Ministry of Health
Sultanate of Oman

Guidelines for Environmental Cleaning Program in Healthcare Facilities

Version 01/September 2021

The Department of Infection Prevention and Control
Directorate General for Disease Surveillance and Control

Contents

GLOSSARY:

ABBREVIATIONS:	
CDIPC	Central Department for Infection Prevention and Control
GS	General Services
HIPC	Hospital Infection Prevention and Control
HCW	Healthcare Worker
HSE	Health Safety and Environment
IC	Infection Control
ICD	Infection Control Department
IFU	Information of use
MoH	Ministry of Health
PPE	Personal protective equipment
SDS	Safety Data Sheets

DEFINITIONS:

Cleaning	Is the removal of foreign material (e.g., soil, and organic material) from surfaces or objects by using detergent and water before application of disinfectants
Cleaning (one -step process)	Is a cleaning process in which combined detergent and disinfectant solution or wipes are used to clean the surfaces or the non-critical items
Cleaning (two steps process)	A cleaning process in which involves cleaning with water and detergent solution followed by the use of a chemical disinfectant and sometimes may require rinsing according to the manufacturers' recommendations.
Color coding system	Is a system to ensure that materials and equipment used for cleaning purposes are not used in multiple different areas reducing the risk of cross-infection
Contact time	Refers to the amount of time necessary for the disinfectant to be in contact with the surface to inactivate microorganisms. The surface should remain wet for the required time.
Disinfection	A thermal or chemical process performed after thorough cleaning for inactivating microorganisms on inanimate objects. It may or may not inactivate bacterial spores, prions, and some viruses.
Disinfectants	A chemical agent, which rapidly kills or inactivates most microorganisms. It is not used as a cleaning agent, unless combined with a detergent as a combination- cleaning agent (detergent-disinfectant).
Enhance cleaning	A disinfection process on environmental surfaces by fumigation with the use of hydrogen peroxide vapor and ultraviolet C (UVC) light, etc., after performing terminal cleaning.
Environmental cleaning	Is a process that involves cleaning and disinfection of environmental surfaces and surfaces of non-critical patient care equipment
Environmental decontamination	A process by which the healthcare environment is made free from a harmful level of contamination that may result in the transfer of pathogens that can cause HCAIs
Environmental cleaning program	is a structured set of elements or interventions which facilitate the implementation of environmental cleaning at a facility level
High Touch Surfaces	Are surfaces that have been in frequent contact with healthcare hands and require more frequent cleaning and disinfection than minimal contact surfaces
Routine cleaning	Procedures that occurs while the patient is admitted, focuses on the patient zone(s). It aims to remove organic material and minimize microbial contamination to provide a visually clean environment.
Terminal /discharge cleaning	A cleaning and disinfection process after the patient is discharged, transferred and died to ensure that there is no transfer of microorganisms to the next patient
Two-bucket system (mopping):	A floor mopping system that uses two buckets, one bucket contains a detergent or cleaning solution and the second bucket contains clean water for rinsing mop.

1. Introduction

Globally the healthcare-associated infections (HAIs) is increasingly becoming a burden for healthcare facilities with millions of patients affected each year. Contamination of the environment plays a key role in the transmission of some pathogens that cause healthcare-associated infection. The most powerful evidence of the role of the contaminated environment is the finding that admission to a hospital room previously occupied by a patient with a pathogen – for example Clostridium difficile, methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE) or *Acinetobacter baumannii* – increases the risk of acquisition for the incoming occupant (Mitchell et al, 2015). This implies that we are not effectively decontaminating the environment, especially at patient discharge. Other studies show that improving the quality of cleaning and disinfection reduces the risk of infection linked to previous occupants of a room (Anderson et al, 2017; Passaretti et al, 2013)

Environmental decontamination refers to the process by which environmental contamination is reduced to a level that is not harmful to health. It is one of the essential interventions for the prevention and control of HAIs. It is a multifaceted intervention that involves environmental cleaning and disinfection process of the physical environment with other key program elements to support successful implementation (e.g., leadership support, training, monitoring, and feedback mechanisms).

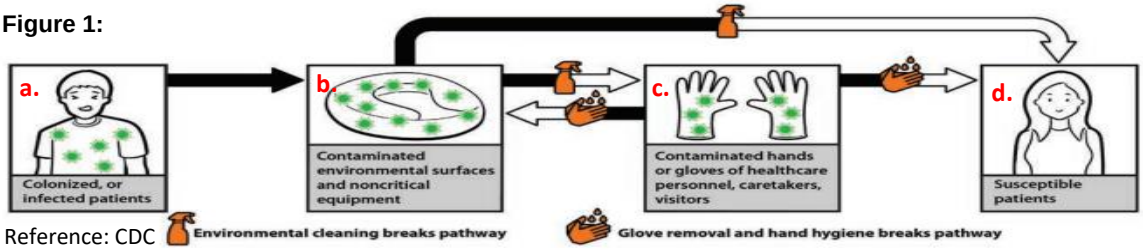
This guideline is describing the environmental cleaning program for the setting of health care. There is a separate document for the part of the environmental disinfection (https://www.moh.gov.om/documents/236878/4743006/Guidelines+for+Enhanced+Environmental+Decontamination+Program+in+Healthcare+Facilities.pdf/19b4a15a-0000-5dcd-370c-ae8fc3e55336)

1.1. Environmental Transmission of HAIs:

The HAI pathogens can survive on environmental surfaces. The actual survival times vary considerably based on factors such as temperature, humidity and surface type. Ranges of pathogens are shed into the environment and can cause widespread contamination. These pathogens can survive for long periods on dry surfaces (Table 1); VRE has remarkable survival properties, remaining alive on a dry laboratory surface for in excess of four years in one study. In different healthcare facilities, environmental contamination has been significantly associated with transmission of pathogens in major outbreaks of methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE), Clostridium difficile (C.diff), and more recently in prolonged outbreaks of *Acinetobacter baumannii*. Outbreak investigations have shown that the risk of patient colonization and infection increased significantly if the patient occupied a room that had been previously occupied by an infected or colonized patient. However, the environmental transmission of HAIs can occur via different pathways.

Figure 1 (below) illustrates how environmental contamination results in infection through contact with contaminated environmental surfaces and noncritical equipment and contact with contaminated hands or gloves of healthcare workers during healthcare activities. It also shows how environmental cleaning and hand hygiene STOP/break the chain of transmission.

Figure 1:



Reference: CDC

a. Patient colonized or infected with pathogens
b. A colonized or infected patient can contaminate environmental surfaces and non-critical equipment.
c. Contaminated hands or gloves of healthcare workers (HCWs), attendant or visitors can also contaminate environmental surfaces.
d. If HCWs, attendant or visitors makes contact with the contaminated surfaces and then transfers the microorganisms to the susceptible patient.

The illustration above shows that proper handwashing and environmental cleaning can STOP the transfer of microorganisms to healthcare personnel, attendant, visitors and to susceptible patients.

Environmental cleaning is one part of standard precautions. It is necessary that the healthcare facilities should develop an environmental cleaning program within the framework of IPC programs.

- An environmental committee is recommended for the management and implementation of the environmental cleaning program.
- The IPC team (or at least a focal person) to be involved in the technical aspects of the environmental cleaning program (e.g., training, policy development).
- In primary health centers (PHC) and Willayat hospitals if the is no IPC personnel, a focal person may be designated and responsible for managing environmental cleaning activities.

Table 1. Pathogen Survival Times On Dry Surfaces

Organisms	**Survival Times**
Influenza	Hours to several days
Norovirus (and feline calicivirus)	8 hours and 2 weeks
SARS CoV	72 hours and >28 days
Acinetobacter spp.	3 days to 5 months
Clostridium difficile (spores)	5 months
S. Aureus, including MRSA	7 days to 7 months
Pseudomonas aeroginusa	6 hours to 16 months
Klebsiella spp	2 hours to >30 months

Enterococcocus spp including VRE	5 days to 4 years
Source adapted from Kramer et al 2006	

1.3. Purpose and Scope of the Document:

The purpose of this document is to guide the healthcare facilities to develop and implement their environmental cleaning program, to improve and standardize the environmental cleaning in patient care areas and for non-critical medical equipment.

1.4. Intended Audience of the Document:

This document was developed targeting the stakeholders who have a role in the management of environmental cleaning in healthcare facilities. This includes administrators, in-house supervisors, infection preventionist, cleaning company supervisor and staff who assure a clean patient-care environment.

1.5. Overview of the Document:

The best practices are divided into three chapters:

Environmental Cleaning Programs

- This section provides the best practices for implementation of environmental cleaning programs including the key elements of supports e.g. organization/ administration, staffing and training , supporting infrastructure and supplies, policies and procedures, monitoring and feedback

Environmental Cleaning Supplies and Equipment

- This section provides an overall best practices for appropriate selection, preparation and care of environmental cleaning supplies and non-critical medical equipment, environmental cleaning products and disinfectant, reusable and disposable cleaning materials.

Environmental Cleaning Procedures

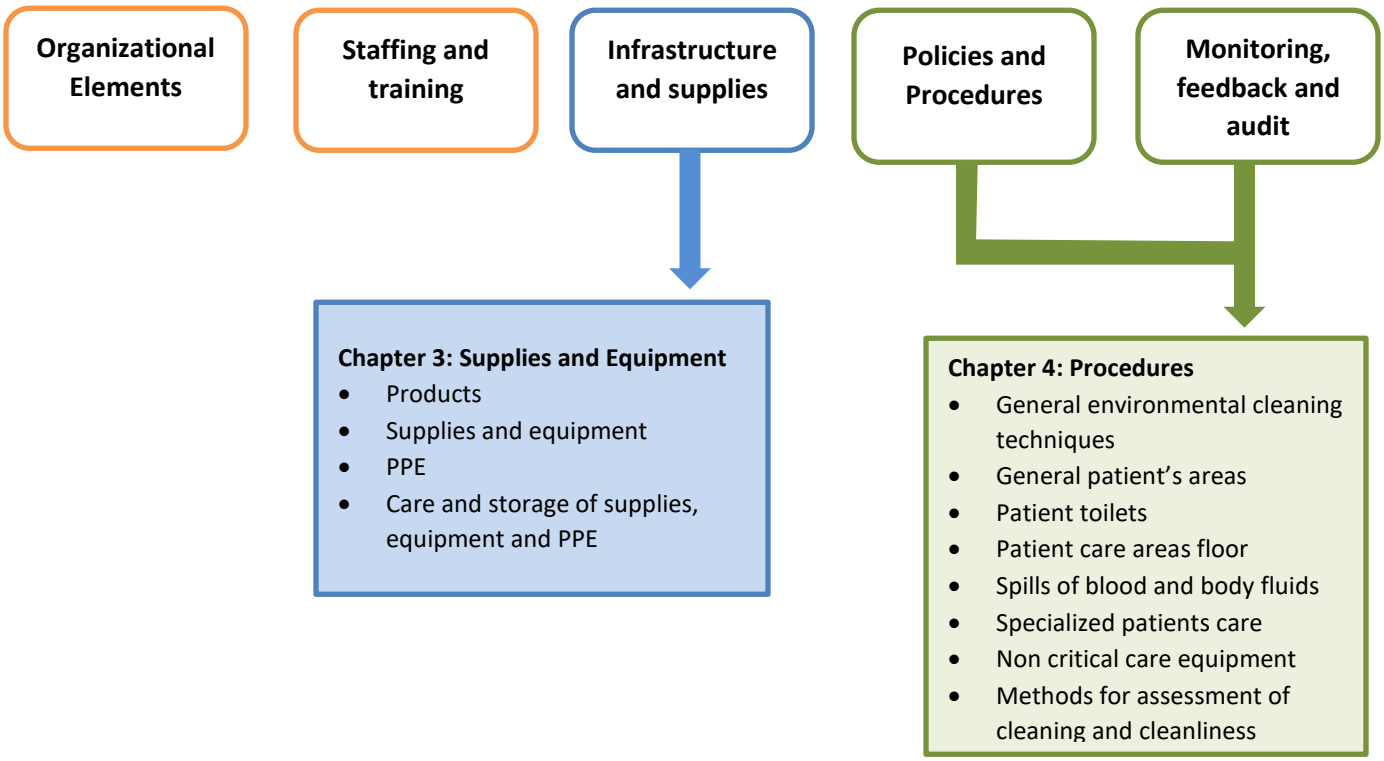
- This section provides the strategies and techniques for conducting environmental cleaning according to best practice based on risk assessment and will aid healthcare facilities develop their local policy and procedures.

2. Environmental Cleaning Programs

Environmental cleaning programs involves engagement from multiple stakeholders and departments, such as administration, IPC, general services, health safety & environment, engineering and maintenance

- The implementation of environmental cleaning program can vary based on the size of the facility and the level of services provided. Comprehensive environmental cleaning programs are most important at all healthcare facilities, where the burden of HAIs is highest.

Figure 2: Outline and overall framework for best practices key elements of cleaning programs



2.1. Organizational Elements:

Facility-level organizational support is one of the important elements for the implementation of an effective environmental cleaning program. The main areas of needed support include:

- Administrative and leadership support
- Clear communication and integration of the cleaning program and IPC
- Defined management structure

2.1.1. Administrative support:

The ultimate responsibility for the environmental cleaning program lies at the facility leadership level.

The facility administration support for the environmental cleaning program includes:

- Designate an appropriate department (e.g. HSE , IPC and GS) to supervise directly the proper implementation of environmental cleaning program
- Designate an in-house trained full time cleaning program manager with a job description
- **Responsibilities of cleaning program manager:**
    - Maintaining the cleaning contract and hospital policy and procedures
    - Ensuring that the education and training activities are carried out for all and new cleaning staff before assignment and on a recurring basis
    - Supervising the cleaning audit process and utilizing the results for improvement and giving feedback to stakeholders.
    - Ensuring that cleaning supplies and equipment are available in required quantities and in good condition (i.e., preventing stock-outs/ non interruption)

- Addressing stakeholders concerns and patient comments about the cleaning process
- Communicating with the cleaning company on any of the cleaning and disinfection issues
- Coordinating with the cleaning company to develop schedules of cleaning activities in all areas

2.1.2. Communication:

An effective environmental cleaning program requires clear communication and collaboration across multiple levels of the facility, during the program development and implementation stages.

The primary communication structures to establish includes:

Formation of environmental cleaning committee:

- A committee is essential to engage all facility-based stakeholders during the development of policy, procedures, and training
- The members of this committee from facility staff could include: a representative from the IPC team, a clinical staff representative from each ward (e.g., nurse in-charge), HSE, facilities management, in-house cleaning manager, company supervisor, engineering and maintenance, and administrative staff.

Routine meetings with key stakeholders:

Stakeholders are essential to facilitate regular communication between the cleaning program manager, IPC and other stakeholders at the facility level (e.g., ward in-charge staff)

- to review and update technical aspects of the program (e.g., outbreak-related changes in cleaning)
- to inform ward staffs of the overall cleaning policy and specific cleaning schedules
- to review performance and report deficiencies

2.1.3. Management and Supervision

An effective environmental cleaning program requires a defined management structure, including organizational and reporting lines, and on-site supervision

The required elements include:

- Development of an organizational chart that outlines reporting lines between cleaning staff, supervisors, manager, and any other direct or indirect relationships
- Designate onsite cleaning supervisors
- Supervisors Responsibilities:
  - Ensuring the proper implementation of local policy and procedures
  - Ensuring compliance to best practices through direct monitoring and feedback
  - Ensuring the availability of cleaning supplies and equipment in areas/wards.
  - Ensuring that the materials and machines used for cleaning are properly cleaned, disinfected, dried and stored properly.

- Ensuring that the safe storage of environmental cleaning products eliminating health and environmental risk.
- Communicating with staff for any challenges or concerns about the compliance with environmental cleaning standards (e.g., supply shortage & safety concerns).

2.2. Staffing Elements

An appropriate number of well trained and qualified staff are key program elements.

- According to best practices, cleaning staff should:
  - be aware of their job descriptions
  - be asked to perform duties only for which they were trained (e.g., cleaning staff should not be asked to clean high-risk wards (e.g., OR), unless they are trained
  - know the labels and hazards of the chemicals they are working with
  - have PPE to perform their job
  - should be monitored by a qualified supervisor

2.2.1. Staffing Levels

Adequate staffing is one of the most important factors determining the effectiveness of an environmental cleaning program.

Staffing numbers must be adequate to each area, with the ability to increase in the event of outbreaks, pandemic etc. The healthcare facility may request to increase the staff levels as per the terms and conditions in the cleaning contract.

Determining adequate staffing Levels:

- The required number of cleaning staff varies based on several of factors, including:
  - Number of patient beds
  - Occupancy rate
  - Type of cleaning (e.g., routine or terminal)
  - Types of patient care areas (e.g., specialized care areas such as ICUs and ORs)
- Staffing levels should include consideration of shift length, breaks, as well as extra staff for contingencies, such as outbreaks and other emergencies.

2.2.2. Training/ Education

Regular education (including orientation and continuing education) and support should be provided in all health care settings. Effective education programs emphasize:

Minimum Training Content Includes:

1. House Keeping Course
2. Personal hygiene
3. Fire Safety Course
4. Environmental & Occupational Health Course Hazard communication standards/ How to read safety data sheets (SDS) & selection of PPE and its appropriate use
5. Infection Control Course: Standard precautions/ Transmission based precautions/ risk of blood borne exposure, PPE use, hand hygiene, Biological spill management
6. Hospital policy and procedures environmental cleaning: Routine cleaning, Terminal / Discharge cleaning, Bathroom cleaning, Other high risk areas cleaning, Cleaning of High touch surfaces, Cleaning of other special areas.

- The training and education tests for cleaning staff should be based on the national or local environmental cleaning policy.
- The facility must ensure that the trainers are qualified and aware of the national or local policy & procedures.
- The designated departments in the facility (e.g. IPC, HSE, and Staff & Development, etc.) should collaborate in developing and conducting in house training & education
- Conduct structured, targeted training and competencies (e.g., before assignment, annual, or when new equipment and cleaning solution is introduced) focus refresher training on the gaps identified during competency assessments and routine monitoring activities
- Maintain training records that include the topic, dates, names of trainers and list of trainees

2.3. Infrastructure and Supplies Elements

Supporting physical infrastructure is necessary for an effective environmental cleaning program at the facility. The main areas are:

- Designated physical space
- Access to adequate water and wastewater services/systems
- Systems to procure and manage environmental cleaning supplies and equipment
- Appropriate selection of finishes, furnishings and patient care equipment

2.3.1. Designated Space

- Provide a clean supply room, soiled utility room and janitorial room in each ward/area
- Soiled utility room requirements: should have physical separation from other areas, have a hands-free door, contain a utility sink, a work counter and flushing-rim clinical sink
- Clean supply room requirements: separated from and have no direct connection with soiled areas
- Janitorial room requirements: drainage sink, high cleanable shelves, good ventilation and lightings, hot and cold water source with floor sink, negative pressure
- For future construction and major renovation, it is best practice to have one designated environmental cleaning services area within the facility for preparation, storage, and reprocessing of reusable cleaning equipment and supplies on each floor.

2.3.2. Water Supply and Waste Services

Environmental cleaning needs a large volume of water and produces almost as much wastewater, which must be disposed of appropriately to prevent contamination of the environment and surrounding community.

- Provide access to adequate water supply adequate for cleaning needs.
- Provide hand hygiene stations in service areas and points of care

- All the endpoints (i.e., taps) should be connected to an available and functioning water supply
- The drains should lead either to on-site wastewater systems or to the national sewer system (e.g. HAYA wastewater & sewer treatment facility)

2.3.3. Finishes, Furnishing and Others Considerations

IPC, HSE and environmental services must be involved in decision-making regarding choices of equipment, furniture and finishes in health care settings

- It's important to ensure that all finishes, furniture, and patient care equipment can be effectively cleaned and disinfected.
- When selecting finishes (floors, walls, and ceilings), furniture, and patient care equipment, consider the following: cleanable, easy to maintain and repair, resistant to microbial growth, non-porous and seamless, and are compatible with the facility disinfectant(s)
- If you can't clean it, don't buy it
- Avoid using cloth and soft furnishing in the patient care areas and nursing station
- Avoid upholstered furniture in the patient care areas – if resources are not available cover the upholstered furniture fabrics with fluid-resistant, nonporous material and resistant to cleaning and disinfection.
- Do not use carpet in patient care areas

There must be a process that ensures damaged finishes, furnishings, or equipment are identified, repaired, replaced or removed from use in patient care areas

2.4. Policy and Procedures Elements

Development of cleaning policy, checklists, and other job aids are essentials for implementing an effective environmental cleaning program

2.4.1. Cleaning policies

The development of local environmental cleaning policy provides the standard to the healthcare facilities that meet best practices and enables a common understanding of the required program elements among staff.

The facility environmental cleaning policy should include the following but not limited to:

- Defined lines of accountability
- Training and education
- List of approved cleaning products, supplies, and equipment
- List of PPE
- Specific supplies and equipment
- Preparation of environmental cleaning products (i.e., dilution, if applicable)
- Types of cleaning and procedures
- Procedures for cleaning different patient care areas and surfaces
- Procedures for cleaning in construction/renovation areas

- Procedures for specific environmentally-hardy microorganisms
- Monitoring and audit
- Cleaning schedules for every patient care area specifying the frequency, method, and staff(s) responsible according to the facility risk assessment

2.4.2. Cleaning Checklists, Logs, and Job Aids

It is best practice to develop supplemental materials to assist with the implementation of policy and procedures.

- **Cleaning checklists**- are an interactive tool that can help ensure that all procedures are completed.
- **Cleaning logs** -can help guide the daily workflow for cleaning staff and ultimately can be kept as records.
  - Specify the location (i.e., room, ward), types of cleaning (e.g., routine cleaning, terminal cleaning), date, and name/signature of cleaning staff.
  - It must be available in a central location(s) and/or where the cleaning task occurs so that supervisors can manage them on a daily basis, along with staff (e.g., IPC team) responsible for periodic monitoring activities.
  - Develop logs for required periodic or scheduled cleaning tasks (e.g., weekly, monthly), such as replacement of window coverings (e.g., curtains).
- **Cleaning job aids**- include posters, pictorial guides, and other visual reminders for key cleaning tasks

2.5. Monitoring and Audit

There are different approaches that can be used to monitor cleanliness in the health care environment. Each approach addresses different aspects of cleaning and each has advantages and disadvantages. (See table) This section discusses only the possible methods that may be available in healthcare facilities.

It is best practice to use both direct (e.g. Visual assessment, performance observation) and indirect (environmental marking) methods

Table: 2 Advantages and disadvantages of monitoring audits.

Method	Description	Advantages	Disadvantages
Visual assessment	Trained observer assesses cleanliness of an area ***after cleaning***	• Easy to implement • Allows feedback to individual environmental service staff	• Results do not correlate with levels of microbial contamination • Results may vary across different observer
Performance observation	Trained observer observes environmental service workers perform ***during cleaning***	• Easy to implement • Useful to assess that facility procedures for	• Time consuming • Labor intensive • Performance while observed may not

		cleaning are performed correctly • Allows feedback to environmental service staff	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 smooth surface suggests that the surface was not cleaned.	• Allows direct assessment of cleaning thoroughness (i.e., proportion of surfaces actually cleaned) • Allows assessment of which high- and low-touch surfaces are cleaned consistently and which 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 removal of the tracing agent
Environmental culture	Cultures can be taken from surfaces ***after cleaning*** to determine if bacteria are present.	• Provides the only direct measure of contamination of viable microorganisms (level of bacterial contamination, type of bacteria present)	• Expensive • Slow turnaround time • Not standardized • Does not assess bacterial contamination beyond the small areas tested

Table 3 : Suggested Monitoring Method, Staff, and Frequency

Method	Monitoring Staff	Monitoring Frequency
Visual assessments of cleanliness	• Cleaning supervisors • Cleaning program manager • IPC staff	• At least weekly
Fluorescent markers (e.g., UV visible)	• Cleaning supervisors • Cleaning program manager • IPC staff	• Weekly basis during the first year of the monitoring program - in order to establish benchmarks and track changes in practice and performance over time. • Once a month after benchmarking

Table 4: Number of beds /rooms to be monitored as per facility bed capacity		
(≥150) bed	(5%) of beds	
(less than 150 beds)	(15) beds	
(less than 15 beds)	(25%) beds	
Outpatient setting	(10- 15%) of examination/procedural room on a weekly basis. This can be increased to 25% weekly, allowing the area to be monitored on a monthly basis.	

2.5.1. Feedback Mechanism

Prompt feedback to staff and management can make immediate improvements to the cleaning practice and to the cleaning program.

Direct feedback to the staff

- *Real-time* - feedback and coaching during performance observations in a non-punitive manner to make prompt improvements in practice.
- *Monthly* - verbal debriefing during a one-on-one meeting between the cleaning staff and direct supervisors
- *Annual - performance review reports (written)*

Reporting to leadership

- Sharing of audit results to the environmental cleaning committee and administration. This report will identify trends and program-level gaps that require corrective action.

2.5.2. Program Audits

It is best practice to conduct a national program audit, reviewing the major program elements & identifying the areas for improvement.

- Program audits should include all the key program elements.
- Perform audits annually or every two years.
- The auditors should come either from the national or regional level, or staff from another healthcare facility.
- Maintain the records of the program audit reports on-site to allow benchmarking, development of remedial action plan and quality improvement projects.
- The audit results can be shared with the Directorate General of Financial Affairs-Contract Department to be used for any modifications of general services cleaning contracts to improve the cleaning services.

3. Environmental Cleaning Supplies and Equipment's

This section provides best practices, selection and preparation of environmental cleaning supplies. The environmental cleaning products must be approved by the local HSE or Department of Environmental and Occupational Health (DEOH)

These are the best practices for environmental cleaning products:

- Develop and maintain a master list of approved environmental cleaning products and suppliers (i.e., manufacturers, distributors).
- Minimize the number of different environmental cleaning products to be used at the facility to:
    - simplify the environmental cleaning process
    - minimize the training requirements for cleaning staff
    - reduce the potential for errors in preparation and use
- Store the environmental cleaning products in a manner to :
    - eliminate contamination risk and degradation
    - minimize contact with personnel (e.g., inhalation, skin contact)
- Manage safely the cleaning products according to the product's safety data sheet (SDS). Keep the SDS in the chemical storage room and preparation area either in soft or hard copies.
- Prepare the solutions according to the manufacturer's instructions (improper concentration or dilutions may pose unnecessary health and environmental risks)
- Ensure that environmental cleaning products do not damage the surfaces and equipment's
- Ensure that the job aids/instructions are available. (preparation, use, and disposal of environmental cleaning products)

Table 5: Ideal properties of environmental cleaning products	
Nontoxic	It should not be irritating to the skin or mucous membranes, choose products with the lowest toxicity rating.
Easy to use	Directions for preparation and use should be simple and contain information about PPE as required.
Acceptable odor	It should not have offensive odors to users and patients
Solubility	It should be easily soluble in water (warm and cold).
Economical/Low cost	It should be affordable.

All the containers used for storing solutions of environmental cleaning products should:

- be cleaned, clearly labelled, and have an expiration date based on the manufacturer's IFU
- be thoroughly cleaned and dried before refilling
- **Never be topped up**—use them until the indicated expiration date or until the container is empty.

3.1 Microfiber and disinfectant wipes

Microfiber is used as an alternative to cotton for both cleaning cloths and mop heads. They are woven with very fine split fibers of **hydrophilic polyamide and hydrophobic polyester** in various combinations that differ across manufacturers.

- They contain charged fibers, which result in higher adherence of dirt particles and microorganisms (i.e., increased absorbency) than cotton.
- It can reduce the amount of water and cleaning disinfecting chemicals used resulting in lower cost and reduced exposure to disinfectant chemicals, and less time spent in preparing and replenishing the cleaning solution.
- It is lighter weight, more ergonomic to handle with a lower risk for musculoskeletal injuries.
- **Can be damaged** by high pH and therefore not compatible with chlorine-based disinfectants. They need to be laundered separately from cotton cloths/linens.

Disinfectant wipes - are saturated with detergent-disinfectant (ONE step process) that can be an alternative to cotton or microfiber cleaning cloths.

- Follow the manufacturer's instructions for storing wipes and reprocessing containers as well as instructions for use and recommended contact time.
- Store with the lid sealed/closed, so the wipes remain wet, discard if they are no longer saturated.
- **Concerns** with ready-to-use wipes include a lack of data on efficacy, the limited contact times, and the potential to dry out prior to use (if incorrectly stored) or rapidly during use.

3.2 Detergents

These are cleaning products that are ***used before the disinfection process***. Must have a pH between 6 and 8 and soluble (in warm and cold water). This includes liquid soap, enzymatic cleaners, and detergents.

Most environmental surfaces can be adequately cleaned with soap and water or a One-step cleaner/disinfectant, depending on the nature of the surface and the type and degree of contamination

Best practice for detergent use:

- These products need approval by the IPC and HSE Team
- Must be used according to the manufacturers' recommendations (e.g., for dilution, temperature, water hardness, etc.) and to the product's safety data sheet.

Ideal properties for environmental cleaning detergent

- Effective to remove dirt, soil and various organic substances.
- Environmentally friendly: should not cause environmental pollution upon disposal; biodegradable.

3.3 Disinfectants

These are cleaning products that are ***used after cleaning*** and are not substitutes for cleaning unless they are combined with detergent-disinfectant product – ONE STEP (see the combined detergent-disinfectants section 3.4)

These products need approval by product evaluation team either at local or national level.

Sterilants or high level of disinfectant and skin antiseptics must NOT be used as environmental disinfectants (e.g., alcohol-based-hand rub, chlorhexidine gluconate) including phenolic because of its toxicity.

Manual dilution and mixing are more subject to error. Currently, there are healthcare facilities which are using an automatic dispensing system to prepare cleaning solutions. It must be calibrated regularly.

Use test strips to confirm correct concentrations of solutions (e.g., for chlorine-based products).

Table 6. Ideal properties of disinfectants:	
Broad spectrum	It should have a wide antimicrobial range, including those pathogens that are common causes of HAIs and outbreaks.
Rapid action	It should be fast acting and have a short contact time.
Remains wet	It should keep surfaces wet long enough to meet recommended contact times with a single application.
Not affected by environmental factors	It should be active in the presence of trace quantities of organic matter (e.g., blood) and compatible with cleaning supplies (e.g., cloths) and products (e.g., detergents) and other chemicals encountered in use.
Material compatibility	It should be proven compatible with common healthcare surfaces and equipment.
Persistence	It should have a residual antimicrobial effect on the treated surface.
Cleaner	It should have some cleaning properties.
Nonflammable	It should have flash point of more than 65°C (150°F).
Stability	It should be stable in concentration and use dilution

Low-level disinfectants is generally adequate for environmental cleaning procedures, but there are cases where intermediate-level disinfection is required with sporicidal properties (e.g., C. difficile)

There are different kinds of disinfectant products which have different properties, advantages and disadvantages to their potential use in healthcare facilities

Table 7. Advantages and disadvantages of disinfectants			
DISINFECTANT	**SPECTRUM OF ACTIVITY**	**ADVANTAGES**	**DISADVANTAGES**

Quaternary ammonium compounds e.g., alkyl dimethyl benzyl ammonium chloride, alkyl dimethyl ethylbenzyl ammonium chloride	*Bactericidal *Virucidal (only enveloped viruses) *Fungicidal *Not Mycobactericidal or sporicidal, only limited activity against non-enveloped viruses	*May be used on food contact surfaces *Wide material compatibility *Noncorrosive *Detergent properties, with good cleaning ability *Low cost	*Skin irritant, can also cause respiratory irritation *Narrow microbiocidal spectrum *Diluted solutions can support growth of microorganisms, particularly gram negative organisms. *Activity reduced by various materials (e.g., cotton, water hardness, microfiber cloths, organic material * Could induce cross resistance with antibiotics. *Persists in the environment and waterways
Alcohols (60-80%) e.g., isopropyl alcohol, ethyl alcohol, and methylated spirits	*Bactericidal *Virucidal *Fungicidal * Mycobactericidal	*Broad spectrum (but not sporicidal) *Rapid action *Nontoxic *Non-staining, no residue *Noncorrosive *Low cost * Good for disinfecting small equipment or devices that can be immersed	*Slow acting against non-enveloped viruses. *Does not remain wet. *Rapid evaporation makes contact time compliance difficult (on large environmental surfaces). *Inactivated by organic material. *Can damage materials (plastic tubing, silicone, rubber, deteriorate glues). *Flammable
Chlorine releasing agents e.g., bleach/sodium or calcium hypochlorite, sodium dichloroisocyanurate (NaDCC)	*Bactericidal *Virucidal *Fungicidal *Mycobactericidal Sporicidal (hypochlorite only at 5000ppm or 0.5%)	*Hypochlorites are broad spectrum (sporicidal) *Rapid action *Nonflammable *Low cost *Widely available *Can reduce biofilms	*Longer cleaning time - needs pre cleaning and rinsing (leaves residues). *Inactivated by organic material. *Can release toxic chlorine if mixed with acids or ammonia (Quats) *Skin and mucous membrane irritant *Damages fabrics, carpets *Corrosive *Offensive odors

			*Poor stability * Subject to deterioration if exposed to heat and UV
Improved hydrogen peroxide e.g., 0.5% enhanced action formulation hydrogen peroxide, 3% hydrogen peroxide	*Bactericidal *Virucidal *Fungicidal *Mycobactericidal *Sporicidal (only at 4-5%)	*Rapid action *Lesser toxic *Detergent properties, with good cleaning ability *Not affected by environmental factors *Active in the presence of organic material Safe for environment	*Contraindicated for use on copper, brass, zinc, aluminum *High cost

3.4 Combined detergent-disinfectants (ONE-STEP)

These are cleaning products that can be used in place of two steps when indicated in specific cleaning procedures.

- It requires rinsing on the environmental surfaces with water on a schedule basis to remove residues.

Do **NOT** use one- step process when the surfaces are visibly soil, contaminated with C. difficile, during blood and body fluid spill, in specialized areas and isolation wards.

3.5 Personal protective equipment (PPE) for environmental cleaning

The required PPE should be accessible and communicated directly to cleaning staff by IPC staff or ward/area in-charge, thru the cleaning supervisors, before starting every cleaning session

PPE best practices

- Include the required PPE for specific tasks in local policy and procedures and other visual job aids (e.g., signage for isolation areas, preparation of solutions).
- Train cleaning staff on appropriate use, application, and removal of required PPE
- Put on all required PPE before entering a patient care area and remove it (for disposal or reprocessing, if reusable) before leaving that area.
- Do not take off PPE in an airborne precaution area (e.g., TB ward) where a respirator (e.g., N95 or FPP2) is required, until after leaving that isolation area.
- All PPE (reusable and disposable) should be, well maintained (good quality, appropriately stored), cleaned before use
- Reprocess (i.e., clean and disinfect) all reusable PPE at least once a day
- Conduct regular fit-testing for cleaning staff who are required to wear respirators.
- Always perform hand hygiene directly before wearing and after removal of gloves
- Use reusable rubber gloves for cleaning.
- Use SDS to determine the required PPE for preparing environmental cleaning products and solutions (e.g., manual dilutions).
- Use chemical-resistant gloves (e.g., nitrile, latex) for preparation of cleaning chemicals.

Cleaning staff uniform and grooming best practices

- Keep sleeves above the elbow to not interfere with glove use or hand hygiene.
- Wear rubber-soled closed toe shoes or boots (i.e., not sandals), preventing 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 harbor microorganisms.
- Keep fingernails short and free of nail varnish preventing tearing of gloves and picking up dirt and bacteria.

Best practices for reprocessing reusable cleaning supplies and equipment

- Reprocess the reusable supplies and equipment (e.g., buckets, rubber gloves) directly after use in isolation rooms/ area, and when soiled with blood or body fluids.
- Clean thoroughly, disinfect, and rinse equipment such as buckets and containers daily and whenever solution is replaced. Store them upside down to allow complete drying.
- Launder mop heads, floor cloths, and soiled cleaning cloths at least daily (e.g., at the end of the day) and allow them to fully dry before storage and reuse.
- Invert the mops with the head up to fully dry.
- Use laundry services with hot water (70–80°C x 10 min) to reprocess cloths and mop heads, if they are available. Do NOT mix mop heads and cleaning cloths from other soiled hospital textile items.
- Reprocess reusable supplies and cleaning equipment in a dedicated area that is not used for other purposes (NOT in handwashing sinks) according to manufacturer's instructions. **If manufacturer's instructions are not available:**
  - Immerse in detergent solution and use mechanical action (e.g., scrubbing) to remove soil.
  - Disinfect by: fully immersing the items in boiling water, or in disinfectant solution for the required contact time and rinsing with clean water to remove residue
  - Allow to fully dry in a clean and dry area to prevent recontamination.

4. Environmental Cleaning Procedures

This section provides the current best practices for environmental cleaning procedures in patient care areas, blood and body fluid spills and for noncritical patient care equipment.

Every healthcare facility should develop detailed policy and procedures for environmental cleaning of surfaces and noncritical equipment in every type of patient care area including cleaning schedules, responsible person, frequency, and methods.

Table 8: Probability of contamination and the required cleaning frequency of environmental surfaces	
Probability of contamination:	Heavily contaminated surfaces and items require more frequent and thorough cleaning than moderately contaminated surfaces, which in turn require more frequent and rigorous environmental cleaning than lightly or non-contaminated surfaces and items.
Vulnerability of patients to infection:	Surfaces and items in care areas containing vulnerable patients (e.g., immunosuppressed) require more frequent and rigorous cleaning than surface and items in areas with less vulnerable patients.
Potential for exposure to pathogens:	High-touch surfaces (e.g., bed rails) require more frequent and rigorous cleaning than low-touch surfaces (e.g., walls).

The determination of environmental cleaning procedures for individual patient care areas, including frequency, method and process, should be based on the probability on the contamination of environmental surfaces and items (see table 8)

Regardless of the anticipated level of contamination for a given area or the frequency of routine cleaning and disinfection, if blood or body fluid spills or contamination occurs, it must be cleaned and disinfected immediately

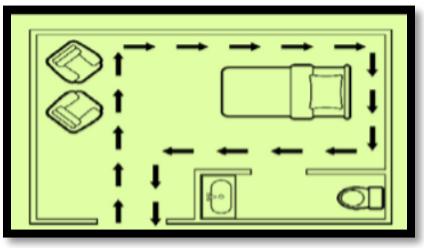
4.1 General environmental cleaning technique

For all types of environmental cleaning procedures, always use the following general strategies.

- **Conduct visual preliminary site assessment to determine if:**
  - the patient(s) status could pose a challenge to safe cleaning
  - there is any need for additional PPE and/or supplies
  - there are any obstacles (e.g., clutter) or issues that could pose a challenge to safe cleaning there is any damaged or broken furniture or surfaces to be reported to supervisor/management
- **Clean from cleaner to dirtier s to avoid spreading dirt and microorganisms**
  - During terminal cleaning, clean low touch surfaces before high-touch surfaces.
  - Clean patient areas before patient toilets.
  - Clean the non-isolation rooms before the isolation rooms
  - Start with shared equipment and common surfaces, then to surfaces and items touched during patient care and finally with surfaces and items directly touched by the patient.

- **Proceed from high to low (top to bottom)** to prevent dirt and microorganisms from dripping/falling down and contaminating the cleaned areas.
    - Cleaning bed rails before bed legs
    - Cleaning environmental surfaces prior and last the floors

- **Clean in a methodical, systematic manner to avoid missing areas**
    - Clean from left to right or clockwise
    - 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.



- **Immediately clean blood and body fluid spills**
    - **Confine** the spill
    - **Clean** – with detergent and water, first
    - **Neutralize-** disinfect using an intermediate level of disinfectants & observe contact time
    - **Dispose** the waste appropriately

4.2 The best practices for environmental cleaning of surfaces:

- Use fresh cleaning cloths at the start of each cleaning session
- Change cleaning cloths when they are no longer saturated with solution
- For higher-risk areas, change cleaning cloths between each patient zone (i.e., use a new cleaning cloth for each patient bed). - For example, in a multi-bed intensive care unit, a fresh cloth is required for every bed/incubator
- Ensure that cleaning cloths are enough to complete the required cleaning session.

- ***General patient areas and outpatient wards***

These areas requires three types of **cleaning routine**, **terminal and scheduled cleaning**

The probability of contamination and/or the vulnerability of the patients to infection is low in these areas compared to specialized areas, so these areas may require less frequent and rigorous (e.g., method, process).

Develop a checklist to delineate responsibility for every surface and item, including ensuring that disposable personal care items and patient care equipment are removed for reprocessing.

- **Scheduled cleaning**

Scheduled cleaning occurs alongside routine or terminal cleaning to reduce dust and soiling on low-touch items or surfaces.

- Perform scheduled cleaning on items or surfaces that are not at risk for soiling under normal circumstances

- Use neutral detergent and water. But if they are visibly soiled with blood or body fluids, clean and disinfect these items as soon as possible

- **Patient area toilets**

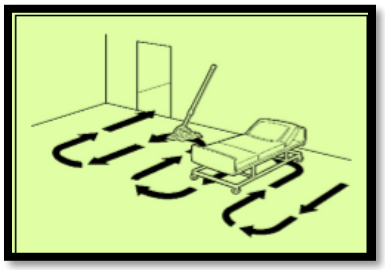
Toilets in patient care areas whether private (in private room) or shared (among patients and visitors) have high patient exposure (i.e., high-touch surfaces) and are commonly contaminated and pose a higher risk of pathogen transmission than in general patient areas.

- If resources permit, assign a dedicated cleaning staff at shared toilets to minimize the risk associated with these areas

- **Patient area floors**

Floors generally have low patient exposure (i.e., are low-touch surfaces) and pose a low risk for pathogen transmission. Normally they should be cleaned daily, It is not necessary to use a disinfectant except in specialized areas.

- **The best practices for environmental cleaning of general patient area floors**
  - Use wet floor or caution signs to prevent injuries.
  - Mop from cleaner to dirtier areas.
  - Mop in a systematic manner, proceeding from the area farthest from the exit and working towards the exit
  - Change mop heads/floor cloths and buckets of cleaning and disinfectant solutions as often as needed (e.g., when visibly soiled, after every isolation room, every 1-2 hours) and at the end of each cleaning session.



4.3 Specialized patient areas

These areas have vulnerable population who is more prone to infection and/or the probability of contamination is high, making these areas higher-risk than general patient areas.
These areas include wards or units that provide service to:

- high-dependency patients, (e.g., ICUs)
- immunosuppressed patients (e.g., bone marrow transplant, chemotherapy)
- patients undergoing invasive procedures (e.g., operating theatres)
- patients who are regularly exposed to blood or body fluids (e.g., labor and delivery ward, burn units)

Environmental surfaces and floors require cleaning and disinfection with a facility-approved disinfectant.

- **Intensive care units (ICUs)**

These are areas/units considered high-risk areas due to the severity of disease and vulnerability of the patients to develop infections.

- The environmental cleaning frequency and the process are the same for adult, pediatric and neonatal units, but there are specific considerations for neonatal areas with the use of disinfectants.
- **Operating rooms/theaters – OR/OT**

OR/OT are highly specialized areas with a mechanically controlled atmosphere where surgical procedures are performed. It require environmental cleaning at three distinct intervals throughout the day: **before the first procedure, between procedures, after the last procedure (i.e., terminal cleaning)**

- **Sterile service departments (SSD)**

These are departments or areas where semi-critical and critical equipment is sterilized and stored.

For more guidance, refer to Decontamination and Reprocessing of Medical Devices for Health-care Facilities (https://www.who.int/infectionprevention/publications/decontamination/en/)

- **Emergency departments (ED)**

ED are moderate to high-risk areas because of the wide variability in the condition of patients and admissions, which can increase the probability of contamination of the environment via infectious agents or blood and body fluids and make them more susceptible to infection (e.g., trauma patients)

- **Labor and delivery wards**

These wards are routinely contaminated and patients are vulnerable to infection.

Best practices for specialized patient care areas

- Provide separate environmental cleaning supplies and equipment, including PPE for cleaning staff (e.g., reusable rubber gloves, gowns), to prevent cross-contamination between these areas.
- Have dedicated supplies and equipment (e.g., mops, buckets).
- Use fresh mops/floor cloths and mopping solutions for every cleaning session
- Use fresh cleaning cloths for every cleaning session, regularly replacing them during cleaning and never double-dipping them into cleaning and disinfectant solutions.
- Use fresh cleaning cloths for surfaces for every cleaning session (at least two per day). Replace them regularly during cleaning and avoid double-dipping into cleaning and disinfectant solutions.
- Critical and semi-critical equipment in the operating rooms require specialized reprocessing procedures should be cleaned by designated OR/OT staff.
- In SSD, start cleaning in the clean area and finish with the dirty area
- If resources allow, designate separate cleaning staff/teams to each area.
    - If not, clean at different times of the day depending on the workflow.
- **Use checklists,** where multiple staff are involved, clearly define and delineate the cleaning responsibilities for cleaning the environmental surfaces and noncritical patient care equipment (stationary and portable).

4.4 Transmission-based precaution / Isolation wards

The three types of transmission-based precautions are airborne, contact and droplet. The PPE should always be put on and removed following the indications posted / recommended by IPC.

Best practices for environmental cleaning in transmission-based precaution areas:

- Clean these areas after non-isolation areas.
- Change environmental cleaning supplies and equipment, including PPE, directly after cleaning.
- Dedicate supplies and equipment for these areas
- Post the type of precaution and required procedures, including required PPE, on signage outside the isolation area, ensure that these indications are understood by cleaning staff.
- Do not bring cleaning carts into the area—keep them at the door and only the equipment and bring only the supplies needed for the cleaning process.

- **Cleaning for C. difficile (spore-forming):**

  Requires a **Two**-step cleaning process.

- **Cleaning for Carbapenem-resistant Enterobacteriaceae, *Acinetobacter baumannii* and *Pseudomonas aeruginosa* (CRE-CRAB-CRPsA):**

  These organisms are a national and international concern due to their implication as an emerging cause of severe healthcare-associated infections.

For environmental cleaning and disinfection. Refer to WHO 2019: Implementation manual to prevent and control the spread of Carbapenem-resistant organisms at the national and health care facility level [PDF – 98 pages] (https://apps.who.int/iris/bitstream/handle/10665/312226/WHO-UHC-SDS-2019.6-eng.pdf)

- **Highly infectious pathogens of epidemic potential, e.g. As those that cause viral hemorrhagic fevers (e.g., Ebola):**

  There might be specific training programs for environmental cleaning procedure and PPE requirements for isolation areas of highly infectious pathogens.

Refer to: • WHO: Infection prevention and control guidance for care of patients in health-care settings, with focus on Ebola (https://www.who.int/csr/resources/publications/ebola/filovirus_infection_control/en/) • WHO | Ebola virus disease: Key questions and answers concerning water, sanitation and hygiene (https://www.who.int/csr/resources/publications/ebola/water-sanitationhygiene/en/)

** Please also refer to the national ICP guide for specific infections

4.5 Non-critical patient care equipment

This equipment includes portable or stationary noncritical patient care equipment such as IV poles, commode chairs, blood pressure cuffs, and stethoscopes are:

- Touched frequently and directly by patients and/or by healthcare workers (i.e., high-touch surfaces)
- Often shared between patients

Responsible Staff

Shared responsibility between cleaning and clinical staff, so it is best practice to clearly define and delineate cleaning responsibilities for all equipment (stationary and portable).

Develop a cleaning chart or schedule outlining the method, frequency and responsible staff for cleaning all of equipment in patient care areas, inform both cleaning and clinical staff (e.g., nursing) so that items are not missed.

These are the best practices for the selection and care of non-critical patient- care equipment:

- All equipment should have detailed written instructions for cleaning and disinfection from the manufacturer, including pictorial instructions if disassembly is required.
- Train the responsible staff for cleaning equipment on procedures before the equipment is placed into use.
- For the patient care areas, do not purchase, install, or use equipment that cannot be cleaned and disinfected, unless they can be fitted with plastic (or other material) coverings.
- Clean all equipment using the methods and products available at the facility.
- If plastic coverings are protecting difficult-to-clean equipment, clean these items with the same frequency, inspect coverings for damage on a regular basis, and repaired and replaced them as needed.

4.6 References

1. Anderson DJ et al (2017) Enhanced terminal room disinfection and acquisition and infection caused by multidrug-resistant organisms and Clostridium difficile (the Benefits of Enhanced Terminal Room Disinfection study): a cluster-randomized, multicenter, crossover study. The Lancet; 389: 10071, 805-814
2. APIC Text of Infection Control and Epidemiology, Environmental services, Teresa Chou, MPH, October 3, 2014
3. Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings, 3rd Edition, Provincial Infectious Disease Advisory Committee, Public Health , Ontario, April 2018
4. Best Practices for Environmental Cleaning in Healthcare Facilities: in Resource-Limited Settings, Center Diseases and Control Prevention, National Center for Emerging and Zoonotic Prevention Diseases, Division of Healthcare Quality Promotion, Version 1, November 2019
5. British Columbia Best Practices for Environmental cleaning for Prevention and Control of Infections in Healthcare Settings and Programs, The Provincial Infection Control Network of British Columbia (PICNIC) , Vancouver British Columbia, September 2016
6. Mitchell BG et al (2015) Risk of organism acquisition from prior room occupants: a systematic review and meta-analysis. The Journal of Hospital Infection; 91: 3, 211-217.
7. MoH, General Services Contract Agreement , 2021 Tender
8. MoH, National guidelines for ambulance cleaning transporting patients suspected /confirmed case of contagious respiratory infections
9. MOH, National guidelines for enhanced decontamination program in healthcare facilities
10. MoH, National guidelines for terminal cleaning and decontamination
11. Passaretti CL et al (2013) An evaluation of environmental decontamination with hydrogen peroxide vapor for reducing the risk of patient acquisition of multidrug-resistant organisms. Clinical Infectious Diseases; 56: 1, 27-35