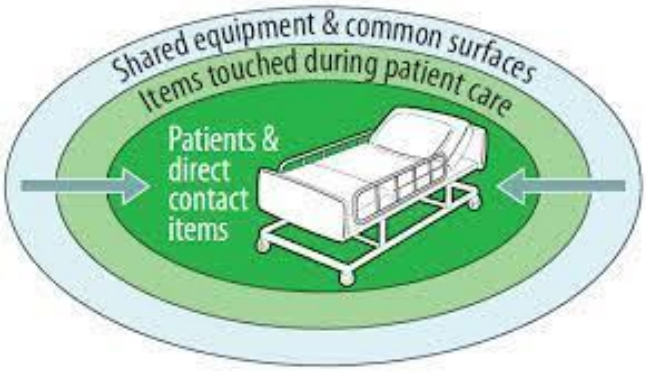
SOP FOR THE ROUTINE ENVIRONMENTAL CLEANING OF HEALTHCARE FACILITIES



Ministry of Health and Wellness
MAURITIUS

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Approval Form

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STANDARD OPERATING PROCEDURE FOR THE ROUTINE ENVIRONMENTAL CLEANING OF HEALTHCARE FACILITIES			
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PEER REVIEW

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This document was reviewed by the IPC teams in October 2023 and no changes were recommended – this version is being extended to 2026.

Date of next review: Jan 2026

Updates

June 2022

- The two-bucket system can now be used in non-patient areas instead of the three-bucket system
- Given the recurrent shortage of equipment, a section on contingency planning has been added

Version history

Version	Date
Version 1.0: Created	4 July 2021
Version 1.0: Approved	3 August 2021
Version 2.0: Revised	30 June 2022
Version 2.0: Approved	25 July 2022

Standard Operating Procedure for the Routine Environmental Cleaning of Healthcare Facilities

Progress since the last version

Following recent audits of infection prevention and control practices in the healthcare facilities of Mauritius, it has been noted that fumigation and spraying with sodium hypochlorite, due to its harmful nature, is being practiced less commonly (although not stopped) and appropriate dilution of Javel is being carried out in some facilities now.

Nonetheless, there is still significant room for improvement with regards to the terminal cleaning of bed spaces and the daily cleaning of high-touch surfaces. For instance, the three-bucket technique has been misunderstood to imply the need to clean surfaces with water after cleaning with soap, semi-critical equipment used for dressing changes (kidney dish, scissors and forceps) are being sterilized (often incorrectly) instead of undergoing high-level disinfection, dipping into containers of disinfectants is a persistent practice (notwithstanding the fact that such disinfectants are often stored in dirty containers or are kept open to the air for the whole day) and the slippery signage during cleaning is often absent.

Purpose

The purpose of this document is to describe the correct steps that should be followed during the cleaning of healthcare facilities so as to reduce the risk of transmission of microbes.

Standard operating procedure

1. Ensure that all the necessary equipment is available before starting to clean e.g.:
    a. Cleaning trolley
    b. Cleaning and disinfectants products: liquid soap, detergents or disinfectants
    c. Color-coded equipment like waste bins
    d. Surface cleaning supplies:
        i. Portable containers (e.g., bottles and small buckets) for storing environmental cleaning products (or solutions)
        ii. Surface cleaning cloths: cotton, microfiber or disposable wipes
    e. Floor cleaning supplies:
        i. Mop head (cotton or microfiber)
        ii. Standard-sized buckets
    f. Wet floor/caution signs
    g. Personal protective equipment (PPE)
2. Select the correct disinfectant:
    a. An ideal solution is non-toxic, easy to use, has an acceptable odor, is soluble and is economical.
    b. Ensure that environmental cleaning products are selected that do not damage the surfaces and equipment that are being cleaned.

c. The following tables are taken from "CDC. Best Practices for Environmental Cleaning in Healthcare Facilities in Resource-Limited Settings."

d.

Table 4. Advantages and disadvantages of common healthcare disinfectants (modified from reference 24)

Disinfectant	Advantages	Disadvantages
Low-level disinfectant: Quaternary ammonium compounds e.g., alkyl dimethyl benzyl ammonium chloride, alkyl dimethyl ethylbenzyl ammonium chloride **Spectrum of activity** Bactericidal Virucidal (only enveloped viruses) Fungicidal	Toxicity: • may be used on food contact surfaces. Wide material compatibility • noncorrosive Detergent properties, with good cleaning ability • low cost	Toxicity: • skin irritant, can also cause respiratory irritation Narrow microbiocidal spectrum • not mycobactericidal or sporicidal, only limited activity against non-enveloped viruses • diluted solutions can support growth of microorganisms, particularly gram negative organisms Affected by environmental factors: • 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
Intermediate-level disinfectant: Alcohols (60-80%) e.g., isopropyl alcohol, ethyl alcohol, and methylated spirits **Spectrum of activity** 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) Affected by environmental factors: • inactivated by organic material Material compatibility: • can damage materials (plastic tubing, silicone, rubber, deteriorate glues) Flammable

e.

Table 4 (Continued)

Disinfectant	Advantages	Disadvantages
Intermediate-level disinfectant: Chlorine releasing agents e.g., bleach/sodium or calcium hypochlorite, sodium dichloroisocyanurate (NaDCC) **Spectrum of activity** Bactericidal Virucidal Fungicidal Mycobactericidal Sporicidal (hypochlorites only at 5000ppm or 0.5%)	Hypochlorites are broad spectrum (sporicidal) Rapid action Nonflammable Low cost Widely available Can reduce biofilms	Affected by environmental factors: • inactivated by organic material High toxicity: • can release toxic chlorine if mixed with acids or ammonia • skin and mucous membrane irritant Material compatibility: • damages fabrics, carpets • corrosive Leaves residue, requires rinsing or neutralization Offensive odors Poor stability: • subject to deterioration if exposed to heat and UV
Intermediate-level disinfectant: Improved hydrogen peroxide e.g., 0.5% enhanced action formulation hydrogen peroxide, 3% hydrogen peroxide **Spectrum of activity** Bactericidal Virucidal Fungicidal Mycobactericidal Sporicidal (only at 4-5%)	Rapid action Nontoxic Detergent properties, with good cleaning ability Not affected by environmental factors • active in the presence of organic material Safe for environment	Material compatibility: • contraindicated for use on copper, brass, zinc, aluminum High cost

Surface	Choice of disinfectant
Metal surfaces	Phenols, ethyl or isopropyl alcohol, iodophors
Non-metallic hard surfaces	Phenols, ethyl or isopropyl alcohol, sodium hypochlorite, hydrogen peroxide
Rubber tubing and catheters	Sodium hypochlorite, hydrogen peroxide
Polyethylene tubing and catheters	Sodium hypochlorite, hydrogen peroxide
Lensed instruments	Sodium hypochlorite, hydrogen peroxide, quaternary ammonium compounds
Thermometers	Ethyl or isopropyl alcohol
Hinged instruments (e.g., forceps, scissors, etc.)	Sodium hypochlorite, hydrogen peroxide
Bench tops and floors	Phenols, iodophors, sodium hypochlorite
Biosafety cabinets and dental equipment	Iodophors
Spills and soiled linen	Sodium hypochlorite

Table 1: Modified from "CDC. Guideline for Disinfection and Sterilization in Healthcare Facilities (2008) - Methods of sterilization and disinfection. Table 1." and "Stanford University. Environmental Health and Safety – 11.2 Decontamination. Figure 4."

f. The above table does not describe the steps to follow for sterilization. It mentions the products that can be used for low-level to high-level disinfection. Of note, quaternary ammonium compounds are mostly used for low level disinfection only.

g. Metals can be corroded with sodium hypochlorite (at moderate to high concentration), hydrogen peroxide, quaternary ammonium compounds (at high concentration) and peracetic acid.

h. Do not use sodium hypochlorite on electronic equipment and optical equipment. High concentration of sodium hypochlorite or hydrogen peroxide will bleach linen.

i. Alcohol is flammable and should not be used in areas where a fire can start.

j. Sporicidal disinfectants include hydrogen peroxide, chlorine dioxide, sodium hypochlorite, formaldehyde and peroxyacetic acid.

k. Paraformaldehyde, formaldehyde and ethylene oxide are very toxic and carcinogenic; it is currently not clear whether glutaraldehyde causes cancer in humans although it can damage DNA. When used, personal protective equipment should be worn, vented fume hoods must be available and unnecessary staff should avoid the area during the procedure. They may be used for the sterilization of some hospital equipment or for the decontamination of high-efficiency particulate absorbing filters or of biosafety cabinets (especially level 3 and above).

l. Iodine itself will usually stain surfaces. However, iodophors are mostly non-staining except when used on some plastics, clothes and porous surfaces.

m.

Spaulding Classification System

Classification of devices, processes, and germicidal products			
Device classification	**Device (examples)**	**Spaulding process classification**	**EPA product classification**
Critical (enters sterile tissue or vascular system	Implants, scalpels, needles, other surgical instruments, etc.	**Sterilization** - sporicidal chemical prolonged contact	Sterilant/disinfectant
Semicritical (touches mucous membranes [except dental])	Flexible endoscopes, laryngoscopes, endotracheal tubes, and other similar instruments	**High-level disinfection**- Sporicidal chemical; short contact	Sterilant/disinfectant
Noncritical (touches intact skin)	Thermometers, hydrotherapy tanks	**Intermediate-level disinfection**	Hospital disinfectant with label claim for tuberculocidal activity
	Stethoscopes, tabletops, bedpans, etc.	**Low-level disinfection**	Hospital disinfectant without label claim for tuberculocidal activity

n. *How to pick the right disinfectant:* Choose the level of disinfection from the Spaulding classification system → Pick an available disinfectant at the right concentration from table 2 below → Ensure the disinfectant is compatible with the surface being cleaned by checking table 1 → If a specific microbe (e.g., tuberculosis) is believed to be present, check the document on "Antimicrobial spectra of some of the disinfectants available on the Mauritian market" to see if the disinfectant is active against this organism.

3. Always use the correct concentration of solution and follow the correct contact time:

a.

Chlorine disinfectant solution preparation

Formula for Making a Dilute Solution from a Concentrated Solution

Total Parts (TP) (H2O) = [% Concentrate / % Dilute] – 1

Example: To make a 0.1% chlorine solution from 5% concentrated solution:

Calculate TP (H2O) = [5.0% / 0.1%] – 1 = 50 – 1 = 49

Take 1 part concentrated solution and add to 49 parts boiled (filtered if necessary) water.

Source: AVSC International (1999). Infection Prevention Curriculum. Teacher's Manual. New York, p.267.

Compound	Concentration			Contact time	Shelf life
	H	I	L		
Hypochlorite	0.5-1%	0.1-0.5%	0.01-0.1%	10-30 minutes	Shelf life of 6 months at > 5% concentration when stored away from sunlight. Otherwise, usage life of 7 days at 0.5% concentration when stored away from sunlight.
Ethanol or isopropyl alcohol	NA	70-90%	70-90%	2-10 minutes	1-6 months
Glutaraldehyde	2-4%	NA	NA	15-30 minutes	14 days
Ortho-phthalaldehyde	0.55%	NA	NA	10-15 minutes	14 days for usage life and 2 years for closed bottle shelf life
Hydrogen peroxide	6-7.5% (2% E*)	(0.5% E*)	3% (0.5% E*)	10-60 minutes (3 - 8 minutes E*)	5-7 days
Peracetic acid	0.2-0.35%	NA	NA	10-60 minutes	5-7 days
Potassium peroxymonosulfate	1-2%	NA	NA	10 minutes	7 days
Phenols	NA	1-5%	0.2-1%	10 minutes	7 days
Quaternary ammonium compounds	NA	NA	0.1-2%	10 minutes	1-5 years
Iodine	1-5%	0.1-1%	0.01-0.1%	5-60 minutes	3 years

*Table 2: Modified from the "University of Nebraska. Safe Operating Procedure - chemical disinfectants for biohazardous materials. Revised March 2021.", "CDC. Guideline for Disinfection and Sterilization in Healthcare Facilities (2008) - Methods of sterilization and disinfection. Table 1." and "Ontario Agency for Health Protection and Promotion (Public Health Ontario). Guide to infection prevention and control in personal service settings. 3rd ed. Toronto, ON: Queen's Printer for Ontario; 2018. At a glance, Disinfectant tables." This table does **not** specify products that should be used for hand hygiene. H = high level disinfection; I = intermediate level disinfection; L = low level disinfection; E* = enhanced or activated formulation of hydrogen peroxide.*

4. Always follow standard and transmission-based infection prevention and control (IPC) precautions:

    a. Implement hand hygiene before and after cleaning, and any time the hands are soiled.

    b. Wear appropriate PPE: this usually consists of heavy-duty gloves, waterproof coat / gown / apron and boots.

    c. Additional PPE may be worn depending on the risk assessment of the area being cleaned. Check any signage for additional precautions e.g., mask or face shield / goggles.

    d. Always physically remove contamination by foreign material (e.g., dust) before starting the disinfection process. Wiping with a damp cloth can remove debris; a detergent is used to remove organic material like oily spills; a disinfectant is necessary to kill microbes.

5. Routine cleaning of surfaces:

    a. Always proceed from the highest area to the lowest area.

    b. Always proceed from the cleanest area to the dirtiest area.

    c. Focus on high touch surfaces e.g., bed rails, bed frames, tray table, bedside table, handles, IV poles, doorknobs, light switches, etc.

    i. 

    d. Use a clean cloth. Wet it in clean water and wipe to remove debris and dust from the surface; soap may be used if necessary. Then, use the appropriate disinfectant to wipe the surface.

6. Clean all areas at the recommended frequency:

	Site of high touch surfaces	**Frequency of cleaning**
Emergency Department and Triage Area	Waiting / Admission	At least twice daily
	Consultation / Examination	After each event/case and at least twice daily, and as needed
	Procedural (trauma, critical care)	Before and after (i.e., between) each procedure And end of the day (terminal clean)
Outpatient department	Examination / consultation room	At least twice daily terminal cleaning and routine cleaning in between each patient
	Procedural (minor operative procedures; e.g., suturing wounds, draining abscesses)	Before and after (i.e., between) each procedure
Inpatient ward	General inpatient wards	Floors: at least once daily. High-touch surfaces: at least twice daily.
	Transmission-based precaution / Isolation wards	At least twice daily and as needed

Specialized patient areas		
	ICUs	Twice daily and as needed
	Haemodialysis units	Before and after (i.e., between) every patient
	Patients undergoing invasive procedures (e.g., operating theatres rooms)	Before the first procedure Between procedures After the last procedure (i.e., terminal cleaning)
	Labor and delivery ward	Before and after (i.e., between) every procedure and at least daily
	Burns unit	Before and after (i.e., between) every procedure and twice daily and as needed
Medication preparation areas		At least once every 24 hours
Bathrooms / toilets		At least twice a day if not shared, three times if shared.
Hallways / corridors		At least twice a day

7. Routine cleaning of floors:

    a. Floors should be cleaned last (after cleaning of high touch surfaces), with adequate signage placed while floors are cleaned and dried to prevent slips, trips and falls on wet floors. Once floors are completely dry, they must be removed as they present a trip hazard.

    b. Change mop heads and buckets of cleaning and disinfectant solutions as often as needed (e.g., when visibly soiled) and at the end of each cleaning session.

    c. Discard dirty solutions in sluice.

    d. Mop buckets must be washed with detergent, rinsed, dried, and stored inverted to drain fully when not in use.

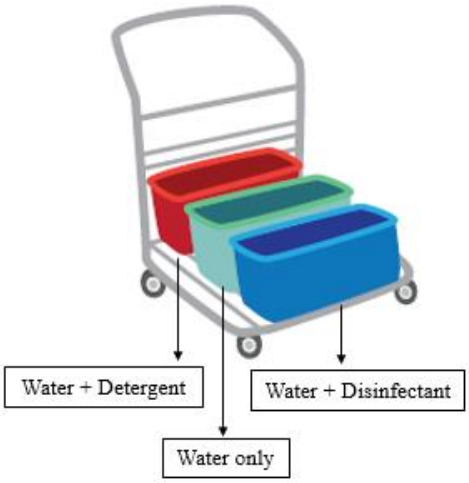
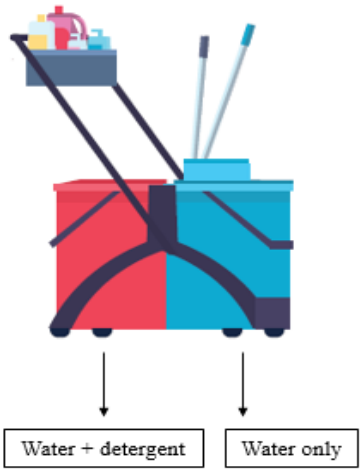
    e. Use 0.1% sodium hypochlorite in most instances. In some specific areas (e.g., areas with high degree of soiling, or areas where patients with multi-drug resistant organisms are hospitalized), 0.5% sodium hypochlorite is recommended.

    f. Recommended method for floor mopping:

        i. Carry out floor mopping, using either the three-bucket or two-bucket system, as detailed in table below.

        ii. While the two-bucket system can be used where non-infectious patients are admitted, since segregation of infectious cases from non-infectious cases are often not carried out in the hospital, it is proposed that all areas where patients are cared

for must strictly follow the three-bucket mopping system. Non-patient areas, such as hospital corridors, can be mopped using the two-bucket system.

	Three-bucket system	**Two-bucket system**
Composition of buckets	 • Use 3 buckets • 1st bucket (cleaning bucket) = detergent + water • 2nd bucket (rinse bucket) = water only • 3rd bucket (disinfectant bucket) = disinfectant + water	 • Use 2 buckets only • 1st bucket (cleaning bucket) = detergent + water • 2nd bucket (rinse bucket) = water only
Sites	All areas where patients are cared for E.g.: Wards, wards' corridors, casualties, intensive care units, operating theatres, treatment rooms, etc.	Non-patient areas E.g.: Hospital corridors
Procedure	1. Dip mop into cleaning bucket. Wring out excess cleaning solution. 2. Wipe floor. 3. Dip mop into rinse bucket. Wring out excess solution. 4. Dip mop into disinfectant bucket. Wring out excess disinfectant solution. Wipe floor. 5. Repeat step above to continue mopping. *<u>Note:</u> Floor is mopped twice, first with detergent solution, and a second time with the disinfectant solution.*	1. Dip mop into cleaning bucket. Wring out excess cleaning solution 2. Wipe floor 3. Dip mop into rinse bucket. Wring out excess solution 4. Repeat step one above to continue mopping. *<u>Note</u>: Floor is mopped only once, with the detergent solution.*

8. Cleaning of spillage:

    a. Confine the spill, clean the area and then disinfect the area.

    b. Clean the spill immediately after spillage.

    c. Care must be taken to avoid skin, eye, and mucous membrane contamination during the cleaning and disinfection of spillages. Wear plastic disposable apron, disposable or thick rubber gloves, face mask, goggles/visor (if splash or spray is anticipated).

    d. Remove the organic matter using absorbent material (absorbent paper towels or cloths) prior to cleaning. Discard absorbent material in yellow plastic bag.

    e. Clean the area with a mop or cloth soaked in soap water.

    f. Use 0.5% chlorine for disinfection. The contact time is 10 minutes.

    g. Chlorine-releasing agents should not be used for management of urine spillage in poorly ventilated areas (as contact with urine liberates toxic gas).

9. Discharge or terminal cleaning:

    a. If a patient room or bed becomes vacant (e.g., the patient is discharged, is transferred or dies), terminal / discharge cleaning is indicated.

    b. Perform routine cleaning and furthermore, concentrate on cleaning difficult to reach areas of the room, the bed, its rails and its headboard, disinfect sideboards, change the bed sheet, remove waste and linen, clean corners of the room, decontaminate drawers and do a thorough cleaning of the bathroom.

10. Deep cleaning:

    a. Deep cleaning is indicated during outbreaks of infections within wards that cannot be controlled using other methods and should be performed only when recommended by the IPC team.

    b. A deep clean should pay particular attention to cleaning objects or surfaces that may not be cleaned as part of a routine clean. This should include wiping low-frequency touch surfaces.

    c. This is a rigorous cleaning using a manual process: vacate the area of all patients, remove as many furniture as possible, curtains should be taken off and cleaned, all disposable supplies must be discarded, walls, floors and ceilings should be scrubbed and destained, vents, radiators, fans and air conditioners are disinfected thoroughly, and all surfaces are chemically cleansed while mattresses are decontaminated.

    d. All clinical and non-clinical equipment, fixtures and fittings must be disinfected.

    e. The ward will likely need to be closed for 2 to 3 days during the cleaning process.

    f. Steam cleaning, misting with hydrogen peroxide and irradiating with ultraviolet light are techniques that may be utilized depending on the circumstances.

g. Fumigation, nebulization or atomization with formaldehyde or quaternary ammonium compounds is not part of deep cleaning.

DON'Ts

1. Fumigation is not indicated:

a. The Centers for Disease Control and the Healthcare Infection Control Practices Advisory Committee in their 2003 Guidelines for Environmental Infection Control in Health-Care Facilities stated that they do not support disinfectant fogging (CDC 2003). It is not effective, is time-consuming and the fumes are toxic (i.e., irritating to mucous membranes of the nose and eyes).

b. Per the Asia Pacific Society of Infection Control, it is an ineffective risk reduction practice (APSIC 2011).

c. In indoor spaces, routine application of disinfectants to environmental surfaces by spraying or fogging (also known as fumigation or misting) is not recommended (WHO 2020).

2. Do not spray disinfectants.

3. Non-critical instruments (e.g., sphygmomanometers, thermometers, stethoscopes, etc.) can be cleaned with cloths soaked in 70-80% alcohol. Sodium hypochlorite can damage medical equipment.

4. Wall washing is not routinely recommended.

5. Do not dip cloths (especially dirty ones) in containers storing disinfectants. This will make the disinfectant dirty. Dip cleaning in general is not recommended.

6. Dry sweeping (with a broom) is not recommended in patient area zones of health care facilities, as particles can be transmitted through the air.

7. Soaking of mops in disinfectant solution is not recommended. After cleaning, keep mops in a dry condition when not in use.

8. Never wipe surfaces with a dry towel. A dry towel spreads debris / dirt instead of cleaning it up.

9. Avoid using alcohol and quaternary ammonium compounds when cleaning the rooms of patients infected with *Clostridioides difficile* since they are not sporicidal.

10. ***Fumigation is not*** needed for cleaning the rooms of patients infected with *Clostridium perfringens* (causing gas gangrene) or infected with HIV.

Contingency planning

1. When hypochlorite is not available, other disinfectants like quaternary ammonium compounds may be used. Check the document on "Antimicrobial spectra of some of the disinfectants available on the Mauritian market" for details.

2. When the concentration of hypochlorite is unknown, samples may be sent to the Government Analyst Division for assessment. Please contact the IPC Team Leader for the steps to take.

3. When elbow-operated taps are not available, use paper towels to close taps.

4. When paper towels are not available, staff should bring their own towels. Alternatively, hospitals can give one small cloth towel to each staff every 3 days.
5. If attendants and cleaners cannot dilute the disinfectant being used, ward managers or charge nurses should help with dilution.
6. When 3 buckets are not available for carrying out the 3-bucket technique:
    a. If 2 buckets are available:
        i. If 2 mops are available:
            1. Use 1 mop for each bucket.
            2. Wipe the floor with soapy water. Then, with the other mop, wipe with disinfectant. At the end of the exercise, clean both mops.
        ii. If 1 mop is available:
            1. Wipe the floor with soapy water, remove dirt from the mop with clean water and next, wipe the floor with the disinfectant.
    b. If 1 bucket is available:
        i. Wipe the floor with soapy water.
        ii. Clean the mop (with clean water) and empty and clean the bucket.
        iii. Fill the bucket with the desired concentration of disinfectant.
        iv. Wipe the floor with the disinfectant.