وزارة الصحة
Ministry of Health

الإدارة العامة لمكافحة عدوى المنشآت الصحية

General Directorate of Infection Prevention and Control

(GDIPC)

Best Practices of Environmental Health for Prevention & Control of Infections in Healthcare Facilities Guidelines

All Healthcare Providers Have a Role in Maintaining a Clean & Safe Environment

August 2022

Version 1.1

وزارة الصحة
Ministry of Health

In the name of ALLAH, Most Gracious, Most Merciful

وزارة الصحة
Ministry of Health

Contributors:

Dr. Sameh Tawfeeq

samehtawfeeq@moh.gov.sa

Mrs. Ahlam Alamri

ahlama@moh.gov.sa

Ms. Hind Alenazi

Hoalenazi@moh.gov.sa

Mr. Rayed Asiri

raalasiri@moh.gov.sa

Mr. Adel Alenazi

adsualanazi@moh.gov.sa

Mr. Riyadh Alshehri

Rashehri@moh.gov.sa

Ms. Wafa Alshammari

Wahaalshammari@moh.gov.sa

Reviewed by:

Mrs. Ahlam Alamri

ahlama@moh.gov.sa

Approved by:

Dr. Khalid H. AlAnazi

Kal-enazi@moh.gov.sa

وزارة الصحة
Ministry of Health

Content

Definitions

Microorganisms:

Animals or plants of microscopic size. As used in healthcare, generally refers to bacteria, fungi, viruses, and bacterial spores

Contaminated:

State of having actual or potential contact with microorganisms. As used in healthcare, the term generally refers to the presence of microorganisms that could produce disease or infection.

Inanimate surface:

Nonliving surfaces (e.g., floors, walls, furniture).

Cleaning:

The physical removal of foreign material (e.g., dust, soil) and organic material (e.g., blood, secretions, excretions, microorganisms). Cleaning physically removes rather than kills microorganisms. It is accomplished with water, detergents, and mechanical action.

Routine cleaning:

Regular cleaning (and disinfection, when indicated) when the room is occupied to remove organic material, reduce microbial contamination, and provide a visually clean environment. Emphasis is on surfaces within the patient zone.

Environmental cleaning:

Cleaning and disinfection (when needed, according to risk level) of environmental surfaces (e.g., bed rails, mattresses, call buttons, chairs) and surfaces of noncritical patient care equipment (e.g., IV poles, stethoscopes).

Cleaning cart (also known as cleaning trolley):

A dedicated cart or trolley that carries environmental cleaning supplies and equipment.

Cleaning products (also known as cleaning agents):

liquids, powders, sprays, or granules that remove organic material (e.g., dirt, body fluids) from surfaces and suspend grease or oil. Can include liquid soap, enzymatic cleaners, and detergents

Cleaning session:

A continuous environmental cleaning activity is performed over a defined period in defined patient care areas. A cleaning session could include routine or terminal cleaning.

Cleaning solution:

A combination of water and cleaning product (e.g., detergent) in a ratio specified by the manufacturer.

Contact time:

The time that a disinfectant must be in contact with a surface or device to ensure that appropriate disinfection has occurred. For most disinfectants, the surface should remain wet for the required contact time.

Safety data sheet (SDS):

A document by the supplier or manufacturer of a chemical product that contains information on the product's potential hazards (health, fire, reactivity, and environmental) and how to work safely with it. It also contains information on the use, storage, handling, and emergency procedures.

Material compatibility:

Chemical compatibility and other factors affect corrosion, distortion, or other damage to materials.

Patient care areas:

Any area where patient care is directly (e.g., examination room) and indirectly (e.g., medication preparation area) provided. Includes the surrounding healthcare environment (e.g., patient toilets).

Patient zone:

The patient and his or her immediate surroundings. Includes all surfaces that are temporarily and exclusively designated for that patient.

General patient areas:

Outpatient or ambulatory care wards and inpatient wards with patients admitted for routine medical procedures who are not receiving acute care (i.e., sudden, urgent or emergent episodes of injury and illness that require rapid intervention).

Specialized patient areas:

Inpatient wards or units (e.g., medication preparation areas) for high-dependency patients (e.g., ICUs), immunosuppressed patients (e.g., bone marrow transplant, chemotherapy), patients undergoing invasive procedures (e.g., operating rooms), or those who are regularly exposed to blood or body fluids (e.g., labour and delivery ward, burn units).

Hemodialysis station:

A hemodialysis machine with a chair or bed and connections to purified water and sanitary sewer. Stations in facilities with central delivery can also have acid concentrate and bicarb concentrate connections.

Surgical field:

Includes the patient zone in the operating rooms where asepsis is required. Only sterile objects and personnel are allowed in the surgical field.

High-touch surfaces:

Surfaces, often in patient care areas, that are frequently touched by healthcare workers and patients (e.g., bedrails, over bed table, IV pole, door knobs, medication carts).

Low-touch surfaces:

Surfaces that are minimally touched by healthcare workers and patients (e.g., walls, ceilings, floors).

Heavy-contamination area:

Areas should be considered heavily contaminated if surfaces or equipment are regularly exposed to significant amounts of blood or other body fluids (e.g., birthing suite, autopsy suite, cardiac catheterization laboratory, burn unit, hemodialysis unit, emergency department, bathrooms of patients with diarrhea or incontinent).

Moderate-contamination area:

Areas should be considered moderately contaminated if surfaces or equipment are regularly contaminated with blood or body fluids (e.g., patient/resident rooms, bathrooms of continent patients) and the blood or body fluids are contained or rapidly removed (e.g., wet sheets). All client/resident/patient rooms and all bathrooms should be considered moderately contaminated.

Light-contamination area:

Areas can be considered lightly contaminated or not contaminated if surfaces are not exposed to blood or body fluids or items that have come in contact with blood or body fluids (e.g., lounges, libraries, offices).

Terminal (discharge) cleaning:

Cleaning and disinfection after the patient is discharged or transferred. Includes the removal of organic material and significant reduction and elimination of microbial contamination.

Environmental cleaning services area:

A dedicated space for preparing, reprocessing, and storing clean or new environmental cleaning supplies and equipment, including cleaning products and PPE. Access is restricted to cleaning staff and authorized personnel.

Antimicrobial agent:

Any agent that kills or suppresses the growth of microorganisms.

Antiseptic:

A substance that prevents or arrests the growth or action of microorganisms by inhibiting their activity or by destroying them. The term is used especially for preparations applied topically to living tissue.

Bactericide:

An agent that kills bacteria.

Detergent:

A synthetic cleansing agent that can emulsify and suspend oil. Contains surfactant or a mixture of surfactants with cleaning properties in dilute solutions to lower surface tension and aid in the removal of organic soil and oils, fats, and greases.

Disinfection:

A thermal or chemical process for inactivating microorganisms on inanimate objects.

Disinfectants:

Chemical compounds that inactivate (i.e., kill) pathogens and other microbes fall into one of three categories based on chemical formulation:

- low-level
- mid-level
- high-level

Disinfectants are applied only to inanimate objects. All organic material and soil must be removed by a cleaning product before the application of disinfectants. Some products combine a cleaner with a disinfectant.

Low-level disinfection:

Inactivates most vegetative bacteria, some fungi, and some viruses in a practical contact time, but does not kill more hardy viruses (e.g. non-enveloped), and bacterial genus (e.g. mycobacteria), or bacterial spores.

Mid-level disinfection (also intermediate-level disinfection):

Kills inactivate vegetative bacteria, including mycobacteria, most viruses, and most fungi, but might not kill bacterial spores.

High-level disinfection:

Kills all microorganisms, with the exception of small numbers of bacterial spores.

Disinfectant fogging:

Misting or fogging a liquid chemical disinfectant to disinfect environmental surfaces in an enclosed space.

Disinfectant solution:

A combination of water and disinfectant, in a ratio specified by the manufacturer.

Three-bucket system (mopping):

Floor mopping system for cleaning and disinfection. One bucket contains a detergent or cleaning solution, the second bucket contains disinfectant or disinfectant solution, and the third bucket contains clean water for rinsing the mop.

Two-bucket system (mopping):

Floor mopping system for cleaning only (not disinfection). One bucket contains a detergent or cleaning solution and the second bucket contains clean water for rinsing the mop.

Reusable patient care equipment:

Devices that Health Care Workers (HCW) can reuse to diagnose and treat multiple patients (e.g., surgical forceps, endoscopes and stethoscopes).

Microfiber cloths:

Cloths are made from a tightly woven combination of polyester and polyamide (nylon) fibers.

Hand hygiene (HH):

Any action of hand cleansing to physically or mechanically remove dirt, organic material or microorganisms.

Personal protective equipment (PPE):

Personal protective equipment for health care providers and other staff refers to a variety of barriers used alone or in combination to protect mucous membranes, airways, skin and clothing from contact with infectious agents and chemical agents.

Standard precautions:

Are used for all patient care. Based on a risk assessment and make use of common sense practices and personal protective and other equipment that protects healthcare providers from infection and prevent the spread of infection from patient to patient.

Transmission-based precautions:

Are used in addition to Standard Precautions for patients with known or suspected infections. There are three categories:

- **Contact:**
  intended to prevent transmission of infectious agents, including epidemiologically important microorganisms, that are spread by direct or indirect contact with the patient or the patient's environment
- **Droplet:**
  intended to prevent transmission of pathogens spread through close respiratory or mucous membrane contact with respiratory secretions
- **Airborne:**
  intended to prevent transmission of infectious agents that remain infectious over long distances when suspended in the air (e.g., rubeola virus [measles], varicella virus [chickenpox], M. tuberculosis, and possibly SARS-CoV).

Biohazard spill kits

If any biological spill occurs, including blood and other body substances (e.g., vomit, urine), this type of kit can be very effective.

Introduction

Healthcare-associated infections (HAIs) are one of the most relevant public health problems worldwide. The role of the hospital environment as a reservoir of pathogens causing HAIs is confirmed by various published literature, healthcare-associated pathogens can survive on environmental surfaces for several months. The actual survival times in healthcare settings vary considerably based on factors such as temperature, humidity, and surface type. In a variety of healthcare settings, environmental contamination has been significantly associated with the transmission of pathogens in major outbreaks of methicillin-resistant Staphylococcus aureus (MRSA), vancomycin-resistant enterococci (VRE), Clostridioides difficile (C.diff), and more recently in protracted outbreaks of Acinetobacter baumannii.

From all the above-mentioned data, it is obvious that environmental contamination in healthcare settings plays a significant role in the transmission of HAIs and outbreak incidents consequently. Therefore, environmental health related measures are a fundamental approach to infection prevention and control (IPC). It is a multifaceted intervention that involve cleaning and disinfection (when indicated) of the environment alongside other key program elements (e.g., leadership support, training, monitoring, and feedback mechanisms). To be effective, environmental health activities must be implemented within the framework of the facility IPC program, and not as a standalone intervention. It is also essential that IPC programs advocate for and work with facility administration and facility officials to operate and maintain adequate environmental infrastructure and resources to ensure that environmental health activities can be performed according to best practices. This guideline is tailored to provide a wide range of environmental health approaches that if implemented effectively will impact on health, safety, and quality of care provided to our patients.

The intended audience of the document:

All Health care workers (HCWs), Infection prevention & control staff, healthcare administrators, housekeeping and maintenance staff's department.

Purpose of the document:

The purpose of this guideline is to provide useful information for healthcare professionals in an effort to offer a safe environment to ensure that quality healthcare services will be administered to the patients. The recommendations herein provide guidance to minimize the risk for and prevent transmission of pathogens in the indoor healthcare facility environment, as well as to promote and standardize the implementation of environmental cleaning in patient care areas in all healthcare facilities.

Effective Environmental Health Program

The key program elements for effective environmental cleaning & disinfection programs include the following components:

1. Organization /administration component.
2. Staffing and training of housekeeper component.
3. Policy and procedure component.
4. Quality monitoring and auditing component.

1. Organization /administration component:

Administrative support

Required support from the healthcare facility administration for the environmental cleaning & disinfection program includes a designated cleaning program manager or focal person. Additionally, an effective environmental cleaning & disinfection program requires a defined management structure, including organizational and reporting lines, and on-site supervision and an annual budget.

2. Staffing and training of housekeeping staff's component

Staffing:

The appropriate number of staffs and their training and education are key program elements. Cleaning staff should always have:

- Written job descriptions.
- Be familiar with their job descriptions and performance standards.
- Supplies and equipment, including personal protective equipment (PPE), to perform their duties.
- Reasonable working shifts.

Education and training:

- A training program must be developed according to the literacy level and work area.
- Maintain training records, including dates, training content, and names of trainers and trainees.
- A training program should be mandatory before staff can work independently within the healthcare facility.
- Follow up and continues competency assessments (e.g., at least annually, before the introduction of new environmental cleaning supplies or equipment).
- Training content should include, at a minimum:
  - General introduction to the principles of IPC, including the transmission of pathogens, personal protective equipment's (PPE), & hand hygiene.
  - Principles of environmental cleaning and disinfection based on national or facility environmental cleaning guidelines and policies.

- Safely prepare and use different detergents, disinfectants, and cleaning solutions
- How to prepare, use, reprocess, and store cleaning supplies and equipment (including PPE).
- Specific training for cleaning staff who could be responsible for cleaning procedures in specialized patient areas—particularly high-risk areas, such as intensive care units, operating rooms, and maternity units.
- Specific environmental cleaning tasks for which they are responsible, including review of internal facility policy & procedure, and checklists.
- How cleaning staff can protect themselves from pathogens.

3. Policy and procedure component

key elements for implementing an effective environmental health program according to the development of facility environmental cleaning & disinfection policy, procedures, checklists, and other job aids.

Provides the standards to which the facility will perform to meet best practices and include the following main standards:

- Defined lines of accountability and functional reporting lines and responsibilities for all implicated staff.
- Cleaning schedules for every patient care area and non-critical patient care equipment, specifying the frequency, method, the area intended to be cleaned, and staff responsible.
- Special cleaning procedures for resistant organisms and outbreak management.
- Only experienced housekeeping staff are allowed in the critical departments such as intensive care units.
- Training requirements and performance standards for cleaning staff
- Monitoring methods, frequency, and staff responsible.
- list of approved cleaning products, supplies, and equipment and any required specifications on their use.
- Use manufacturer's instructions in the following: preparation of environmental cleaning products (i.e., dilution, if applicable), reprocessing of reusable cleaning supplies, equipment and personal protective equipment, and reprocessing (i.e., cleaning and disinfection) of noncritical patient care equipment.
- literacy levels and preferred language of cleaning staff should be taken into consideration.
- Cleaning checklists are an interactive tool that can help ensure that all steps of cleaning and disinfection measures are completed.
- Cleaning logs are job aids that can help guide the daily workflow of cleaning staff.

- Cleaning job aids include posters, pictorial guides, and other visual reminders for key cleaning tasks.
- Make logs available in central locations or where the cleaning task occurs so that supervisory staff can manage them on a daily basis, along with staff (e.g., IPC focal person) responsible for periodic monitoring activities.

Note:

Externally Contracted Programs

Environmental cleaning programs are increasingly implemented by external companies through a contract or service level agreement. Contracted staff, including cleaning staff and cleaning supervisors, should work closely with the environmental cleaning program focal person and IPC staff at the facility to ensure that environmental cleaning is performed according to best practices and facility policy.

It is essential that all the standard program elements be described explicitly in the service level agreement with the external company, to ensure accountability. In general, the components of the service level agreement should be similar to the facility cleaning policy, and at a minimum should include:

- An organizational chart for all contracted employees, including functional reporting lines and responsibilities.
- The staffing plan for each patient care area, including contingency plans for additional staff.
- The training content and frequency for contracted employees.
- A summary of the cleaning schedules and methods for each patient care area, in line with the facility policy.
- The methods for routine monitoring and feedback.
- The supplies and equipment to be used.

4. Quality monitoring and auditing component

- The responsibility for ensuring that cleaning of the environment in a health care facility is performed according to best practices and health care facility policy belongs to all staff involved in environmental cleaning, from the front-line environmental service workers to supervisors.
- To ensure that this goal is met, a quality control program that includes regular assessments of cleaning and cleanliness is required.
- There are currently a wide variety of approaches that can be used to monitor cleanliness in the health care environment.
- Each approach addresses different aspects of cleaning and each has strengths and weaknesses.
- Results of approaches used to monitor cleanliness should be used for education and training and to provide both positive and constructive feedback to environmental service workers.

- Health care facilities should use at least one measure that directly assesses environmental cleaning process quality.
- Results of cleaning audits should be used for the purposes of training and to provide positive and constructive feedback to frontline environmental service workers.
- Aggregate results must be presented to relevant stakeholders, e.g., environmental service leadership, infection prevention and control, and the infection control committee.

Common monitoring methods are either (*see* Table 1): -

- Visual assessment
- Environmental cleaning performance observation
- Environmental marking
- Adenosine triphosphate (ATP)

Table 1: Methods Used to Monitor Cleaning and Cleanliness in Health Care Facilities

Method	Description	Advantages	Disadvantages
Visual assessment	- Trained observer (e.g., Trained infection control personnel) assesses cleanliness of an area following cleaning.	- Easy to implement. - Allows feedback to environmental service staff.	- Results do not correlate with levels of microbial contamination. - Does not assure that a "health care clean" has been achieved. - Results may vary across different observers.
Environmental cleaning performance observation	- The environmental service supervisor observes environmental service workers performing cleaning.	- Easy to implement. - Useful to assess that facility procedure for cleaning are performed correctly. - Allows feedback to environmental service staff.	- Time-consuming. - Labour intensive. - Performance while observed may not be the same as performance when not observed.
Environmental marking	- Prior to cleaning, environmental surfaces are marked with an invisible tracing agent** that can only be seen using a revealing agent. - After cleaning, a trained observer can check to determine if the tracing agent was removed from the surfaces during cleaning. - Failure to remove the tracing agent from a surface suggests that the surface was not cleaned.	- Allows direct assessment of cleaning. - Allows assessment of which high- and low-touch surfaces are cleaned consistently and are omitted associated with rapid improvement when constructive feedback is provided. - Easy to implement. - Results easily understood.	- Does not directly measure microbial contamination. - Does not measure quality or intensity of cleaning (i.e., a single wipe will remove marker). - Does not assess adequacy of cleaning of unmarked surfaces. - Surface texture may affect the removal of tracing agent.
Adenosine triphosphate (ATP)*	- ATP is a substance found in all living cells. - Surfaces can be tested after cleaning to determine the quantitative level of ATP present.	- Allows assessment of residual organic material present after cleaning. - Provides quantitative result. - Easy to implement. - Provides quick and direct feedback.	- Not a direct measure of microbial contamination. - Some cleaning products may interfere with the test (e.g., microfiber, bleach, hydrogen peroxide, quaternary ammonium compounds). - Does not assess the adequacy of cleaning of unmarked surfaces.

* **Adenosine triphosphate (ATP)** is a substance present in all living cells and some organic materials, including food, and body fluids as the presence of ATP on a surface indicate that organic material remains on the surface thus while the absence of ATP suggests that there is little microbial contamination of a surface, the presence of ATP could represent either microbial (viable and dead) contamination or other organic material.

** **A tracing agent** (e.g., fluorescent material, chemical tracer) marks predetermined items and surfaces before cleaning. After cleaning, a trained observer uses a detecting agent (e.g., ultraviolet light, enzymatic detector) to determine if any tracing agent is left. The observer counts the items that still show tracing agent and gives a score based on how many were cleaned completely, partially, or not at all.

Structured monitoring programs ensure that environmental cleaning is conducted according to best practices. There must be organizational support and resources to address deficiencies identified during monitoring activities. Use a standardized methodology for monitoring, apply it on a routine basis, and provide timely feedback to cleaning staff and program leadership. Promptly return monitoring results as a feedback mechanism to cleaning staff, so they can make immediate improvements to practice, and management (e.g., cleaning program manager), to make more general improvements to the cleaning program.

Environmental Cleaning and Disinfection Required Supplies, Equipment's, Health Care and Utility Room Design

A. In order to support the best environmental cleaning & disinfection practices, the following general requirements are essential:

Environmental surfaces

- Environmental services, infection prevention & control, and occupational health should be consulted as key stakeholders at the planning stage of construction and renovation and must be involved in decision-making regarding choices of equipment, furniture and finishes in health care settings.
- All healthcare settings must have a process in place to ensure that all selected surfaces, finishes, furnishings and equipment are cleanable and compatible with the hospital disinfectant used by the healthcare facility.
- If equipment, furnishings, finishings, or surfaces are damaged and cannot be effectively cleaned, they must be repaired, replaced or removed from use within clinical areas.
- When selecting surfaces for use in clinical areas within health care settings, surfaces with the following characteristics are recommended, as these characteristics minimize the risk of microbial contamination:
  a) Cleanable
  b) Easy to maintain & repair
  c) Resistant to microbial growth

d) Nonporous
e) Seamless

- Wood is an example of an organic material that contains moisture, porous and should be avoided in care areas.

Cloth furnishing:

- Microorganisms have been shown to survive on porous fabrics such as cotton, cotton terry, nylon and polyester and on porous plastics such as polyurethane and polypropylene.
- Cloth furnishings can harbour higher concentrations of fungi than nonporous furnishings additionally, bacteria cannot be effectively removed from the surfaces of upholstered furniture.
- Stuffing and foam cannot be effectively disinfected if breaks in fabric or leaks of body fluids or spills have occurred.
- Cloth surfaces such as curtains, pillows, mattresses or soft furnishings are used in clinical areas, cloth surfaces with the following characteristics are preferred, as these characteristics minimize the risk of microbial contamination:
  - Seamless (where possible) or have double-stitched seams.
  - Easy to access (e.g., removable covers) for cleaning.
  - Have foam cores that are resistant to mold.
  - Durable and able to tolerate repeated cleaning with detergents and disinfectants, without damage.
  - Quick drying.
  - Easy to maintain, repair or replace.
  - Covered with fluid-resistant fabric.

Bedside privacy curtains:

- Privacy curtains are commonly used in health care settings, and they rapidly become contaminated with microorganisms.
- Privacy curtains are considered high-touch surfaces.
- The use of privacy curtains with antimicrobial properties has not been proven to reduce infection risk and does not eliminate the risk of contamination with microorganisms.
- Bedside curtains should be washed properly and drying temperatures must be reached and appropriate chemicals must be ensured.
- Privacy bedside curtains must be removed, cleaned and disinfected immediately if they become contaminated with blood or body fluids, or are visibly soiled.
- Privacy bedside curtains used for all patients including patients under isolation precautions should be changed following discharge or transfer of the patient and before a new patient is admitted to that room or bed space.

- For patients with extended stays, health care facilities should consider changing privacy curtains regularly (on a routine schedule), and when visibly soiled, or at least monthly.

Carpeting:

- Carpeting has been associated with an increased risk of health care-associated infection rates in immunocompromised populations.
- Carpets collect dust and debris and are more difficult to maintain than floors. Because the dust in carpets contains fungal spores that may induce asthma attacks and cause fatal infections in immunocompromised patients, carpets are not recommended
- Compared to hard-surface flooring, however, carpeting is harder to keep clean, especially after spills of blood and body substances.

B. Soiled (dirty) and clean utility/supply rooms:

- It is an essential environmental cleaning principle that clean and soiled (i.e., dirty, used) supplies and equipment should be clearly separated.
- Each patient care area should be equipped with a room dedicated as a soiled utility room.
- A separate room shall be dedicated to the storage of clean supplies and equipment.
- A soiled utility room is used for the temporary storage of supplies and equipment that will be removed for cleaning, reprocessing or disposal.

Soiled utility rooms characteristics:

- Should be well-ventilated and illuminated (lighting or window access)
- Labelled with a biohazard sign on the door
- Physically separate from other areas, including clean supply/storage areas.
- Have a work counter and flushing-rim clinical sink (i.e., hopper) with a hot and cold mixing faucet.
- Have a dedicated hand washing sink with both hot and cold running water.
- A separate utility sink is also required if the soiled utility room will be used for rinsing or removal of gross soiling of medical instruments or equipment.
- Have personal protective equipment available to protect staff during cleaning and disinfecting procedures.
- Be adequately sized within the unit and located near the point of care.
- Soiled utility rooms should not be used to store unused equipment.
- Have printed copies of the SDS for all environmental cleaning products, manufacturer's instructions, and job aids for the preparation of cleaning and disinfectant solutions.
- Never contain personal clothing or grooming supplies, food or beverages.

Clean utility room characteristics:

- Separate from and have no direct connection with soiled workrooms or soiled holding areas.
- Keep supplies free from dust and moisture and stored off the floor.
- Be adjacent to usage areas and easily available to staff.
- Be equipped with a work counter and dedicated hand washing sink if used for preparing patient care items.

C. Cleaning equipment:

- Cleaning equipment requires careful and regular cleaning and disinfection to avoid inadvertent cross-transmission of microorganisms during subsequent use.
- Tools and equipment used for cleaning and disinfection must be single-use and, if multi-use should be cleaned and dried between uses (e.g., mops, buckets).
- Cleaning tools and equipment such as mop used in a room or bed space on isolation precautions must be either disposable and discarded after use, or if re-usable, changed immediately after use and transport to the laundry.
- If the mop heads and cleaning cloths should be changed and laundered daily or after use (if used less frequently than daily) and changed when visibly soiled.
- All washed mop heads must be dried thoroughly before storage.
- Cleaning equipment shall be well maintained, clean and in good repair.

Surface cleaning supplies:

Portable containers for environmental cleaning products (or solutions) should be clean, dry, appropriately sized, labelled, and dated.

Surface cleaning cloths should be cotton or microfiber (disposable wipes can be used if resources allow). Have a supply of different colored cloths to allow color-coding: for example, one color for cleaning and a second color for disinfecting. Color-coding also prevents cross-contamination between areas.

Floor cleaning supplies:

- Mop heads or floor cloths should be cotton or microfiber.
- Use a cart or trolley with two or three buckets for the mopping process.
- It is highly recommended to display a wet floor/caution sign before starting.

D. Storage of cleaning supplies:

- All chemical cleaning agents and disinfectants should be appropriately labelled and stored in a manner that eliminates exposure, inhalation, skin contact or personal injury.
- A safety data sheet (SDS) shall be readily available for each item.
- Equipment used to clean toilets (e.g., toilet brushes, toilet swabs) should not be carried from room to room.
- Toilet cleaning and disinfecting equipment should be discarded when the patient leaves or sooner if required.
- In multi-bed rooms, a system should be developed for the replacement of toilet brushes on a regular basis or as required.
- When choosing a tool for cleaning toilets, consideration should be given to equipment that will minimize splashing.

Remember:

Microfiber Versus Cotton:

Microfiber cloths are often preferred over cotton for both cleaning cloths and mop heads because microfiber absorb more dirt and microorganisms than cotton. However, microfiber cloths can be damaged by high pH and therefore not compatible with all disinfectant products (especially chlorine-based). They need to be laundered separately from cotton cloths/linens, which could be expensive.

Disinfectant or Detergent-Disinfectant Wipes:

Prepared (ready-to-use) wipes that are saturated with an appropriate disinfectant or detergent-disinfectant product can be used as an alternative to cotton or microfiber cleaning cloths. It is important to ensure that they are stored appropriately with the lid closed, so the wipes remain wet. Discard wipes if they are no longer saturated. Follow manufacturer's instructions for storing wipes and for instructions for use (e.g., recommended contact times).

E. Cleaning carts and trolleys

- Cleaning carts and trolleys provide several benefits, such as the ability to carry and safely manage all the essential cleaning supplies and equipment and increased occupational safety for cleaning staff**.**
- Two-bucket system (routine cleaning): one bucket contains a detergent or cleaning solution and the other contains rinse water **(***see* **Figure 1).**

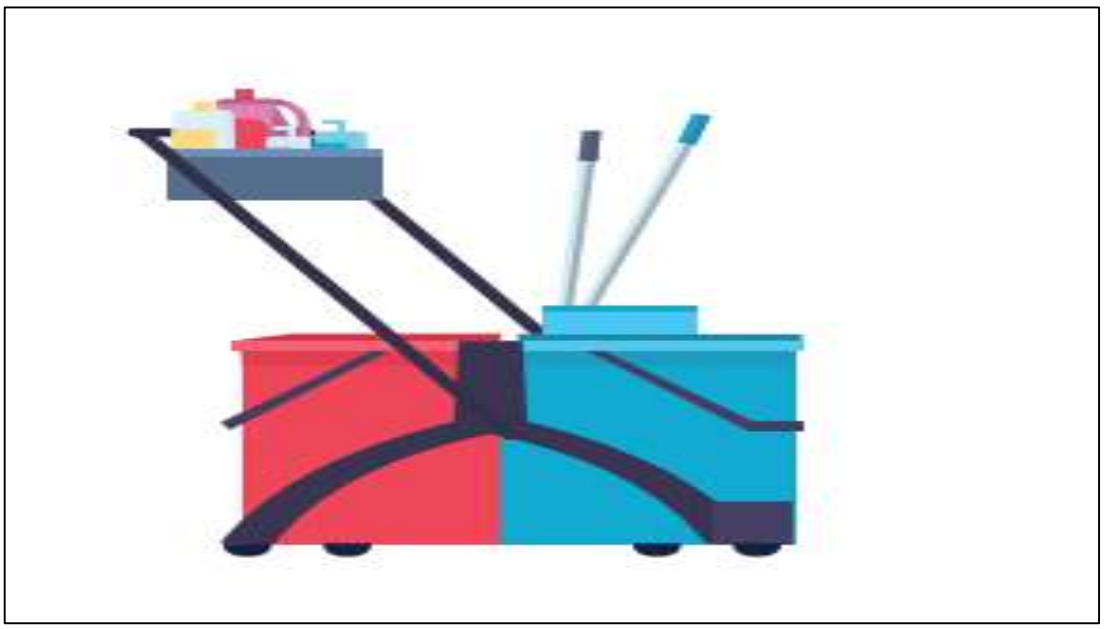

Figure 1: Two Bucket System

- Three-bucket system (for disinfection): one bucket contains the detergent or cleaning solution; one contains rinse water and one the disinfectant or disinfectant solution. The rinse water bucket allows the mop to be rinsed and wrung out before it is re-dipped into the prepared solution. This extends the life of the solution (i.e., fewer changes are required), which saves both time and material costs (*see* **Figure 2**)

Figure 2: Three Bucket System

- Stock cleaning carts with sufficient quantities of supplies (e.g., cleaning cloths, cleaning solutions) to avoid the need to return for more supplies in the middle of cleaning in a particular patient care area.

- Should have a separation between clean and soiled items.
- Should never contain personal clothing or grooming supplies, food or beverages.
- Should be thoroughly cleaned at the end of the day.
- Shall be equipped with a locked compartment for storage of hazardous substances, and each cart shall be locked at all times when not attended, and stored, when not in use, within a locked housekeeping closet.

F. New equipment/product purchases

The administration of the health care setting is responsible for ensuring and verifying that any item used in the provision of care to clients/patients/residents is capable of being cleaned and disinfected according to current standards and guidelines.
There are different kinds of products available for environmental cleaning, which all have distinct properties, advantages, and disadvantages to their potential use in healthcare.

Method of selecting the environmental cleaning products (e.g., detergents, disinfectants):

- Develop and maintain a master list of facility-approved environmental cleaning products in the facility cleaning policy, as well as a list of approved suppliers (i.e., manufacturers, and distributors).
- Minimize the number of different environmental cleaning products in use at the facility.
- Manage environmental cleaning products according to the product's material safety data sheet (MSDS). Display the MSDS where these products are stored and prepared.
- Prepare cleaning and disinfectant solutions according to the manufacturer's instructions. Preparing higher-strength concentrations or diluting beyond recommendations may pose an unnecessary risk to patients, staff, visitors, and the environment.
- Ensure that environmental cleaning products are selected that do not damage the surfaces, equipment intended to be cleaned and disinfected and are compatible with them.
- Ensure that standard operating procedures or instructions are available for the preparation, use, and disposal of environmental cleaning products.
- Must be approved by MoH infection prevention and control, occupational health and safety, and environmental services.
- Must be used according to the manufacturers' recommendations (e.g., for dilution, temperature, water hardness, contact time, etc.).
- Must be dedicated for healthcare facilities use.

The process of selecting cleaning and disinfecting agents

- A multidisciplinary team should evaluate the cleaning and disinfectant products and selection will be made accordingly. Team members should include infection

preventionist, hospital leaders, housekeeping staff, occupational health staff, medical supply department staff, clinical staff, and other environments of care professionals (see Table 2).

- Review manufacturers' instructions and relevant national guidelines before purchasing cleaning and disinfectant. Consequently, the cleaning and disinfectant products can be properly used and will not pose a patient or health care worker safety risk.
- Although the complexity of the health care environment may require the use of more than one disinfectant product, every effort should be made to limit the total number of different products in use. This will simplify the cleaning process, minimize the training requirements for environmental service workers and reduce the potential for errors.
- Disinfectants are only used after cleaning and are not substitutes for cleaning unless they are a combined detergent-disinfectant product. Before disinfecting, use a cleaning product to remove all organic material and soil (see **Table 2**).
- Low-level disinfection is generally adequate for environmental cleaning procedures, but there are specific cases where intermediate-level disinfection with sporicidal properties (e.g., C. difficile) is required.

Table 2: The Criteria for Selection of Disinfectant:

The properties of the disinfection	The common Action
Broad-spectrum	- Active against the microorganisms encountered in the health care setting.
Fast-acting	- Produce a rapid kill.
Not affected by environmental factors	- Active in the presence of organic matter (e.g., blood, sputum, feces) and compatible with soaps, detergents, and other chemicals.
Nontoxic	- Low irritancy and allergenic characteristics. - Not to be harmful to the user or patient.
Surface compatibility	- Not corrode instruments and metallic surfaces. - Not cause the deterioration of cloth, rubber, plastics, and other materials.
Residual effect on treated surfaces	- Leave an antimicrobial film on the treated surface.
Ease of use	- Easy to use with clear label directions. - The disinfectant should be simple to prepare and use at the required concentration. - Require little or no mixing or diluting. - The ability of the disinfectant to act as a cleaner and disinfectant (e.g., one-step cleaner disinfectant.)
Wet contact time	- The disinfectant should have a sufficiently short contact time and should keep surfaces wet long enough to ensure that the contact time is met. - Active at room temperature with a short contact time.
Odorless	- A pleasant odor or no odor to facilitate its routine use.
Economical	- Not be prohibitively high in cost.
Solubility	- Be soluble in water.
Stability	- Stable in concentrate and use-dilution.
Cleaner	- Good cleaning properties.
Environmentally friendly	- Damage the environment on disposal.

Table (3): Types of Approved Disinfectants & Detergents Used for Healthcare Environments:

Disinfectant	Area / Surfaces	Example of Items / Surfaces	Steps
Hospital Approved **Hydrogen Peroxide 3-5 %**	• Isolation Rooms • Critical Care Unit • Surgical Ward • Operating Theatre	**HIGH-TOUCH ENVIRONMENTAL SURFACES:** Bed rails, bedside tables, lockers, doorknobs, computers, blood pressure cuffs, pulse oximeters, Crutches, keyboards, trolleys, stethoscopes, intravenous pumps, stands etc.	- All non-critical items if not visibly clean should be cleaned with [soap and water] before using any disinfectant on daily basis and after patient discharge. - Wear PPE (disposable non-sterile gloves and mask). - Spray the solution on the surface/equipment and allow it to air dry. (pre-cleaned surface) (Contact Time: 5 minutes).
Hospital Approved **Quaternary Ammonium Chloride** (Disposable Wipes)	Non-Critical Surface Areas	**HIGH-TOUCH ENVIRONMENTAL SURFACES:** Bed rails, bedside tables, lockers, doorknobs, computers, blood pressure cuffs, pulse oximeters, crutches, keyboards, trolleys, stethoscopes, intravenous pumps, stands etc.	- Wear PPE. - Pick up the wipe from the container. - Wipe the equipment/surface to thoroughly wet in one direction with friction. - Allow the surface to air dry to ensure greater contact time for killing pathogens. (Contact time minimum 1-2 minutes). - Discard the wipe after 'one usage' and 'one direction'.
Hospital Approved **70% Isopropyl Alcohol** (Disposable Wipes)	Non-Critical Patient Care Items / Medical Equipment	Patient care equipment which are not compatible with Quaternary Ammonium Chloride wipes.	- Wear PPE. - Pick up the wipe from the container. - Wipe the equipment/surface to thoroughly wet in one direction with friction. - Allow the surface to air dry to ensure a greater contact time for killing pathogens. (Contact time minimum 1-2 minutes). - Discard the wipe after 'one usage' and 'one direction'.

Disinfectant	Area / Surfaces	Example of Items / Surfaces	Steps
Hospital Approved **Sodium Hypochlorite 5.25**	(C. Difficile & OR Rooms)	Floor & Toilet	- Use 1:10 dilution (5000ppm) - (400ml + 1 gallon of water) - Contact time 20 minutes
	(Non-C. Difficile Room)	For Toilet	- Use 1:100 dilution (500ppm) - (40mls + 1-gallon water) - Contact time 20 minutes
Hospital Approved **Quaternary Ammonium Chloride** (Liquid)	Non-Critical Surface Areas	For floors, walls and ceilings of Isolation and Non-Isolation patients' room during daily cleaning and terminal cleaning	- Use the disinfectant in accordance with the manufacturer's instructions (for the use and contact time).

Note:

Please follow the manufacturer's instructions for the cleaning and disinfecting direction and contact time. In the absence of a manufacturer's cleaning instructions, follow certain procedures:

1. All Surfaces/ equipment should be physically clean prior to disinfection either by disinfectant by wipe or by spray.
2. This may be followed by an application of an EPA-registered hospital-approved disinfectant after careful evaluation.
3. Contact time is the time needed for the germicide solution to remain wet on the surface to achieve disinfection of the stated kill claim(s) on the manufacturer's label.

Note:

For further information; Refer to the Approved Infection Control Supplies, Equipment and Disinfectants Specifications Guidelines, 1st Edition, GDIPC, MOH, 2021

Environmental Cleaning and Disinfecting Methods:

A. General overview of the environmental surfaces:

- Although any surface may become contaminated, the risk and extent of contamination are greater for surfaces and items that are handled frequently by the hands or gloves of staff or patients as compared to surfaces that are less frequently handled or touched.
- Surfaces within the health care setting and in particular within the patient's environment can be classified as high- and low-touch surfaces, as follows:
  - **High-touch surfaces** are those that have frequent contact with hands, examples include (but are not limited to) doorknobs, elevator buttons, telephones, call bells, bedrails, light switches, toilet flushes, monitoring equipment, IV infusion pump, end-of-bed table and the edges of the privacy curtains.
  - **Low-touch surfaces** are those that have minimal contact with hands, examples include (but are not limited to) floors, walls, ceilings, and window sills.
- High-touch surfaces in care areas require more frequent cleaning and disinfection than minimal contact surfaces.
- Cleaning and disinfection should be performed at least daily and more frequently if the risk of environmental contamination is higher.
- Low-touch surfaces require cleaning on a regular basis, when soiling or spills occur, and when a patient is discharged or transferred.

B. Cleaning & disinfection techniques:

- **Daily routine cleaning of the patient room or bed space:**

  The health care clean of patient rooms should follow a standard, methodical format that includes each of the following elements:

  a) Routine practices and additional precautions.
  b) Perform hand hygiene before entering the room or bed space (for multi-bed rooms).
  c) Put on additional personal protective equipment if required to avoid exposure to blood or body fluids or if indicated by additional precautions signage.
  d) As much as possible, work from clean to dirty (to avoid moving dirt and microorganisms from dirty areas to cleaner areas) and from high to low (to avoid having dirt or microorganisms drip down and re-contaminate areas already cleaned).
  e) Hand hygiene is required every time the room or bed space is re-entered and every time upon leaving the room or bed space.

f) If gloves or other personal protective equipment are worn, they must also be removed every time you leave the room or bed space, and new personal protective equipment must be put on when re-entering the room or bed space.
g) In-room bathrooms should be cleaned last, after completing room cleaning, based on the principle of cleaning from clean to dirty.

- **Discharge/Transfer patient room cleaning (Terminal Cleaning):**
  - When a patient is discharged, transferred or dies, the room or bed space must be cleaned and disinfected thoroughly before the next patient occupies the space to prevent the transfer of microorganisms to the new patient.
  - Cleaning and disinfection upon discharge include several steps not required during routine daily cleaning.
  - **<u>In general, clinical staff are responsible for:</u>**
    a) Removing or discarding medical supplies.
    b) Emptying items containing blood or body fluids and removing items or equipment potentially contaminated with blood or body fluids (e.g., discarding IV bags and tubing and urinary catheter collection bag, emptying bedpans/commodes/urinals/washbasins, emptying suction bottles.
    c) Disposal of personal articles left by the patient/resident including toiletries (e.g., soap, creams, razors, toothbrushes, comb, books, magazines, toys).
    d) These items can transmit microorganisms to other patients and must be taken with the patient on discharge/transfer or discarded.

- **Floor cleaning:**
  - Floors in health care settings may be comprised of a number of materials, depending on the location of the flooring and the patient population in the vicinity.
  - It is important to review the manufacturer's recommendations for cleaning a particular type of flooring before developing cleaning protocols.
  - Floor cleaning consists of dry dust mopping to remove dust and debris, followed by wet mopping with a detergent to clean.
  - Floors are low-touch surfaces that rarely come in contact with the hands of patients or health care providers.
  - Dry mopping may be done with microfiber mops or pads to reduce the dispersal of dust and debris.
  - A clean mop pad should be used for each room.
  - Wet mopping can be done using a bucket and loop mop, or with a microfiber mop.

- **Cleaning & disinfection of equipment:**
  - Electronic equipment in the health care setting includes infusion pumps, ventilators, patient-controlled analgesia pumps, infusion fluid warmers, infant sensors, monitoring equipment, and keyboards.
  - Inappropriate use of liquids on electronic medical equipment may result in fires and other damage, equipment malfunctions and health care provider burns.
  - It is important that the cleaning and disinfecting agents used for equipment should be compatible with it and that manufacturer's recommendations for cleaning are followed.

To avoid hazards of medical equipment problems due to cleaning and disinfection processes the followings should be applied:

a) Obtain the manufacturer's labelling which may include instructions for cleaning and disinfection; information may be available on the manufacturer's website.
b) Review labelling for any cautions, precautions, or warnings about wetting, immersing or soaking the equipment.
c) Review the manufacturer's cleaning and maintenance instructions and ensure all staff who will be cleaning the item are trained.
d) If equipment is contaminated with blood or other potentially infectious material, follow the equipment manufacturer's directions for cleaning to remove as much soil as possible; it may be necessary to remove the equipment from service for thorough cleaning and disinfection.
e) Electronic equipment that cannot be adequately cleaned or disinfected should not enter the immediate care environment.
f) Electronic equipment should be cleaned on a regular basis, depending upon its use and the risk for patient-to-patient transmission of microorganisms.
g) Electronic equipment that goes from patient to patient within the care environment must be cleaned and disinfected between patients.
h) Electronic equipment used within the patient's environment by staff (e.g., work station on wheels) should be cleaned and disinfected by the user before entering the patient's environment and after removal from the patient's environment.
i) Electronic equipment that is handled by staff in the care areas outside of the patient environment (e.g., keyboard at the nursing station) should be cleaned and disinfected on a routine basis (e.g., daily, twice daily).

- **Toys/playrooms/activity room cleaning & disinfection:**

  Toys can be a reservoir for potentially pathogenic microorganisms and outbreaks associated with toys have been described in the literature. All toys should be cleaned and disinfected between users.

  Note:
  - For further information; Refer to the Infection Control Recommendations for Toys and Kids Playing Areas in Healthcare Facilities, GDIPC, MOH, 2018.

- **Transport equipment's & vehicle cleaning & disinfection:**

  Transport equipment (e.g., wheelchairs, stretchers, walkers, and ambulance vehicles) used for more than one patient should be cleaned and disinfected immediately following use and when required and paying particular attention to the high touched surfaces. Once cleaned and disinfected, equipment should be tagged as clean.

  Note:
  - For further information; Refer to Emergency Medical Services (EMS) Infection Control Guidelines, GDIPC, MOH, 2019.

- **Blood or body fluid spill cleaning and disinfection:**

  Health care facilities should have policy & procedure documents in place for dealing with blood and body fluid spills. Protocols should be included in procedural manuals and emphasized in ongoing education or training programs.
  Strategies for decontaminating spills of blood and other body substances (e.g., vomit, urine) differ based on the setting in which they occur and the volume of the spill.

  Note:
  - For further information; Refer to the Basic Infection Control Skills License (BICSL) - Trainer's Guideline – 2nd Edition, GDIPC, MOH, 2021

C. Cleaning & disinfection strategies:

- **Proceed from High to Low (Top to Bottom)**

  Proceed from high-to-low to prevent dirt and microorganisms from dripping or falling and contaminating already cleaned areas. Examples include:
  - Cleaning bed rails before bed legs.
  - Cleaning environmental surfaces before cleaning floors.
  - Cleaning floors last to allow the collection of dirt and microorganisms that may have fallen.

- **Proceed from Cleaner to Dirtier**

  Proceed from cleaner to dirtier areas to avoid spreading dirt and microorganisms (see **Figure 3**). Examples include:
  - During terminal cleaning, clean low-touch surfaces before high-touch surfaces.
  - Clean patient areas (e.g., patient zones) before patient toilets.

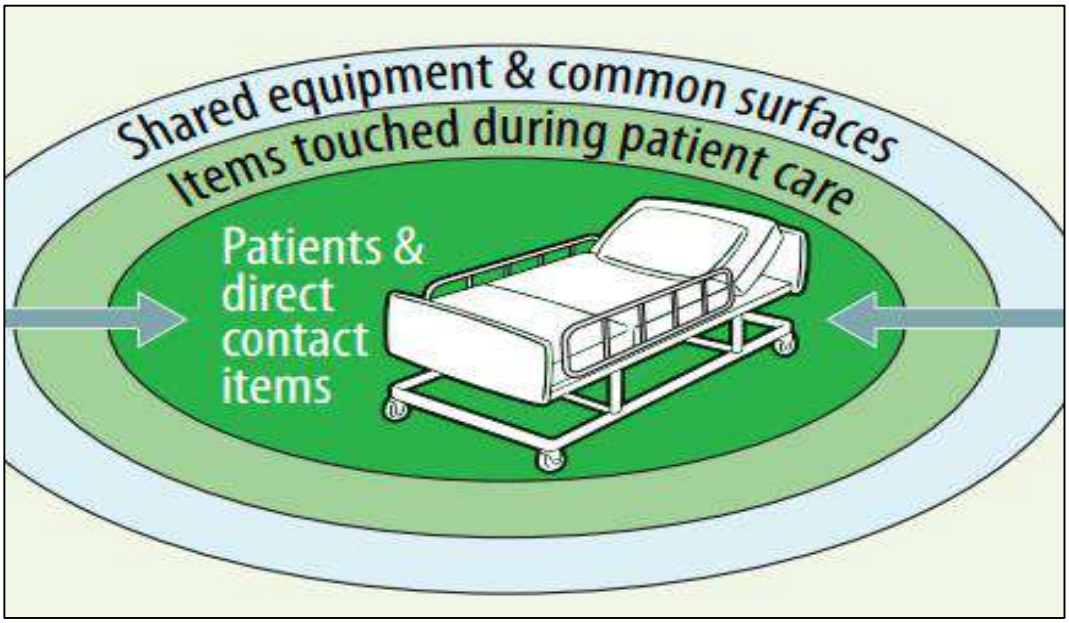

Figure 3: Proceed for Cleaner to Dirtier

- **Proceed in a Methodical, Systematic Manner**

  Proceed in a systematic manner to avoid missing areas—for example, left to right or clockwise (Figure 4). In a multi-bed area, clean each patient zone in the same manner—for example, starting at the foot of the bed and moving clockwise.

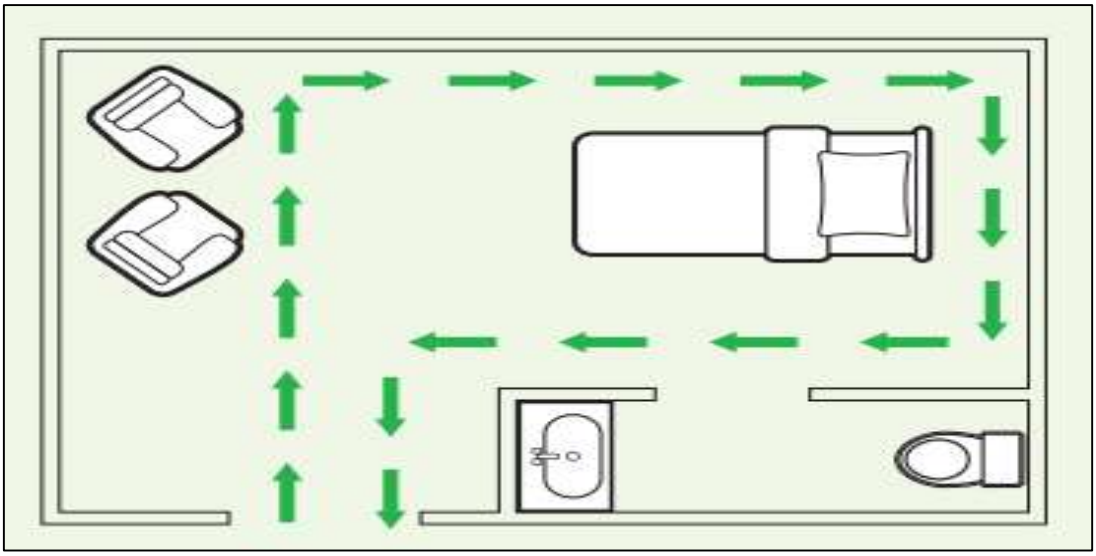

Figure 3: Proceed in a Methodical, Systematic Manner

D. New and evolving technologies for environmental cleaning & disinfection in health care settings:

- **No-touch disinfection systems**
  - Environmental surfaces in the health care setting are frequently contaminated with clinically relevant pathogens and these pathogens often persist despite routine cleaning and disinfection.
  - No-touch disinfection systems are systems that use chemical disinfectants or physical agents to disinfect surfaces and which do not require that the active agent is directly applied to and removed from the surface manually.
  - The most studied and approved no-touch disinfection systems include the use of hydrogen peroxide mist or vapor or the use of ultraviolet light to disinfect surfaces.

- **Disinfection using hydrogen peroxide vapor or mist:**

  Systems that produce hydrogen peroxide for surface disinfection include:
  - Hydrogen peroxide vapor at 30% to 35% is generated by heat.
  - Aerosolized hydrogen peroxide at 2% to 7% is generated by pressure or ultrasonic nebulization.
  - Hydrogen peroxide disinfection systems could be not used in presence of a human.
  - Hydrogen peroxide systems are effective against a wide range of microorganisms, including bacteria, viruses and spores, particularly those of C. Difficile.
  - The vapor or mist is typically delivered by a distribution system that ensures even distribution throughout the room while monitoring gas concentration, temperature and relative humidity.
  - Once decontamination is complete, an aeration unit in the room converts the hydrogen peroxide into water and oxygen.
  - The complete decontamination process takes an average of two to five hours.
  - Hydrogen peroxide vapor systems have some limitations, including health and safety risks to patients and staff present when the system is operating, erosion of some plastic and polymer surfaces after repeated exposure, and reduced efficacy where organic materials are not removed prior to using the system. In addition, different materials (e.g., linen, soft furnishings) may also affect the efficacy of these systems.
  - To achieve optimal disinfection effect, these systems also need to be positioned properly, and the heating, ventilation and air conditioning system must be shut off during while these systems are operating.
  - The time required to complete a cycle of disinfection using some hydrogen peroxide vapor systems may take more than four times longer than the time required for manual environmental cleaning or the use of other technologies such as the use of ultraviolet light disinfection.

- Hydrogen peroxide vapor reduces the level of bacterial contamination on surfaces following routine cleaning and disinfection (*see* **Table 4**).

- **Disinfection using ultraviolet light:**
  - UV radiation is a known disinfectant for air, water, and nonporous surfaces. UV radiation has effectively been used for decades to reduce the spread of bacteria.
  - Ultraviolet light disinfection could be not used in presence of humans as direct exposure to UV light is dangerous to humans.
  - Ultraviolet light at wavelengths of 200 to 320 nm can kill microorganisms by destroying bonds in genetic materials.
  - UV radiation can only inactivate microorganisms if the microorganism is directly exposed to the radiation.
  - Inactivation of microorganisms on surfaces may not be effective due to the blocking of the UV radiation by soil, such as dust, or other contaminants such as bodily fluids.
  - The Ultraviolet light disinfection has been used in the health care setting to destroy airborne organisms or inactivate microorganisms on surfaces.
  - Bacteria and viruses are more easily killed by ultraviolet light than are bacterial spores.
  - If ultraviolet light is used in a health care setting, warning signs should be posted in the affected area to alert staff, patients and visitors of the hazard.
  - A schedule for replacing ultraviolet lamps should be developed according to the manufacturer's recommendations.
  - Ultraviolet light intensity should be regularly monitored.
  - Pre-cleaning of visibly soiled surfaces is necessary before ultraviolet light disinfection, as ultraviolet light is absorbed by organic materials and its ability to penetrate is low.
  - Ultraviolet light disinfection reduces the level of bacterial contamination on surfaces following routine cleaning and disinfection.
  - UV machine is commonly used inside air ducts to disinfect the air (*see* **Table 4**).

Table 4: Advantages and Disadvantages of Hydrogen Peroxide Vapor or Mist and Ultraviolet Disinfection Systems:

Environmental Terminal Disinfection Technology	Advantages	Disadvantages
Hydrogen peroxide vapor or mist	- Reduces bacterial burden when added to manual cleaning - Broad-spectrum microbicidal activity and sporicidal - Environmentally safe residues - Simultaneous disinfection of room surfaces, furniture, and complex equipment - Uniform distribution in the room via an automated dispersal system - No need to move furniture and equipment away from the walls - It may be used to decontaminate entire units or wards during outbreaks	- Adds to the time required for room cleaning - Discharge/transfer cleaning only, as patients and staff must be removed from the room before decontamination - Efficacy is affected by surface nature, hydrogen peroxide concentration, presence of organic soiling - Pre-cleaning is required to remove dust and stains - Sealing of air ducts from the room and gaps under doors required prior to decontamination - The optimal methodology (including exposure time) is still under investigation - Expensive - The potential damage of some plastic and polymer surfaces - Staff must not enter during the disinfection cycle - Trained system operators required - Transport of system to rooms where disinfection occurs requires time and labour
Ultraviolet light	- Reduces bacterial burden when added to manual cleaning - Broad spectrum microbicidal activity and sporicidal - Relatively short cycle time (15 minutes) - No residue after use - Prior-to-use sealing of heating, ventilation and air conditioning systems not required - Simultaneous disinfection of room surfaces, furniture, and equipment - Low operating costs	- Discharge/transfer cleaning only, as patients and staff must be removed from the room before decontamination - Pre-cleaning is required to remove dust and stains - Expensive for the initial outlay of equipment - Staff must not enter during the disinfection cycle - Trained system operators required

Note:

- The use of no-touch disinfection systems does not replace the need for routine manual cleaning of environmental surfaces.

Cleaning Procedures for Different Hospital Areas

A. Cleaning procedures for Operating Room:

This is a high-risk specialized patient area with a mechanically controlled atmosphere where surgical procedures are performed. A high degree of asepsis is required because the vulnerability of the patients to infection is high (*see* **Table 5)**.

Table (5): Cleaning Procedures for Operating Room

Frequency	Person / Staff	Products / Technique	Method
Before first procedure	**Shared cleaning possible:** perioperative nursing / clinical staff and cleaning staff	**Disinfect:** 1. Horizontal surfaces 2. Furniture 3. Surgical lights 4. Operating bed 5. Stationary equipment	1. Carefully inspect records and assess the operating space to ensure that the terminal clean was completed the previous evening. 2. Wipe all horizontal surfaces in the room (e.g., furniture, surgical lights, operating bed, stationary equipment) with a disinfectant to remove any dust accumulated overnight. 3. If there was no written confirmation of terminal cleaning on the previous day, do a full terminal clean. 4. Thoroughly clean and disinfect portable patient-care equipment that is not stored within the operating theatre, such as suction regulators, anaesthesia trolley, compressed gas tanks, x-ray machines, and lead gowns, before introduction into the operating theatre.
Before and after every procedure	**Shared cleaning possible:** perioperative nursing /Clinical staff and cleaning staff	**Clean and disinfect:** • High-touch surfaces (e.g., light switches, doorknobs) outside • Surgical field • Any surface visibly soiled with blood or body fluids • All surfaces and noncritical equipment and the floor inside • The surgical field	Remove all used linen and surgical drapes, and waste (including used suction canisters, ¾ filled sharps containers), for reprocessing or disposal. • **Clean and disinfect:** high-touch surfaces (e.g., light switches, doorknobs) outside of the surgical field or any visible blood or body fluids outside of the surgical field (e.g., walls, floors). • All surfaces (high- and low-touch) and the floor inside of the surgical field, tops of surgical lights, reflective portion of surgical lights, suction canisters, tourniquet cuffs and leads, anesthesia trolley, operating table from top to bottom.

After the last procedure (terminal cleaning)	**Shared cleaning possible:** perioperative nursing / clinical staff and cleaning staff	**Clean and disinfect:** • All surfaces and noncritical equipment in the operating room • The entire floor • Any surface visibly soiled with blood or body fluids • Scrub and utility areas/sinks	**Clean and disinfect:** 1. Horizontal surfaces (high- and low-touch) and fixed equipment in the operating theatre, including booms and wheels of any equipment (e.g., carts). 2. Vertical surfaces such as walls and windows as needed to remove visible soiling. 3. Ventilation (ducts), handwashing sinks, scrub, and utility areas/sinks. 4. Floor take care to move the operating table and any mobile equipment to make sure to reach the floor areas underneath. 5. Thoroughly clean and disinfect portable patient-care equipment that is not stored within the operating theatre prior to removal from the operating theatre.

N.B. Operating Room must:

- Have dedicated supplies and equipment for the OR (e.g., mops, buckets).
- Use fresh mops/floor cloths and mopping solutions for every cleaning session, including between procedures.
- Use fresh cleaning cloths for every cleaning session, regularly replacing them during cleaning and never double-dipping them into cleaning and disinfectant solutions.

B. Cleaning procedure for Intensive Care Units (ICU) (Adult, Pediatric, Neonatal):

These are high-risk areas because patients may be immuno-compromised by underlying diseases, treatment modalities (e.g., invasive devices), and other life-threatening conditions (e.g., major trauma, stroke), and vulnerability to infection are high (*see* **Table 6)**.

Table 6: Cleaning Procedures for ICU (Adult, Pediatric, Neonatal)

Frequency	Person / Staff	Method	Additional Guidance
Twice daily and as needed	Cleaning staff	**Clean and disinfect:** • High-touch surfaces (only outside of neonatal incubator when occupied) **Clean:** • Floors with neutral detergent and water.	Last clean of the day: clean low-touch surfaces
At discharge / Transfer (Terminal cleaning)	Cleaning staff	**Clean and disinfect:** • High-touch surfaces • Low-touch surfaces • Floors	1. Remove soiled/used personal care items (e.g., cups, dishes) for reprocessing or disposal. 2. Remove linens for reprocessing or disposal. 3. Change curtains for laundering. 4. Reprocess all reusable (noncritical) patient care equipment (in assistant with the area nursing staffs). 5. Clean and disinfect all low- and high-touch surfaces, including those that may not be accessible when the room/area was occupied (e.g., patient mattress, bedframe, tops of shelves, vents), and floors. 6. Clean (scrub) and disinfect handwashing sinks. Pay special attention to the terminal cleaning of incubators.

C. Cleaning procedure for Special Isolation Units:

These are high-risk areas in which patients are highly immunosuppressed (e.g., bone marrow transplant, leukemia) and vulnerability to infection is high (*see* **Table 7)**.

Table 7: Cleaning Procedures for Special Isolation Units

Frequency	Person / Staff	Method	Additional Guidance
Daily, before cleaning any other patient care area (i.e., first cleaning session of the day)	Shared cleaning possible (clinical staff and cleaning staff)	Clean and disinfect: High-touch surfaces, with a focus on the patient zone Clean: Floors with neutral detergent and water	In addition, clean low-touch surfaces.
At discharge/ transfer (terminal cleaning)	Cleaning staff	Clean and disinfect: • High-touch surfaces • low-touch surfaces • Floors	• Remove soiled/used personal care items (e.g., cups, dishes) for reprocessing or disposal. • Remove linens & curtain for reprocessing or disposal. • Reprocess all reusable (noncritical) patient care equipment (in assistant with the area nursing staffs). • Clean and disinfect all low- and high-touch surfaces, including those that may not be accessible when the room/area was occupied (e.g., patient mattress, bedframe, tops of shelves, vents), and floors. • Clean (scrub) and disinfect handwashing sinks.

D. Cleaning procedure for Burn Units:

These are high-risk units where the vulnerability of the patients to infection (immunocompromised) and probability of contamination (e.g., with blood and body fluids) are high (*see* **Table 8)**.

Table 8: Cleaning Procedure for Burn Units

Frequency	Person/ Staff	Method	Additional Guidance
Before and After (i.e., between) every procedure and twice daily and as needed	Shared cleaning possible (clinical staff and cleaning staff)	Clean and disinfect: • High-touch surfaces and floors focus on the patient zone. • Any surface visibly soiled with blood or body fluids.	Remove soiled linens and waste containers for disposal/reprocessing. **Last clean of the day**: clean and disinfect the entire floor and low-touch surfaces.
At discharge/ Transfer (Terminal cleaning)	Cleaning staff	Clean and disinfect: • High-touch surfaces •Low-touch surfaces • Entire floor	• Remove soiled/used personal care items (e.g., cups, dishes) for reprocessing or disposal. • Remove linens for reprocessing or disposal. • Change curtains for laundering or disposal. • Reprocess all reusable (noncritical) patient care equipment. • Clean and disinfect all low- and high-touch surfaces, including those that may not be accessible when the room/area was occupied (e.g., patient mattress, bedframe, tops of shelves, vents), and the entire floor. • Clean (scrub) and disinfect handwashing sinks.

E. Cleaning procedure for Medication Preparation Areas:

Areas where medication is prepared (including pharmacy or in clinical areas) are high-risk areas in which a high degree of asepsis is required (*see* **Table 9**).

Table 9: Cleaning Procedures for Medication Preparation Areas

Frequency	Person/ Staff	Method	Additional Guidance
Between uses	Clinical staff	**Clean and disinfect:** • Countertops • Portable carts used to transport or prepare medications	None
End of each day	Shared cleaning possible (clinical staff and cleaning staff)	**Clean and disinfect:** • All high-touch surfaces • Floors	Clean and disinfect low-touch surfaces, such as the tops of shelves and walls/ vents, on a scheduled basis (e.g., weekly)

F. Cleaning procedure for Sterile Services Areas:

Areas where semi-critical and critical equipment is sterilized and stored in which a high degree of asepsis is required (*see* **Table 10)**.

Table 10: Cleaning Procedures for Sterile Services Areas:

Frequency	Person/ Staff	Method	Additional Guidance
Before and after every use	Clinical staff	**Clean and disinfect:** • Utility sinks used for washing • Semi-critical equipment (e.g., endoscopes)	None
Twice daily	Shared cleaning possible (clinical staff and cleaning staff)	**Clean and disinfect:** • All high-touch surfaces • Floors	Clean and disinfect low-touch surfaces, such as the tops of shelves and walls/ vents, on a scheduled basis (e.g., weekly) during the final daily clean

G. Cleaning procedure for General Procedure Areas:

These are high-risk areas (such as radiology and endoscopy services) because they often service patients with high vulnerability to infection (e.g., immunosuppressed), in addition to other patient populations (*see* **Table 11**).

Table 11: Cleaning Procedure for General Procedure Areas

Frequency	Person/ Staff	Method	Additional Guidance
Before and after every procedure	Clinical staff	**Clean and disinfect:** • Any surface that is visibly soiled with blood or body fluids • High-touch surfaces inside the patient zone • Procedure table/station • Counter tops • External surfaces of fixed equipment • Floors inside the patient zone	Remove disposable equipment and reprocess reusable noncritical patient care equipment.
After the last patient of the day (terminal cleaning)	Shared cleaning possible (clinical staff and cleaning staff)	**Clean and disinfect:** • All high-touch and low-touch surfaces • Entire floor	Move the procedure table and other portable equipment to clean and disinfect the entire floor area. Handwashing sinks should be thoroughly cleaned (scrubbed) and disinfected.

H. Cleaning procedure for Labor and Delivery Wards/Rooms:

These are high-risk areas because they are routinely contaminated and the vulnerability of patients to infection is high (*see* **Table 12)**.

Table 12: Cleaning Procedure for Labor and Delivery Wards/Rooms

Frequency	Person/ Staff	Method	Additional Guidance
Before and after (i.e., between) every procedure	Shared cleaning possible (clinical staff and cleaning staff)	**Clean and disinfect:** • Any surface that is visibly soiled with blood or body fluids • High-touch surfaces inside the patient zone • Floor inside the patient zone	Remove soiled linens and waste containers for disposal / reprocessing
After the last delivery of the day (terminal cleaning)	Cleaning staff	**Clean and disinfect:** • Any surface that is visibly soiled with blood or body fluids. • All high-touch and low-touch surfaces • Entire floor	- Move the procedure table and other portable equipment to clean and disinfect the entire floor area. - Handwashing sinks should be thoroughly cleaned (scrubbed) and disinfected.

I. Cleaning procedure for Hemodialysis Stations/Areas:

These are high-risk areas because they are routinely contaminated and the vulnerability of patients to infection is high (*see* **Table 13)**.

Table 13: Cleaning Procedure for Hemodialysis Stations/Areas

Frequency	Person/ Staff	Method	Additional Guidance
After each event / case	Shared cleaning possible (clinical staff and cleaning staff)	**Clean and disinfect:** • Any surface that is visibly soiled with blood or body fluids • All surfaces of the dialysis station area - Bed - Chair - Countertops - External surfaces of the machine • Floor inside the patient zone	- Remove disposable patient care items/ waste and reprocess reusable patient care equipment. - Take care to allow enough contact time before the next subsequent use of the station/area.
After the last case of the day (terminal cleaning)	Cleaning staff	Clean and disinfect: • Any surface that is visibly soiled with blood or body fluids. • All surfaces of the dialysis station/area • High-touch surfaces in the area/room housing hemodialysis stations. • Entire floor.	- Move the procedure table and other portable equipment to clean and disinfect the entire floor area. - In addition, clean low-touch surfaces on a scheduled basis (e.g., weekly).

J. Cleaning procedure for Emergency Department:

This is moderate to high-risk area because of the number of people who could contaminate the environment and because some patients may be more susceptible to infection. e.g., trauma patients (*see* **Table 14)**.

Table 14: Cleaning Procedure for Emergency Department

Area	Frequency	Person / Staff	Method	Additional Guidance
Waiting / admission areas	At least daily and as needed (e.g., visibly soiled, blood/body fluid spills)	Cleaning staff	**Clean and disinfect:** • High-touch surfaces • low-touch surfaces • Floors	None
Consultation / examination areas	After each event/ case and at least twice per day and as needed	Shared cleaning possible (clinical staff and cleaning staff)	**Clean and disinfect:** • High-touch surfaces	Last clean of the day: clean and disinfect the entire floor and low-touch surfaces
Procedure areas include trauma areas	Before and after (i.e., between) every procedure, when needed	Shared cleaning possible (clinical staff and cleaning staff	**Clean and disinfect:** • Any surface visibly soiled with blood or body fluids • High-touch surfaces in the patient zone • Floors in the patient zone	**Clean and disinfect:** • Any surface visibly soiled with blood or body fluids • High-touch surfaces in the patient zone • Floors in the patient zone **Last clean of the day:** **Clean and disinfect:** • Other high-touch surfaces and low-touch surfaces • Handwashing sinks • Dirty/ clean utility areas • The entire floor.

K. Cleaning procedure for Transmission-Based Precaution / Isolation Wards:

These are high-risk areas, especially for environmentally hardy pathogens (e.g., resistant to disinfectants) and for multidrug-resistant microorganisms (*see* **Table 15)**.

Table 15: Cleaning Procedure for Transmission-Based Precaution / Isolation Wards

Area	Frequency	Person/ Staff	Method	Additional Guidance
Airborne precautions	Daily and as needed	Cleaning staff	**Clean (neutral detergent and water) and disinfect:** • High-touch surfaces • Floors	• The primary focus is adherence to required PPE and additional entry/ exit procedures. • In addition, clean low-touch surfaces on a scheduled basis (e.g., weekly).
Droplet and/or contact precautions	Twice daily and as needed	Cleaning staff	**Clean and disinfect:** • Any surface visibly soiled with blood or body fluids • High-touch surfaces • Floors	• The cleaning staff must wear the required PPE. • Dispose of or reprocess cleaning supplies and equipment immediately after cleaning. • Last clean of the day: clean and disinfect the entire floor and low-touch surfaces.
A patient diagnosed with C. difficile on contact precautions	Twice daily and as needed	Cleaning staff	**Clean and disinfect (two-step process required and sporicidal agent):** • Any surface visibly soiled with blood or body fluids • High-touch surfaces in the patient zone • Floors	**Two-step process required (not use combined detergent disinfectant):** • Rigorous mechanical cleaning process (e.g., using friction). • Disinfectants with sporicidal properties, for example: - Sodium hypochlorite solution (e.g., 1,000-5,000ppm). - Enhanced hydrogen peroxide at 4.5%.
Dedicated noncritical patient care equipment for patients on transmission-based precaution	Consistent with cleaning frequency for the patient zone, before and after each use and as needed	Shared cleaning possible (clinical staff and cleaning staff)	Products based on the risk level of the patient care area	Select a compatible disinfectant. Reprocess (i.e., clean and disinfect) dedicated equipment after the patient is discharged or transferred (terminal clean).

All transmission based precautions	At discharge/ transfer (terminal cleaning)	Shared cleaning possible (clinical staff and cleaning staff)	**Clean and disinfect:** • High-touch surfaces • Low-touch surfaces • Floors	1. Remove soiled/used personal care items (e.g., cups, dishes) for reprocessing or disposal. 2. Remove linens for reprocessing or disposal. 3. Always remove privacy curtains and window coverings for laundering (curtains, blinds). 4. Clean and disinfect all low- and high-touch surfaces, including those that may not be accessible when the room/area was occupied (e.g., patient mattress, bedframe, tops of shelves, vents), and floors. 5. Clean (scrub) and disinfect handwashing sinks. **Airborne precautions:** The cleaning staff must wear the required PPE. Keep the door closed during the environmental cleaning process (ventilation requirement).

L. Cleaning procedure for General Outpatient area:

This is a low-risk area because the probability of contamination and the vulnerability of the patients to infection is low; however, procedural areas are moderate risk and therefore require more frequent and rigorous environmental cleaning.

Table 16: General Outpatient Area

Area	Frequency	Person / Staff	Method	Additional Guidance
Waiting / Admission	At least once daily (e.g., per 24-hour period), when needed	Cleaning staff	**Clean (neutral detergent and water):** • High-touch surfaces • Floors	In addition, clean low-touch surfaces on a scheduled basis (e.g., weekly).
Consultation / Examination	At least twice daily, when needed	Shared cleaning possible: clinical and cleaning staff	**Clean (neutral detergent and water):** • high-touch surfaces	Last clean of the day: clean the entire floor with neutral detergent and water In addition, clean low-touch surfaces on a scheduled basis (e.g., weekly).
Procedural (minor operative procedures; e.g., suturing wounds, draining abscesses)	Before and after (i.e., between) each procedure, when needed	**Shared cleaning possible:** clinical and cleaning staff	**Clean and disinfect:** Any surface visibly soiled with blood or body fluids • High-touch surfaces in the patient zone • Floors in the patient zone	Last clean of the day Clean and disinfect: • Other high-touch surfaces • low-touch surfaces • Handwashing sinks • Dirty and clean utility areas • The entire floor

Occupational Safety Considerations

A. Personal protective equipment (PPE) is used by cleaning staff for performing cleaning procedures

Appropriate PPE for the cleaning staff should always be available and used appropriately to reduce the risk for both patients and staff (*see* **Figure 4**).

<u>These are the best practices for cleaning staff PPE:</u>

- Always perform hand hygiene immediately before wearing gloves and immediately after removal.
- Train cleaning staff on appropriate use and removal of required PPE for all environmental cleaning procedures and tasks.
- Put on all required PPE before entering a patient care area and remove it (for disposal or reprocessing, if reusable) before leaving that area. Exception: N95 respirator should be removed outside the airborne isolation room or in ante room if available.
- Conduct regular fit-testing for cleaning staff who are required to wear respirators.
- Use reusable rubber gloves for cleaning and chemical-resistant gloves (e.g., nitrile, latex) for the preparation of cleaning chemicals.

Note:

- Best practices for cleaning staff personal attire/grooming:
  - Keep sleeves at or above the elbow to not interfere with glove use or hand hygiene.
  - Wear rubber-soled closed toe shoes or boots (i.e., not sandals), to prevent accidental injury (e.g., slips and falls) and exposure to cleaning chemicals, dirt, or bacteria.
  - Remove wristwatches and hand jewelry before starting cleaning tasks these items can tear gloves and can also pick up microorganisms.
  - Keep fingernails short and free of nail varnish to prevent tearing of gloves and picking up dirt and bacteria.

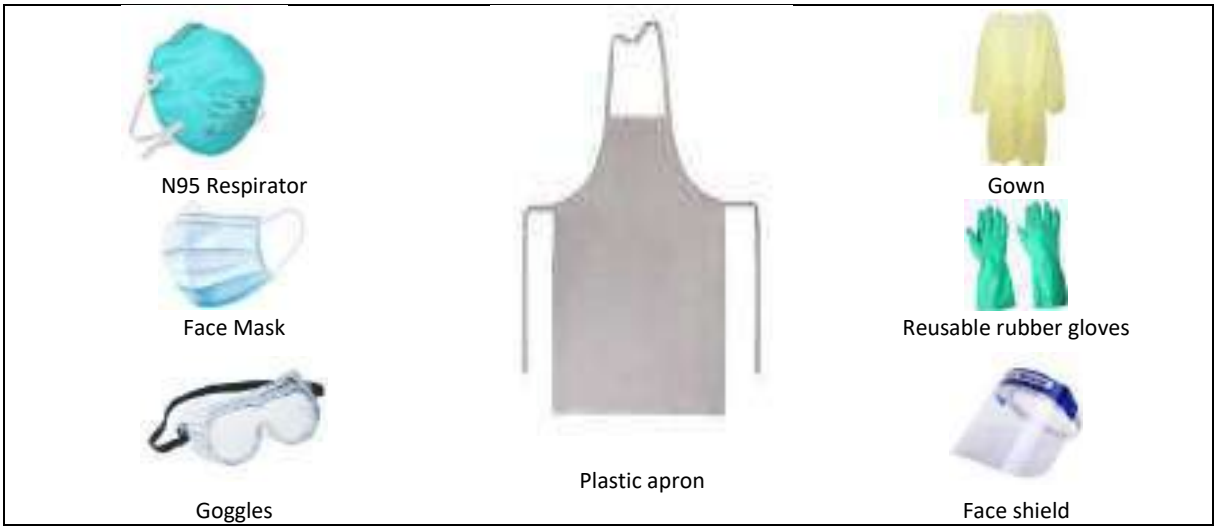

Figure 4: Recommended personal protective equipment

Table 17: Recommended Personal Protective Equipment for Environmental Cleaning Tasks/Cleaning in Specific Patient Areas:

Type of cleaning task	Required personal protective equipment for cleaning staff
Routine cleaning (standard precautions)	None (unless spills or contamination risk)
Terminal cleaning (standard precautions)	Reusable rubber gloves
Blood and body fluid spills and high contamination risk areas (e.g., cleaning bed of an incontinent patient, labour and delivery wards)	Gown and/or plastic apron Reusable rubber gloves Face mask with either goggles or face shield
Droplet precautions (routine and terminal cleaning)	Gown and/or plastic apron Reusable rubber gloves Face mask with either goggles or face shield
Contact precautions (routine and terminal cleaning)	Gown and/or plastic apron Reusable rubber gloves
Airborne precautions (routine and terminal cleaning)	Gown and/or plastic apron Respirator (N95 or FPP2), fit-tested Reusable rubber gloves

B. Immunization

Appropriate immunization protects staff and clients/patients/residents. Environmental service workers and housekeeping staff shall be included in facility policies of staff immunization.

C. Staff exposure

There shall be written policies and procedures for the evaluation of staff (employees or contract workers), including environmental service workers, who could be exposed to blood or body fluids and other infectious hazards.

Flowers and Plants in Patient-Care Areas

Fresh flowers, dried flowers, and potted plants are common items in healthcare facilities. Several subsequent studies evaluated the numbers and diversity of microorganisms in the vase water of cut flowers. These studies revealed that high concentrations of bacteria, were often present, especially if the water was changed infrequently. The major group of microorganisms in flower vase water was gram-negative bacteria, such as Pseudomonas aeruginosa which is the most frequently isolated organism. Microorganisms from cut flowers or potted plants have been linked with hospital-acquired infections. Health-care-associated outbreaks reinforce the importance of maintaining an environment free from these pathogens.

A. Vulnerable patient groups

- Severely immunocompromised patients such as oncology patients, organ transplantation, stem cells transplantation patients, and other immunosuppressant patients.
- Burn patients.
- Acutely ill patients those admitted in critical areas such as Intensive Care Units.
- Hemodialysis patients.

B. Environmental control measures

- Cut flowers and potted plants must be avoided in rooms of the above-mentioned vulnerable groups all the time.
- Flowers and plants are permitted in the rooms of immunocompetent patients only.
- Limit plant care to staff not directly caring for patients.
- If plant care by patient care staff is unavoidable, staff should wear gloves while handling plants/flowers and perform hand hygiene after glove removal.
- Change vase water every two days; discard water outside the patient's room.

Environmental Sampling

Microbiologic sampling of air, inanimate surfaces and water (i.e., environmental sampling) is an expensive and time-consuming process that is complicated by many variables in the protocol, analysis, and interpretation. Routine environmental microbiological cultures are not recommended and it is therefore indicated for only specific situations such as in outbreaks and when approved and recommended by the infection control team.

A. Air sampling

Before sampling begins, decisions should be made regarding whether the results are to be qualitative or quantitative. Comparing quantities of airborne microorganisms to those of outdoor air is also standard operating procedure. Infection-control professionals, hospital epidemiologists, environmental health staff, and laboratory supervisors, as part of a multidisciplinary team, should discuss the potential need for microbial air sampling to determine if the capacity and expertise to conduct such sampling exists within the facility and when it is appropriate to enlist the services of an environmental microbiologist consultant (*see* **Table 18**).

Table 18: Methods of Air Sampling

Method	Principle	Suitable measuring	Collection media or surface	Rate of collection (L/min)	Auxiliary equipment needed	Points to consider
Impingement in liquids	Air drawn through a small jet and directed against a liquid surface	Viable organisms, and concentration over time. Example use: sampling water aerosols to Legionella spp	Buffered gelatin, Tryptose saline, peptone, nutrient broth	12.5	Yes	Antifoaming agent may be needed. Ambient temperature and humidity will influence length of collection time
Impaction on solid surfaces	Air drawn into the sampler; particles deposited on a dry surface	Viable particles; viable organisms (on non-nutrient surfaces, limited to organisms that resist drying and spores); size measurement, and concentration over time. Example use: sampling air for Aspergillus spp., fungal spores	Dry surface, coated surfaces, and agar	28 (sieve) 30–800 (slit)	Yes	Available as sieve impactors or slit impactors. Sieve impactors can be set up to measure particle size. Slit impactors have a rotating support stage for agar plates to allow for measurement of concentration over time
Sedimentation	Particles and microorganisms settle onto surfaces via gravity	Viable particles. Example uses: sampling air for bacteria in the vicinity of and during a medical procedure; general measurements of microbial air quality	Nutrient media (agars) on plates or slides	n/a	No	Simple and inexpensive; best suited for qualitative sampling; significant airborne fungal spores are too buoyant to settle efficiently for collection using this method.

Filtration	Air drawn through a filter unit; particles trapped; 0.2 µm pore size	Viable particles; viable organisms (on non-nutrient surfaces, limited to spores and organisms that resist drying); concentration over time. Example use: air sampling for Aspergillus spp., fungal spores, and dust	Paper, cellulose, glass wool, gelatin foam, and membrane filters	1–50	Yes	Filter must be agitated first in rinse fluid to remove and disperse trapped micro-organisms; rinse fluid is
Centrifugation	Aerosols subjected to centrifugal force؛ particles impacted onto a solid surface	Viable particles؛ viable organisms)on non-nutrient surfaces, limited to spores and organisms that resist drying؛(concentration over time. Example use: air sampling for Aspergillus spp., and fungal spores	Coated glass or plastic slides, and agar surfaces	40–50	Yes	Calibration is difficult and is done only by the factory; relative comparison of airborne contamination is its general use.
Electrostatic precipitation	Air drawn over an electrostatically charged surface; particles become charged	Viable particles؛ viable organisms (on non-nutrient surfaces, limited to spores and organisms that resist drying)؛ concentration over time	Solid collecting surfaces (glass, and agar)	85	Yes	High volume sampling rate, but equipment is complex and must be handled carefully; not practical for use in health- care settings

Thermal precipitation	Air drawn over a thermal gradient؛ particles repelled from hot surfaces، settle on colder surfaces	Size measurements	Glass coverslip, and electron microscope grid	0.003–0.4	Yes	Determine particle size by direct observation; not frequently used because of complex adjustments and low sampling rates.

Source: *(CDC, 2019)*

B. Environmental Surfaces Sampling

Routine environmental-surface sampling (e.g., surveillance cultures) in healthcare settings is neither cost-effective nor warranted. When indicated, surface sampling should be conducted with multidisciplinary approval in adherence to carefully considered plans of action and policy (*see* **Table 19**).

Table (19): Methods of Environmental-Surface Sampling.

Method	Suitable for appropriate surface(s)	Assay technique	Procedural notes	Points of interpretation
Sample/rinse (Moistened swab/rinse)	Non-absorbent surfaces, corners, crevices, devices, and instrument	Dilutions; qualitative or quantitative assays	Assay multiple measures areas or devices with separate swabs	Report results per measured areas or if assaying an object, per the entire sample site
Sample/rinse (Moistened sponge/rinse	Large areas and housekeeping surfaces (e.g., floors or walls)	Dilutions; qualitative or quantitative assays	Vigorously rub a sterile sponge over the surface	Report results per measured area
Sample/rinse (Moistened wipe/rinse)	Large areas and housekeeping surfaces (e.g., countertops	Dilutions; qualitative or quantitative assays	Use a sterile wipe	Report results per measured area
Direct immersion	Small items capable of being immersed	Dilutions; qualitative or quantitative assays	Use membrane filtration if rinse volume is large and anticipated microbiological concentration is low	Report results per item
Containment	Interior surfaces of containers, tubes, or bottles	Dilutions; qualitative or quantitative assays	Use membrane filtration if rinse volume is large	Evaluate both the types and numbers of microorganisms
RODAC (Replicate Organism Direct Agar Contact)	Previously cleaned and sanitized flat, non-absorbent surfaces; not suitable for irregular surfaces	Direct assay	Overgrowth occurs if used on heavily contaminated surfaces; use neutralizers in the agar if surface disinfectant residuals are present	Provides direct, quantitative results; use a minimum of 15 plates per an average hospital room

Source: *(CDC, 2019)*

C. Water Sampling

Water sampling in health-care settings is used to detect waterborne pathogens of clinical significance or to determine the quality of finished water in a facility's distribution system. Routine testing of the water in a health-care facility is usually not indicated, but sampling in support of outbreak investigations can help determine appropriate infection-control measures.

Pest Control

The presence of cockroaches, flies, maggots, ants, mosquitoes, mice, rats, bed bugs and other pests is an indicator of an unhealthy environment in a healthcare facility. Institutions are responsible for minimizing, and if possible, eliminating vermin. The key to minimizing pests is to eliminate food sources, eliminate areas for nests and burrows, install tightly-fitting screens on windows and doors, seal off penetrations to the outside, and apply pesticides. Environmental health staffs are responsible for coordinating pest control. Although environmental health personnels play a major role in minimizing pests, facilities should consider contracting licensed professionals to handle toxic pesticides.

Conclusion

The importance of environmental cleaning and disinfection as a fundamental IPC intervention cannot be overstated. Environmental contamination plays a role in the transmission of HAIs, which are a significant burden globally. It is important that environmental health related measures implemented within the framework of a functional IPC program while ensuring that multi-disciplinary approaches are taken to enable engagement and coordination of all required measures. The best practices contained in this document provide the framework for implementing effective environmental health procedures and program in healthcare facilities.

References:

CDC (2003). *Guidelines for Environmental Infection Control in Health-Care Facilities Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC)*. [online] Available at: https://www.cdc.gov/infectioncontrol/pdf/guidelines/environmental-guidelines-P.pdf.

CDC (2020). *Key Definitions & Abbreviations | Environmental Cleaning in RLS | HAI | CDC*. [online] www.cdc.gov. Available at: https://www.cdc.gov/hai/prevent/resource-limited/definitions.html.

GDIPC (2021). *General Directorate of Infection Prevention and Control in Healthcare Facilities (GDIPC) Manual of Environmental Cleaning and Disinfection in Healthcare Facilities 1st Edition -2021*. [online] Available at: https://gdipc.sa/wp-content/uploads/2021/08/Manual-of-Environmental-Cleaning-and-Disinfection-in-Healthcare-Facilities-Ver-1.0-GDIPC-.pdf.

Government of South Australia (2021). *Cleaning Standard*. *https://www.sahealth.sa.gov.au/wps/wcm/connect/18741180499970f0891e8faa8650257d/Cleaning+Standards+2021_v1.0+%28revised+final%29.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-18741180499970f0891e8faa8650257d-o0mGWX7*.

Mehtar, S., Hopman, J. and Duse, A. (2018). *GUIDE TO INFECTION CONTROL IN THE HEALTHCARE SETTING Patient Areas and Environmental Cleaning Topic Outline*. [online] Available at: https://isid.org/wp-content/uploads/2019/07/ISID_GUIDE_PATIENT_AREAS.pdf.

Public Health Ontario (2018). *Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings, 3 rd Edition*. [online] Available at: https://www.publichealthontario.ca/-/media/documents/B/2018/bp-environmental-cleaning.pdf.

Appendix A: General Ward Daily Cleaning Checklist Form

Daily Cleaning Checklist
(Form 1)

Hospital name:…… **Room no.:…….**
Date:……/……/20…. **Supervisor name:……**

Before Routine Room Cleaning:

- Ask the nurse to remove all soiled linen
- Prepare the cleaning equipment.
- Use a double or three bucket and follow mop and cloth color coding
- Perform hand hygiene
- Don appropriate PPE (Reusable rubber gloves)

Note:

1- Put (√) if the item was cleaned
2- Put (X) if the item was not cleaned
3- Put (NA) if the item was not present

Area	Day: - / /		Day: - / /		Day: - / /		Day: - / /		Day: - / /		Day: - / /		Day: - / /	
	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift
Clean and disinfect patient care equipment														
Door Handles														
Call Bell														
Clean the bed frame														
Sink and its accessories														
Floor														
light switches														
Door Handles														
Telephones														
Patient toilet- Follow mop and cloth color coding: -														
Light switches														
Door handles														

Area	Day: - / /		Day: - / /		Day: - / /		Day: - / /		Day: - / /		Day: - / /		Day: - / /	
	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift
Hand rails														
Sink and its accessories														
Hand washing sink														
Clean soap and paper towel dispensers														
Clean and disinfect walls, Ceiling and Floor														
Toilet paper Dispenser														
Toilet flusher														
Toilet seat														
Under the bowel														
Toilet rim.														
Clean inside of the bowl with disinfectant cleaner and toilet brush														

Area	Day: - / /		Day: - / /		Day: - / /		Day: - / /		Day: - / /		Day: - / /		Day: - / /	
	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift	Morning shift	Night shift
Clean frame and cover Last														
Remove the gloves and perform hand hygiene														
Restock supplies														
Final check for room cleanliness														

Write here a list of disinfectants used: -

Appendix B: OR Daily Cleaning Checklist Form

Operating Rooms Daily Cleaning Checklist
(Form 1 - At the Beginning and After the Last Case of the Day)

Hospital name:…… **Room no.:**…….

Date:……/……/20…. **Supervisor name:**……

Note:

1- Put (√) if the item was cleaned
2- Put (X) if the item was not cleaned
3- Put (NA) if the item was not present

Area	Before First Case of the Day			After the last case of the day		
	Done	Not Done	Not present	Done	Not Done	Not present
Before First Case of the Day: -*						
Remove unnecessary equipment.						
Damp dust from top to bottom:						
a. Overhead lights						
b. All reachable flat surfaces						
i. Furniture						
ii. Surgical lights						
iii. Operating bed						
iv. Equipment						
v. Countertops						

After the last case of the day: -**						
1. All the floor						
2. Anesthesia carts and equipment						
3. Patient monitors						
4. OR beds						
5. OR bed attachments						
6. Under mattress						
7. Reusable table straps						
8. Under tables						
9. Tables and Mayo stands						
10. Patient transfer devices						
11. Overhead procedure lights						
12. Mobile and fixed equipment						
13. Storage cabinets, supply carts, and furniture						
14. High touch surfaces:						
a. Light switches						
b. Door handles						
c. Telephones and mobile communication devices						
d. Push plates						
15. Computer Accessories						
16. Chairs, stools, and step stools						
17. Trash and linen receptacles						
18. Walls and windows as needed to remove visible soiling						

* N.B If there was no written confirmation of end-of-day cleaning on the previous day, do a full terminal clean.

** N.B Other areas of the operating theatres including the semi-restricted and unrestricted areas should be cleaned daily or as scheduled by the facility's policy.

Daily Cleaning Checklist of the Operating Rooms
(Form 2 - Between Cases)

Hospital name:…… **Room no.:**…….

Date:……/……/20…. **Supervisor name:**……

Note:

1- Put (√) if the item was cleaned
2- Put (X) if the item was not cleaned
3- Put (NA) if the item was not present

Area	Patient 1			Patient 2			Patient 3			Patient 4			Patient 5			Patient 6		
	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present
a) Collect linen																		
b) Remove visible soil																		
c) Empty the trash																		
d) Collect all used instruments																		
Clean and disinfect high-touch surfaces outside of the surgical field, including:																		
a) light switches																		
b) Doorknobs																		
c) Telephones and mobile communication devices																		
d) Push plates																		
All surfaces (high- and low-touch) and the floor inside of the surgical field, including:																		
a) Anesthesia cart and equipment (IV poles and pumps)																		
b) Patient monitors																		
c) OR beds																		

Area	Patient 1			Patient 2			Patient 3			Patient 4			Patient 5			Patient 6		
	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present
d) Under mattresses																		
e) Reusable table straps																		
f) Bed attachments																		
g) Wipe the joints, table attachments, frame, legs, and rails.																		
h) Overhead procedure lights																		
i) Tables																		
j) Under tables																		
k) Mayo stands																		
l) Mobile and fixed equipment																		
i. Suction regulators																		
ii. Medical gas regulators																		
iii. Imaging monitors																		
iv. Radiology equipment																		
v. Electrosurgical units																		
vi. Microscopes																		
vii. Lasers																		
Floors																		
Walls and ceiling if soiled or potentially soiled (splash, splatter or spray)																		

Daily Cleaning Checklist of the Operating Rooms

(Form 3 - Weekly cleaning and disinfection of the operating room - 1-month period)

Hospital name:…… **Room no.:…….**

Date:……/……/20…. **Supervisor name:……**

Note:

4- Put (√) if the item was cleaned
5- Put (X) if the item was not cleaned
6- Put (NA) if the item was not present

Area	Week 1			Week 2			Week 3			Week 4		
	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present
All items of the daily terminal cleaning: -												
1. All the floor												
2. Anesthesia carts and equipment												
3. Patient monitors												
4. OR beds												
5. OR bed attachments												
6. Under mattress												
7. Reusable table straps												
8. Under tables												
9. Tables and Mayo stands												
10. Patient transfer devices												
11. Overhead procedure lights												
12. Mobile and fixed equipment												
13. Storage cabinets, supply carts, and furniture												
14. High touch surfaces:												
a. Light switches												

Area	Week 1			Week 2			Week 3			Week 4		
	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present
b. Door handles												
c. Telephones and mobile communication devices												
d. Push plates												
15. Computer Accessories												
16. Chairs, stools, and step stools												
17. Trash and linen receptacles												
18. OR light and handle												
19. Walls and windows as needed to remove visible soiling												
low-touch surfaces not cleaned every day (unless visibly soiled), including:												
1. Sterile storage areas												
2. Sterilizer and loading carts												
3. Shelving and storage bins												
4. Wall												
5. Ceiling												
6. Ventilation (ducts)												
7. Insides of cupboards												

** N.B Other areas of the operating theatres including the semi-restricted and unrestricted areas should be cleaned daily or as scheduled by the facility's policy.

Appendix C: Terminal Cleaning Procedures Checklist (Discharge) Form

Terminal Cleaning Procedures Checklist (Discharge)
(Form 1)

Hospital name:…… **Room no.:……**

Date:……/……/20…. **Supervisor name:……**

Before Terminal Room cleaning:

- Ask the nurse to remove all soiled linen
- Prepare the cleaning equipment.
- Use double bucket or three bucket and follow mop and cloth color coding
- Perform hand hygiene
- Don appropriate PPE (Reusable rubber gloves)

Note:

1- Put (√) if the item was cleaned
2- Put (X) if the item was not cleaned
3- Put (NA) if the item was not present
4- Do not wear dirty gloves outside of the room,
5- If you have to leave the room after you have started a room clean, remove your PPE and perform hand hygiene. put a new pair of PPEs on to resume cleaning.
6- Clean and disinfect using disinfectant and follow mop and cloth colour coding.

Area	Room no.			Room no.			Room no.			Room no.			Room no.			Room no.		
	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present
Clean from top to bottom																		
Clean all furniture																		
Clean and disinfect patient care equipment																		
Clean and disinfect Hand rails																		
Clean and disinfect Mattress																		
Clean and disinfect Pillows																		
Door and Door Handles																		
Clean the bed																		
Telephone																		
Light switches																		
Call Bell																		
Patient drawers																		
Patient cabinets																		
Walls																		
Other wall-mounted equipment. EX. (TV, Remote control, Tissue Holder)																		
Window																		
Floor																		
Ceiling																		
Sink and its accessories																		
Patient rest Room- Follow mop and cloth color coding: -																		
Light switches																		
Door handles																		
Hand rails																		
Sink and its accessories																		
Hand washing sink																		

Area	Room no.			Room no.			Room no.			Room no.			Room no.			Room no.		
	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present	Done	Not Done	Not present
Clean soap and paper towel dispensers																		
Clean and disinfect walls, Ceiling and Floor																		

Write here a list of disinfectants used: -

وزارة الصحة

Ministry of Health

General Directorate of Infection Prevention and Control in Healthcare Facilities
Ministry of Health, Kingdom of Saudi Arabia
Email: gdipc@moh.gov.sa
Visit us at: www.gdipc.sa

Ministry of Health
Assistant Agency for Preventive Health
King Abdulaziz Road, Sulaymaniyah, Riyadh, 3rd Building, 3rd Floor.