Environmental cleaning, disinfection and bio-medical waste management
Learning Objectives

• Environmental cleaning and Disinfection
  • Environmental decontamination
  • Cleaning of medical equipment
  • Cleaning soiled bedding, towels and clothes from patients with COVID-19
  • Cleaning and disinfection of occupied patient rooms
  • Cleaning and disinfection after patient discharge and transfer
  • Prevent environment contamination: contain respiratory secretions

• Bio-medical waste management
Environmental Cleaning and Disinfection
General Principles

- Healthcare environment contains a diverse population of microorganisms, but only few are significant pathogens.
- Microbiologically contaminated surfaces can serve as reservoirs of potential pathogens.
- Contaminated surfaces not directly associated with transmission of infections to either staff or patients.
- Transfer of microorganisms from environmental surfaces to patients is mostly via hand contact with the surface.
- Hand hygiene is important to minimize the impact of this transfer.
- Cleaning and disinfecting environmental surfaces is fundamental in reducing healthcare-associated infections.
Environmental Decontamination (2)

- COVID-19 virus can potentially survive in the environment for several hours/days
- Premises and areas potentially contaminated with the virus to be cleaned before their re-use
- Products containing antimicrobial agents known to be effective against coronaviruses may be used
- Established cleaning strategies to be used
  - Remove the majority of bioburden, and
  - Disinfect equipment and environmental surfaces
Environmental Decontamination (3)

- Housekeeping surfaces can be divided into two groups
  - Those with minimal hand contact (e.g. floors and ceilings)
  - “High touch surfaces” – those with frequent hand-contact
- High touch housekeeping surfaces in patient-care areas should be cleaned and/or disinfected more frequently
  - Doorknobs
  - Bedrails
  - Light switches
  - Wall areas around the toilet in the patient’s room
  - Edges of privacy curtains
Cleaning/disinfection of medical equipment (1)

- Wear gloves when handling and transporting used patient care equipment.
- Before removing equipment from patients room, medical equipment must be disinfected.
- Non-critical medical equipment:
  - E.g., stethoscopes, blood pressure cuffs, dialysis machines and equipment knobs and controls.
  - Usually only require cleansing followed by low- to intermediate-level disinfection, depending on the nature and degree of contamination.
Cleaning/disinfection of medical equipment (2)

• In absence of manufacturer instructions regarding cleaning/disinfection of equipment
  • Ethyl alcohol or isopropyl alcohol (60%–90%, v/v) often used to disinfect small surfaces (rubber stoppers of multiple-dose medication vials, and thermometers) and occasionally external surfaces of equipment (stethoscopes and ventilators)
  • Alcohol causes discoloration, swelling, hardening and cracking of rubber and certain plastics after prolonged and repeated use
    • Cover mattresses for easier disinfection
Cleaning/disinfection of medical equipment (3)

• Barrier protection of difficult to clean surfaces and equipment is useful, especially if these surfaces are
  • Touched frequently by gloved hands during the delivery of patient care
  • Likely to become contaminated with body substances, or
• Impervious-backed paper, plastic or fluid-resistant covers are suitable for use as barrier protection
• Remove and discard coverings with gloved hands
• Perform hand hygiene after ungloving
• Cover these surfaces with clean materials before the next patient encounter
## Cleaning/disinfection of medical equipment (4)

<table>
<thead>
<tr>
<th>Area/Items</th>
<th>Inputs</th>
<th>Process</th>
<th>Method/ procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stethoscope</td>
<td>Alcohol-based rub/Spirit swab</td>
<td>Cleaning</td>
<td>- Should be cleaned with detergent and water</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Should be wiped with alcohol based rub/spirit swab before each patient contact</td>
</tr>
<tr>
<td>BP cuffs &amp; covers</td>
<td>Detergent Hot water</td>
<td>Washing</td>
<td>- Cuffs should be wiped with alcohol- based disinfectant and regular laundering is recommended for the cover</td>
</tr>
<tr>
<td>Thermometer</td>
<td>Detergent and water</td>
<td>Cleaning</td>
<td>- Should be stored dry in individual holder</td>
</tr>
<tr>
<td></td>
<td>Alcohol rub</td>
<td></td>
<td>- Clean with detergent and tepid water and wipe with alcohol rub in between patient use</td>
</tr>
<tr>
<td></td>
<td>Individual thermometer holder</td>
<td></td>
<td>- Store in individual holder inverted</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Preferably one thermometer for each patient</td>
</tr>
<tr>
<td>Injection and dressing trolley</td>
<td>Detergent and water</td>
<td>Cleaning</td>
<td>- To be cleaned daily with detergent and water</td>
</tr>
<tr>
<td></td>
<td>Duster</td>
<td></td>
<td>- After each use should be wiped with disinfectant</td>
</tr>
<tr>
<td></td>
<td>Disinfectant (70% alcohol)</td>
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</tr>
</tbody>
</table>
Cleaning soiled bedding, towels and clothes from patients with COVID-19 (1)

- Clean the laundry and surfaces in all environments in which COVID-19 cases receive care – at least once a day and when a patient is discharged

- Hospital disinfectants:
  - 70% ethyl alcohol for small areas – reusable dedicated equipment (e.g. thermometers)
  - Sodium hypochlorite at 0.5% (equivalent 5000 ppm) for surface disinfection

- Individuals/staff dealing with soiled bedding, towels and clothes from patients with COVID-19 should:
  - Wear appropriate PPE – heavy duty gloves, mask, eye protection (goggles/face shield), long-sleeved gown, apron (if gown is not fluid resistant), and boots or closed shoes
  - Never carry soiled linen against body; place soiled linen in a leak-proof bag or bucket
  - Perform hand hygiene after blood/body fluid exposure and after PPE removal
Cleaning soiled bedding, towels and clothes from patients with COVID-19 (2)

- Soiled linen should be placed in clearly labelled, leak-proof bags or containers, carefully removing any solid excrement and putting in covered bucket to dispose of in the toilet or latrine

- Washing machine
  - Wash at 60-90°C with laundry detergent followed by soaking in 0.1% chlorine for approximately 30 minutes and dried

- No machine washing
  - Soaked in hot water with soap/detergent in a large drum
  - Use a stick to stir and avoid splashing
  - Empty the drum and soak linen in 0.1% chlorine for approx. 30 minutes
  - Rinse with clean water and let linens dry fully in the sunlight
Cleaning and disinfection of occupied patient rooms

• Designate specific well-trained staff for cleaning environmental surfaces
• Cleaning personnel should wear PPE and must be trained on proper use of PPE and hand hygiene
• Define the scope of cleaning to be done each day
• Use a checklist to promote accountability for cleaning responsibilities
• Keep cleaning supplies outside the patient room
Cleaning of Housekeeping surfaces and eating utensils

• Housekeeping surfaces:
  • Require regular cleaning and removal of soil and dust
  • Personal protective equipment (PPE) used during cleaning and housekeeping procedures
  • Need to be cleaned only with soap and water or a detergent/disinfectant, depending on the nature of the surface and the degree of contamination

• Dishes and eating utensils used by a patient with known or suspected infection
  • No special precautions other than standard precautions
  • Wear gloves when handling patient trays, dishes and utensils
Spill management

- Worker assigned to clean the spill should wear gloves and other personal protective equipment.
- Most of the organic matter of the spill to be removed with absorbent material.
- Surface to be cleaned to remove residual organic matter.
- Use disinfectant: hypochlorite.
  - 1% for small spills.
  - 10% for large spills.
Cleaning and disinfection after patient discharge or transfer

- Clean and disinfect all surfaces that were in contact with patient or may have become contaminated during patient care
- Do not spray or fog occupied or unoccupied rooms with disinfectant – potentially dangerous practice that has no proven benefits
Prevent environment contamination: contain respiratory secretions (1)

Ensure early recognition and prevention of transmission of the respiratory virus at the initial encounter with a healthcare setting

• Post **visual alerts** (in appropriate languages) at the entrance to outpatient facilities (e.g., emergency departments, physicians’ offices, outpatient clinics) instructing patient and the persons who accompany them to:
  • Inform healthcare personnel of symptoms of a respiratory infection when they first register for care, and
  • Practice **respiratory hygiene/cough etiquette**
Respiratory hygiene/cough etiquette

- All persons with signs and symptoms of a respiratory infection (regardless of presumed cause) must follow respiratory hygiene/cough etiquette
  - Cover the nose/mouth when coughing or sneezing
  - Use tissues to contain respiratory secretions
  - Dispose of tissues in the nearest waste receptacle after use
  - Perform hand hygiene after contact with respiratory secretions and contaminated objects/materials
Prevent environment contamination: contain respiratory secretions (2)

Ensure availability of materials for adhering to respiratory hygiene/cough etiquette in waiting areas for patients and visitors:

• Provide tissues and no-touch receptacles (i.e. waste container with foot-operated lid or uncovered waste container) for used tissue disposal

• Provide conveniently located dispensers of alcohol-based hand rub

• Provide soap and disposable towels for hand washing where sinks are available
Prevent environment contamination: contain respiratory secretions (3)

_Masking and separation of persons with symptoms of respiratory infection_

- During periods of increased respiratory infection in the community, offer triple-layer masks to persons who are coughing
- Encourage coughing persons to sit at least 3 feet (1 metre) away from others in common waiting areas

_Droplet precautions_

- Healthcare workers should practice droplet precautions, in addition to standard precautions, when examining a patient with symptoms of a respiratory infection
- Droplet precautions should be maintained until it is determined that they are no longer needed
Biomedical Waste Management

• Environment (Protection) Act, 1986
• Apply to all persons who generate, collect, receive, store, transport, treat, dispose, or handle any bio-medical waste
• "Occupier" means a person having administrative control over the institution and the premises generating bio-medical waste
• Responsibility of every occupier – safe and proper identification, handling, storage and disposal of biomedical waste from laboratories and related facilities
Segregation, packaging, transportation and storage

• Untreated bio-medical waste should not be mixed with other wastes
• Bio-medical waste shall be segregated into containers or bags at point of generation (as per BMWM Rules 2016)
• Bio-medical waste containers or bags should be prominently labelled with biohazard symbol (and other details as per Rules)
• Untreated bio-medical waste must not be stored >48 hrs
• Ensure no spillage occurs during handling and transit of bio-medical waste
Yellow bag

- Anatomical waste – human, animal body parts & tissue
- Soiled waste – items contaminated with blood or body fluids – like dressings, cotton swabs and bags containing residual blood/blood components
- Chemical waste – chemicals used in production of biologicals
- Microbiology, biotechnology and other clinical laboratory waste (to be pre-treated by autoclaving before discarding):
  - Blood bags
  - Laboratory cultures
  - Stocks or specimens of microorganisms
  - Live or attenuated vaccines
  - Human and animal cell cultures
- Discarded linen contaminated with blood or body fluid including mask and gown
Red Bag

- Contaminated recyclable waste
- Waste from disposable items:
  - Tubing and bottles
  - Intravenous tubes and sets
  - Catheters and urine bags
  - Syringes (without needles), vacutainers
  - Gloves
- Plastic petri-plates containing infectious material to be pre-treated by autoclaving and discarded in red bags
Translucent white box

- Puncture, leak and tamper proof
- Sharps waste (used, discarded and contaminated metal sharps)
  - Needles
  - Syringes with fixed needles
  - Needles from needle tip cutter or burner
  - Scalpels
  - Blades
- Any other contaminated sharps
Blue box

• Or containers with blue coloured marking
• Puncture and leak proof boxes

• Glassware
  • Broken or discarded glass including medicine vials & ampoules (except those contaminated with cytotoxic waste)
  • Broken or discarded contaminated glass
Labelling of BMW bags

Label should be non-washable and prominently visible

<table>
<thead>
<tr>
<th>Waste category Number .......</th>
<th>Day .......... Month .............</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste quantity...............</td>
<td>Year ...........</td>
</tr>
<tr>
<td>Sender's Name and Address:</td>
<td>Date of generation ................</td>
</tr>
<tr>
<td></td>
<td>Receiver's Name and Address:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phone Number:........................</td>
</tr>
<tr>
<td>Phone Number ............</td>
<td>Fax Number:..........................</td>
</tr>
<tr>
<td>Fax Number ..................</td>
<td>Contact Person .....................</td>
</tr>
<tr>
<td>Contact Person .............</td>
<td></td>
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<tr>
<td>In case of emergency please</td>
<td></td>
</tr>
<tr>
<td>contact:</td>
<td></td>
</tr>
<tr>
<td>Name and Address :</td>
<td></td>
</tr>
<tr>
<td>Phone No.</td>
<td></td>
</tr>
</tbody>
</table>
## Disposal of BMW

<table>
<thead>
<tr>
<th>Category</th>
<th>Type of bag/container</th>
<th>Type of waste</th>
<th>Treatment disposal options</th>
</tr>
</thead>
</table>
| Yellow   | Non chlorinated colour coded bags in coloured bins | • Human anatomical waste  
  • Animal anatomical waste  
  • Soiled waste  
  • Expired or discarded medicines  
  • Chemical waste  
  • Micro, biotech & clinical lab waste  
  • Chemical liquid waste | Incineration/deep burial                                                     |
|          |          | Separate collection system leading to ETP                                      |                                                 |
| Red      | Non chlorinated plastic bags in coloured bins/containers | Contaminated waste (recyclable) tubing, bottles, urine bags, syringes (without needles) and gloves | Auto/micro/hydro and then sent to recycling       |
| White    | Translucent, puncture, leak & tamper proof | Waste sharps including metals                                                  | Auto/dry heat sterilization followed by shredding/mutilation/encapsulation |
| Blue     | Water proof card board boxes/containers | Glassware waste                                                                | Disinfection or auto/micro/hydro then sent to recycling |

*Disposal by deep burial is permitted only in rural or remote areas where there is no access to common biomedical waste treatment facility. This will be carried out with prior approval from the prescribed authority*
Conclusion

• Cleaning and disinfecting environmental surfaces is fundamental in reducing healthcare-associated infections
• Established cleaning strategies to be used
• Cleaning staff must be protected by use of standard precautions including use of appropriate PPE
• Prevent environment contamination by containing respiratory secretions
• Manage biomedical waste as per existing Biomedical waste management Rules
Thank you