash heavily soiled linen separately from non-soiled linen
- Wash the entire item in water with soap: Presoak heavily soiled lined in detergent
- Use disinfectant after washing soiled or contaminated linen
- Check items for cleanliness: Rewash if they are dirty or stained
- Clothes should be washed with soap and water until visibly clean
- Rinse linen with clean water
- Spread to facilitate drying by drip drying under sun or open area.

Machine Washing of Dirty/used Linen

- Dirty linen (non-infected linen) is to be washed in the first batch
- Weigh linen before loading it in the machine
- Adjust the temperature and time cycle of the machine according to manufacturer's instruction and the type of soap or other washing product being used
- Add an agent to the rinse cycle to reduce alkalinity and prevent yellowing.

Machine Washing of Dirty/used Linen

- **Machine Washing of Soiled Linen**
- Sluice soiled linen first (Removal of loose and heavier biological soil)
- After rinsing the sluiced linen wash as normal
- Heavily soiled linen may need two cycles if not found visibly clean
- If sluicing machine is not available, then it can be done manually wearing PPE.

- **Use of Mattresses, Pressure Relieving Cushions and Pillows**
- Should be covered with waterproof, stretchable vapor permeable materials capable of being washed with water, detergents and disinfectants
- Replace the mattress, pressure relieving cushion or pillow cover if soiled or torn
- Mattresses, pressure relieving cushion or pillow contaminated with blood or body fluids should be disposed of as clinical waste.

6.3.11 Protection of Laundry Workers

- PPE (e.g., utility gloves, water-resistant apron, protective eyewear and closed toe shoes) should always be worn when collecting, handling, transporting, sorting, hand washing or loading soiled linen into automatic washers
- Reusable gloves should be washed after use, allowed to air dry, and discarded if punctured or torn
- Personnel shall wash their hands whenever gloves are changed or removed
- All laundry workers should be trained in procedures for handling of soiled linen
- Laundry workers shall be offered immunization against hepatitis B virus (HBV).

6.3.13 Session summary

- An efficient and effective Linen and Laundry services can enhance patient experience and reduce the risk of cross contamination.
- Safe handling of linen following steps of laundry management and standard precautions is required.
- Quality inspectors may wish to understand how the laundry process impacts above and design a framework to identify necessary quality requirements within the organization.

Food and Water Safety

- **6.4.1 Objectives**
- By the end of this session, participants should be able to:
- Describe food and water borne infections
- Describe food and water safety in health facilities

6.4.2 Introduction

- Food safety is an important issue facing us in modern times. In the last decades, the epidemiology of food borne diseases is changing with new or unexpected pathogens often emerging.
- These changes are attributable to several socio-economic and demographic factors.
- The reoccurring challenges of maintaining a safe food environment in hospitals.
- Food safety is (and should be) a priority in hospitals and healthcare facilities.
- The dangers associated with feeding vulnerable patients such as the elderly, young children and immunocompromised individuals, that may be at a higher risk of developing a foodborne illness cannot be ignored.
- Food should not be the reason for otherwise preventable fatalities.

6.4.3 Definitions

- **Food safety**: The term “food safety” refers to the manner of handling, preparation and storage of foodstuffs with the aim of preventing contamination of the product and subsequent foodborne illness (or injury) of the consumer.
- Food safety encompasses the practices that are implemented to ensure that food products served are safe to consume.
- It ensures that food is not chemically or biologically contaminated during harvesting, storage, transportation, preparation and consumption.
- **Food borne infection** - invasion by the organism with multiplication or toxin production in the host.
- **Food borne intoxication** - growth in food source with toxin production before ingestion.

6.4.5 Causes of Food Poisoning: Common Bacterial Food Poisons

Incubation period	Cause	Symptoms	Common foods
1-6 hours	Staph aureus (enterotoxin)	Nausea, vomiting, diarrhea	Milk and milk products, ham, poultry, salads, custards
	Bacillus cereus (enterotoxin)	Nausea, vomiting, (emetic form)	Fried rice
8-16 hours	Clostridium perfringes (spores)	Abd.cramps, diarrhea Nausea and Vomitting -rare	Meat, poultry, legumes. gravies
	Bacillus cereus (diarrheal form- preformed n stable toxins)	Diarrhea, abd.pain, nausea, vomitting/fever-No	
>16 hours	Vibrio cholera	Rice watery stools	Water and ice creams, sea food
	Salmonella spp	Inflammatory diarrhea	Meat, milk n milk products, poultry
	Shigella sp	dysentery	Potato/raw eggs-salad

6.4.3 Water safety

- Infrastructure that supports water, sanitation, hygiene (WASH) and healthcare waste management practices helps prevent the spread of diseases within the healthcare facility and to the surrounding community.
- The collection, transportation, storage, and handling of water should be done so as to avoid risk of contamination.
- If the water supply for the health facility is from an unsafe source, it is possible to make it safe through boiling or chemical treatment.
- Monitoring or inspection of the water quality including the sources, collection, and storage, should be done on a regular basis.

6.4.4 Session summary

- Food and water safety should be a priority in hospitals and healthcare facilities to minimize infection risks related to unsafe food and water. Monitoring or inspection of the food and water quality including the sources, collection, and storage, should be done on a regular basis. Policies and procedures that are well implemented can help guide practice in these services.
- It is necessary to perform risk assessment to identify gaps and guide action plan.
- All staff should be trained on relevant issues aimed at reducing the risk, and they should be able to identify food and water hazards.

References

- https://www.cdc.gov/safelabs/resources-tools/bio-risk-assessment.html

Thank You
Questions ?