THE NATIONAL GUIDELINE ON INFECTION PREVENTION AND CONTROL

PART A
THE INFECTION PREVENTION AND CONTROL MANUAL

MINISTRY OF HEALTH
REPUBLIC OF MALDIVES

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NATIONAL GUIDELINE FOR INFECTION PREVENTION AND CONTROL 2022

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1. STANDARD PRECAUTIONS

Standard precautions are routinely applied at all times to all patients receiving care in the hospital. These work practices are used by healthcare workers to prevent or reduce the likelihood of transmission of infectious agents from health care worker to patient, patient to health care worker, and from patient to patient regardless of their diagnosis and presumed infectious status

Components of Standard Precaution

1. Hand hygiene
2. Personal Protective Equipment
3. Respiratory hygiene and cough etiquette
4. Patient placement
5. Processing of patient care equipments
6. Environmental cleaning
7. Handling of waste and linen
8. Aseptic technique
9. Handling and disposal of sharps
10. Occupational health in infection control

Table 1: Health care facility recommendations for Standard Precaution:

Summary of key elements

Standard Precautions	
1. Hand hygiene Summary technique: • Hand washing (40–60 sec): wet hands and apply soap; rub all surfaces; rinse hands and dry thoroughly with a single use towel; use towel to turn off faucet. • Hand rubbing (20–30 sec): apply enough product to cover all areas of the hands; rub hands until dry. Summary indications: • Before and after any direct patient contact and between patients, whether or not gloves are worn. • Immediately after gloves are removed. • Before handling an invasive device. • After touching blood, body fluids, secretions, excretions, non-intact skin, and contaminated items, even if gloves are worn. • During patient care, when moving from a contaminated to a clean body site of the patient. • After contact with inanimate objects in the immediate vicinity of the patient. 2. PPE Gloves • Wear when touching blood, body fluids, secretions, excretions, mucous membranes, non-intact skin. • Change between tasks and procedures on the same patient after contact with potentially infectious material. • Remove after use, before touching non-contaminated items and surfaces, and before going to another patient. Perform hand hygiene immediately after removal. Facial protection (eye, nose and mouth) • Wear (1) a surgical or procedure mask and eye protection (eye visor, goggles) or a face shield to protect mucous membranes of the eyes, nose, and mouth during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, and excretions Gown Wear to protect skin and prevent soiling of clothing during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions.	4. Patient placement Prioritize for those patients who have conditions that facilitate transmission of infectious material to other patients and for those who are at increased risk of acquisition and adverse outcomes resulting from HAI • Single room • Cohorting of patient • Cohorting of HCW At ER triage screen for communicable diseases of public health importance • Fever with Rash • Fever with history of travel to outbreak region • Fever with respiratory symptoms and with history of health care related exposure or part of cluster ≥2 persons with similar symptoms. 5. Reprocessing of patient care equipment • Handle equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of pathogens to other patients or the environment. • Clean, disinfect, and reprocess reusable equipment appropriately before use with another patient. 6. Environmental cleaning • Use adequate procedures for the routine cleaning and disinfection of environmental and other frequently touched surfaces. 7. Handling and disposal of waste and linen • Treat waste contaminated with blood, body fluids, secretions and excretions as clinical waste, in accordance with national guideline. • Human tissues and laboratory waste that is directly associated with specimen processing should also be treated as clinical waste. • Discard single use items properly. Handle, transport and process linen in a manner which • Prevents skin and mucous membrane exposures and contamination of clothing. • Avoids transfer of pathogens to other patients and or the environment. 8. Aseptic technique

Remove soiled gown as soon as possible, and perform hand hygiene. 3. Respiratory Hygiene and cough etiquette Persons with respiratory symptoms should apply source control measures: • Cover their nose and mouth when coughing/sneezing with tissue or mask, dispose of used tissues and masks, and perform hand hygiene after contact with respiratory secretions. Health-care facilities should: • Place acute febrile respiratory symptomatic patients at least 1 metre (3 feet) away from others in common waiting areas, if possible. • Post visual alerts at the entrance to health-care facilities instructing persons with respiratory symptoms to practice respiratory hygiene/cough etiquette. Consider making hand hygiene resources, tissues and masks available in common areas and areas used for the patient placement	Protects patients during invasive clinical procedures by employing infection control measures that minimise, as far as practicably possible, the presence of pathogenic microorganisms • Standard ANTT • Surgical ANTT 9. Handling and disposal of sharps Use care when: • Handling needles, scalpels, and other sharp instruments or devices. • Cleaning used instruments. • Disposing of used needles and other sharp instruments. 10. Occupational health in infection control • Health status screening and immunization • Education on safe work practices • Ensure safe work system and design • Physical protection with PPE and PEP • Reporting system to detect compliance and breach in infection control

1.1 HAND HYGIENE

Hand-mediated transmission is a major contributing factor in the acquisition and spread of infection in hospitals. Improved hand hygiene practices have been associated with reductions in healthcare-associated infections of up to 45% in a range and greater than 50% reduction in the rates of nosocomial disease associated with MRSA and other multi-resistant organisms. Hand hygiene is therefore the most important measure to avoid the transmission of harmful germs and prevent health care-associated infections (WHO).

Hand hygiene practices alone are not sufficient to prevent and control infection and need to be used as part of a multifactorial approach to infection control

The hands are colonized by two categories of microbial flora;

1. The resident flora which are found on the surface, just below the uppermost layer of skin. These organisms are adapted to survive in the local conditions and are generally of low pathogenicity, although some, such as Staphylococcus epidermidis,

may cause infection if transferred on to a susceptible site such as an invasive device.

2. The transient flora are made up of microorganisms acquired by touching contaminated surfaces such as the environment, patients or other people, and are readily transferred to the next person or object touched. They may include a range of antimicrobial-resistant pathogens such as MRSA, Acinetobacter or other multi-resistant Gram-negative bacteria. If transferred into susceptible sites such as invasive devices or wounds, these microorganisms can cause life-threatening infections.

During daily practice, HCWs' hands typically touch a continuous sequence of surfaces and substances including inanimate objects, patients' intact or non-intact skin, mucous membranes, food, waste, body fluids, and the HCW's own body. With each hand-to-surface exposure, a bidirectional exchange of microorganisms between hands and the touched object occurs and the transient hand-carried flora is thus continually changing. In this manner, microorganisms can spread throughout a health-care environment and between patients within a few hours

Key terms

Hand hygiene: Any action of hygienic hand antisepsis in order to reduce transient microbial flora, generally performed either by hand rubbing with an alcohol-based formulation or hand washing with plain (hand wash) or antimicrobial soap and water (surgical hand preparation).WHO

Alcohol-based hand rubs (ABHR):

Applying an antiseptic hand rub to reduce or inhibit the growth of microorganisms without the need for an external water source and requiring no rinsing or drying with towels or other devices.

Handwashing: Action of performing hand hygiene for the purpose of physically or mechanically removing dirt, organic material, and/or microorganisms using soap and water.

Surgical hand preparation:

Antiseptic hand wash or antiseptic hand rub performed preoperatively by the surgical team to eliminate transient flora and reduce resident skin flora. Such antiseptics often have persistent antimicrobial activity.

1.1.1 Types of hand hygiene practices

There are three main types of hand hygiene practices in the health care setting, this include; alcohol based hand rub (ABHR with 70-80% ethanol), hand wash with soap and water and surgical antisepsis (hand rub or surgical hand scrub). Table below gives the details on each of these types of hand hygiene.

Table 2: Types of hand hygiene practices

Procedure		Product	Duration	Comments
Hand rub		Ethanol +/-isopropol and glycerol	20-30 sec	Preferred unless visible soiling
Hand wash		Non medicated soap	40-60 sec	When hands are visibly soiled and used in all toilets
Surgical hand antisepsis	Surgical hand rub	Ethanol +/- isopropol and glycerol	90 sec	Preferred method unless visible soiling
	Surgical hand scrub	4% chlorhexidine (preferred over iodophores)	3-5minutes	Preferred when there is visible soiling

1.1.2 Hand hygiene products

1.1.2.1 Alcohol based hand rub

Hand hygiene using alcohol-based hand rubs is more effective against the majority of common infectious agents on hands than hand hygiene with plain or antiseptic soap and water.

Advantage of alcohol-based hand rubs

- Alcohol hand rub is the preferred method of hand hygiene, if hands are not visibly soiled, as it is
- Easily accessible at point of care.
- Able to kill microorganisms, while soap and water physically removes them
  - Excellent antimicrobial activity against Gram-positive and Gram-negative vegetative bacteria, Mycobacterium tuberculosis and a wide range of fungi
  - Generally good antimicrobial activity against enveloped viruses
- Softer on hands (often contain emollients which act to protect and moisturize the skin).

However, the disadvantages of alcohol based hand rubs are:

- Lesser and/or variable antimicrobial activity against non-enveloped viruses (such as norovirus)
- No activity against protozoan oocysts and bacterial spores (such as C. difficile)

Alcohol-based handrubs with optimal antimicrobial efficacy usually contain 75 to 85% ethanol, isopropanol, or n-propanol, or a combination of these products. The WHO-recommended formulations contain either 75% v/v isopropanol, or 80% v/v ethanol.

1.1.2.2 Plain soap and water

When hands are visibly soiled or contaminated with blood or body fluids, they must be washed with soap and water. Washing with soap and water act by mechanical removal of microorganisms and have no antimicrobial activity. Hand wash with soap and water is also used for mechanical removal of certain organisms such as C. difficile and norovirus. When C. difficile and non-enveloped viruses are suspected or known to be present, use of alcohol based hand rubs alone may not be sufficient to reduce transmission of these organisms

Liquid soap is preferred, in case liquid soap is not available bar soap can be used, if it is stored in a manner that allows water to drain (i.e., on a rack) and properly dry.

1.1.2.3 Surgical hand preparation

Prior to performing any surgical procedure, handwashing with antiseptics must be performed to remove transient organisms, reduce resident flora and prevent microorganism growth. Surgical hand antisepsis will also help reduce risk of transmission in case of any glove tear occurring during the surgical procedure. Surgical hand antisepsis maybe performed using hand rub with alcohol based preparation or with medicated soap. Antimicrobial soap is not necessary for use in everyday clinical practice.

Table 3: Hang hygiene products and their usual concentration and effectiveness

Antiseptics	Typical conc. in %	Speed of action	Residual activity	Use
Alcohols	60-70 %	Fast	No	HR
Chloroxylenol	0.5-4 %	Slow	Contradictory	HW
Chlorhexidine	0.5-4%	Intermediate	Yes	HR,HW
Hexachlorophene[a]	3%	Slow	Yes	HW, but not recommended
Iodophors	0.5-10 %)	Intermediate	Contradictory	HW
Triclosan[d]	(0.1-2%)	Intermediate	Yes	HW; seldom
Quaternary ammonium compounds[c]		Slow	No	HR,HW; Seldom; +alcohols

Good = +++, moderate = ++, poor = +, variable = ±, none = –
HR: handrubbing; HW: handwashing
*Activity varies with concentration.
[a] Bacteriostatic.
[b] In concentrations used in antiseptics, iodophors are not sporicidal.
[c] Bacteriostatic, fungistatic, microbicidal at high concentrations.
[d] Mostly bacteriostatic.
[e] Activity against *Candida* spp., but little activity against filementous fungi.
Source: adapted with permission from Pittet, Allegranzi & Sax, 2007.[479]

Table 4: Antimicrobial activity and summary of properties of antiseptics used in hand hygiene

Antiseptics	Gram-positive bacteria	Gram-negative bacteria	Viruses enveloped	Viruses non-enveloped	Myco-bacteria	Fungi	Spores
Alcohols	+++	+++	+++	++	+++	+++	-
Chloroxylenol	+++	+	+	±	+	+	-
Chlorhexidine	+++	++	++	+	+	+	-
Hexachlorophene[a]	+++	+	?	?	+	+	-
Iodophors	+++	+++	++	++	++	++	±[b]
Triclosan[d]	+++	++	?	?	±	±[e]	-
Quaternary ammonium compounds[c]	++	+	+	?	±	±	-

1.1.3 Five moments of hand hygiene

There are five moments during health care delivery when hand hygiene must be performed by HCW to prevent transmission.

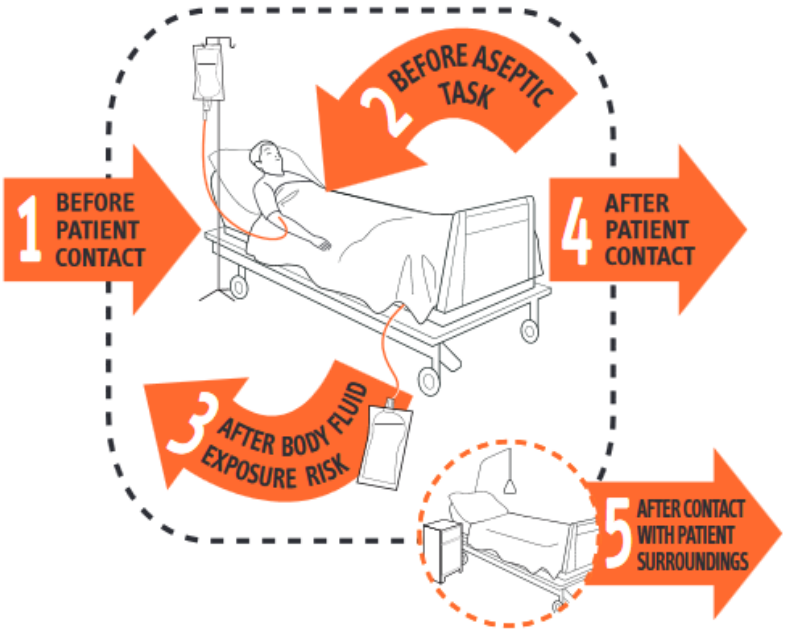

Figure 1: Five moments of hand hygiene

Table 5: WHO's five moments of Hand Hygiene

1	**Before Patient Contact**	**When?**	Clean your hands before touching a patient when approaching him or her
		Why?	To protect the patient against harmful germs carried on your hands
2	**Before antiseptic task**	**When?**	Clean your hands immediately before any aseptic task
		Why?	To protect the patient against harmful germs. Including the patient's own germs
3	**After body fluid exposure risk**	**When?**	Clean your hands immediately after an exposure risk to body fluids (and after glove removal)
		Why?	To protect yourself and the health-care environment from harmful patient germs
4	**After patient contact**	**When?**	Clean your hands after touching a patient and his or her immediate surroundings when leaving
		Why?	To protect yourself and the health-care environment from harmful patient germs
5	**After contact with patient surroundings**	**When?**	Clean your hands after touching any object or furniture in the patient's immediate surroundings when leaving- even without touching the patient
		Why?	To protect yourself and the health-care environment from harmful patient germs

WHO, Five moments of hand hygiene: https://www.who.int/gpsc/5may/Hand_Hygiene_Why_How_and_When_Brochure.pdf

1.1.4 Method of hand hygiene

General points:

- Clean your hands by rubbing them with an alcohol-based formulation, as the preferred mean for routine hygienic hand antisepsis if hands are not visibly soiled. It is faster, more effective, and better tolerated by your hands than washing with soap and water
- Wash your hands with soap and water when hands are visibly dirty or visibly soiled with blood or other body fluids or after using the toilet.
- If exposure to potential spore-forming pathogens is strongly suspected or proven, including outbreaks of Clostridium difficile, hand washing with soap and water is the preferred means.

1.1.4.1 Steps of hand hygiene using alcohol based had-rub

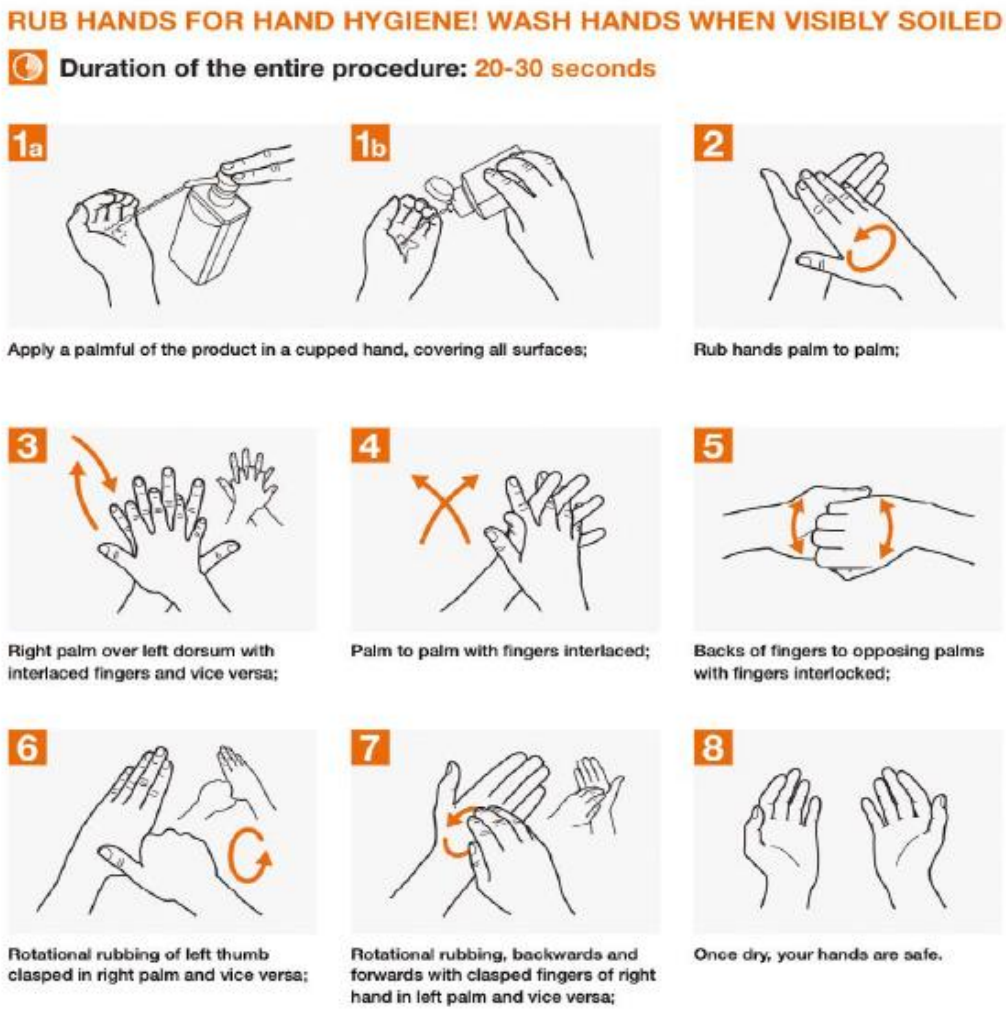

Figure 2: Steps of Alcohol based hand rub

1.1.4.2 How to perform hand hygiene with soap and water

Duration of procedure 40-60 sec

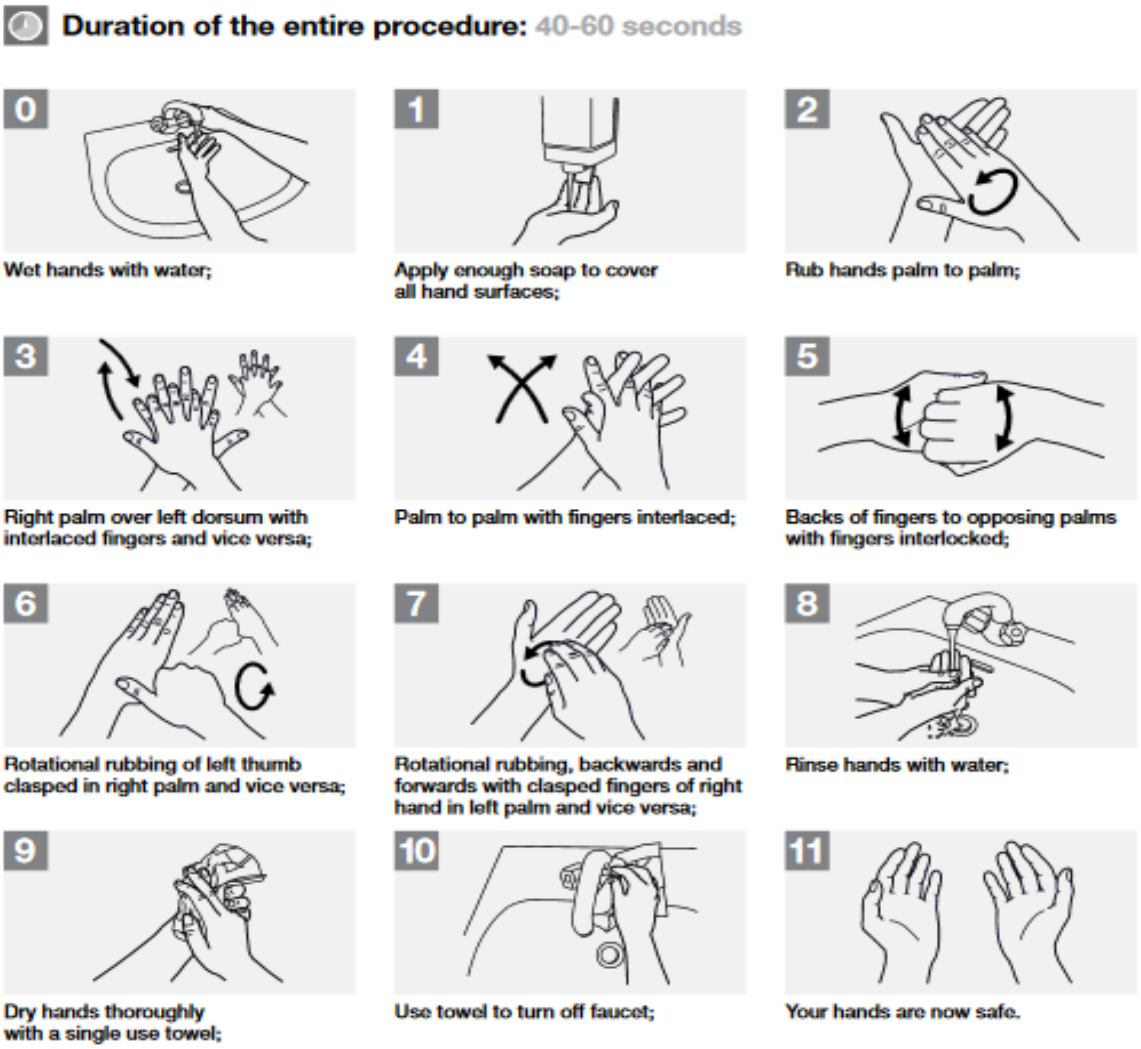

Figure 3: Steps of hand hygiene using soap and water

1.1.4.3 Surgical hand hygiene

Steps before starting surgical hand preparation

- Keep nails short and pay attention to them when washing your hands – most microbes on hands come from beneath the fingernails.
- Do not wear artificial nails or nail polish.
- Remove all jewelry (rings, watches, bracelets) before entering the operating theatre.
- Wash hands and arms with a non-medicated soap before entering the operating theatre area or if hands are visibly soiled.

- Clean subungual areas with a nail file. Nailbrushes should not be used as they may damage the skin and encourage shedding of cells.

Product used for surgical hand antisepsis:

Recommended products for surgical hand antisepsis are;

- Alcohol based hand rub (preferred)
- For hand scrub using medicated soap: Chlorhexidine or povidone-iodine-containing soaps.

Alcohol based hand rubs are preferred over antimicrobial soap for surgical hand hygiene;

- Antibacterial efficacy of products containing high concentrations of alcohol is far better than that of any medicated soap presently available
- The initial reduction of the resident skin flora is so rapid and effective that bacterial regrowth to baseline on the gloved hand takes more than six hours
- Procedure takes less time
- Less side-effects, and
- No risk of recontamination by rinsing hands with water

1.1.4.4 Steps of alcohol based hand scrub for surgical procedures

The WHO approach for surgical hand preparation requires the six basic steps for the hands as for hygienic hand antisepsis, but requires additional steps for rubbing the forearms

The handrubbing technique for surgical hand preparation must be performed on perfectly clean, dry hands.
On arrival in the operating theatre and after having donned theatre clothing (cap/hat/bonnet and mask), hands must be washed with soap and water.
After the operation when removing gloves, hands must be rubbed with an alcohol-based formulation or washed with soap and water if any residual talc or biological fluids are present (e.g. the glove is punctured).

Surgical procedures may be carried out one after the other without the need for handwashing, provided that the handrubbing technique for surgical hand preparation is followed (Images 1 to 17).

1

Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your left hand, using the elbow of your other arm to operate the dispenser

2

Dip the fingertips of your right hand in the handrub to decontaminate under the nails (5 seconds)

3

Images 3–7: Smear the handrub on the right forearm up to the elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the handrub has fully evaporated (10-15 seconds)

4

See legend for Image 3

5

See legend for Image 3

6

See legend for Image 3

7

See legend for Image 3

8

Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your right hand, using the elbow of your other arm to operate the dispenser

9

Dip the fingertips of your left hand in the handrub to decontaminate under the nails (5 seconds)

10

Smear the handrub on the left forearm up to the elbow. Ensure that the whole skin area is covered by using circular movements around the forearm until the handrub has fully evaporated (10-15 seconds)

11

Put approximately 5ml (3 doses) of alcohol-based handrub in the palm of your left hand, using the elbow of your other arm to operate the distributor. Rub both hands at the same time up to the wrists, and ensure that all the steps represented in Images 12-17 are followed (20-30 seconds)

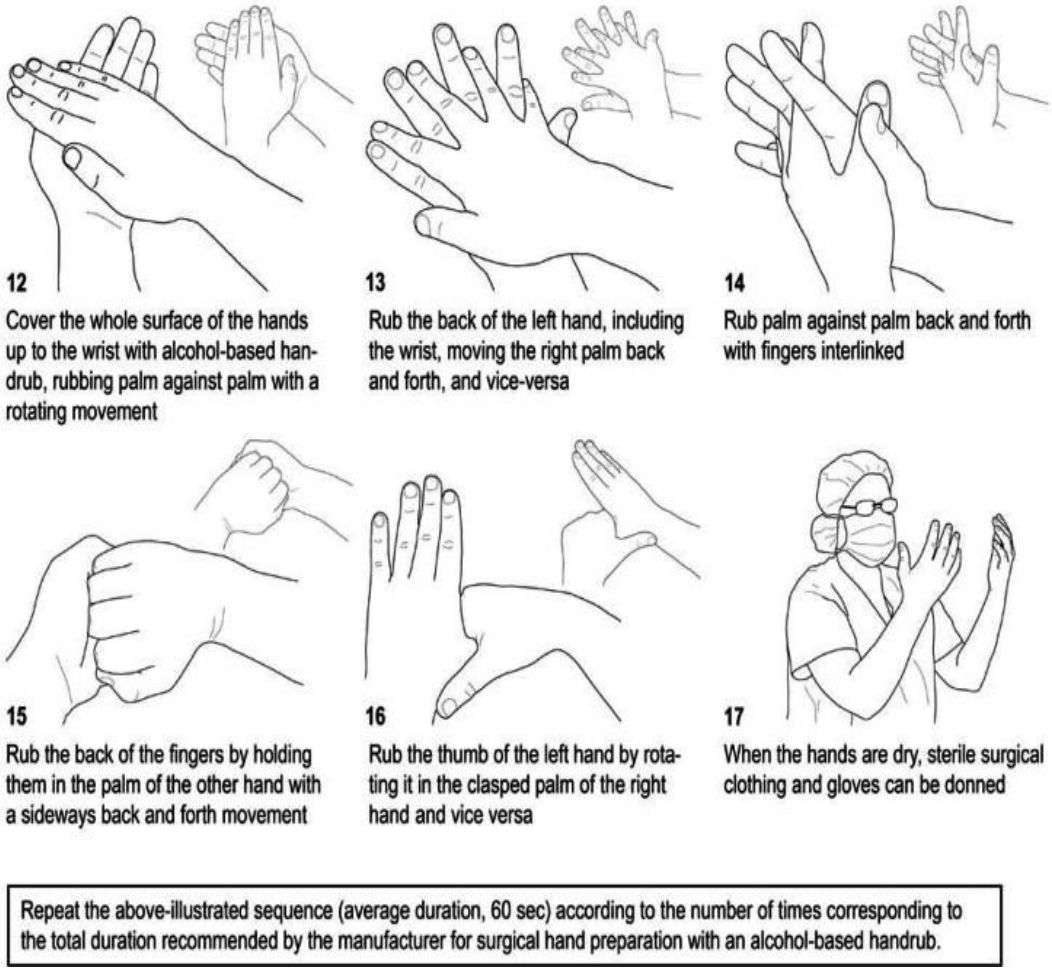

Figure 4: Steps of Surgical hand rub

Steps of surgical hand scrub:

Duration: 5 minutes

- Start timing. Scrub each side of each finger, between the fingers, and the back and front of the hand for 2 minutes.
- Proceed to scrub the arms, keeping the hand higher than the arm at all times. This helps to avoid recontamination of the hands by water from the elbows and prevents bacteria-laden soap and water from contaminating the hands.
- Wash each side of the arm from wrist to the elbow for 1 minute.
- Repeat the process on the other hand and arm, keeping hands above elbows at all times. If the hand touches anything at any time, the scrub must be lengthened by 1 minute for the area that has been contaminated.
- Rinse hands and arms by passing them through the water in one direction only, from fingertips to elbow. Do not move the arm back and forth through the water.
- Proceed to the operating theatre holding hands above elbows.

- At all times during the scrub procedure, care should be taken not to splash water onto surgical attire.
- Once in the operating theatre, hands and arms should be dried using a sterile towel and aseptic technique before donning gown and gloves.

Duration:

WHO-recommended formulations for surgical hand preparation should ensure that a minimum of three applications are used, if not more, for a period of 3 to 5 minutes. For surgical procedures of more than a two hours' duration, ideally surgeons should practice a second hand-rub of approximately 1 minute.

1.1.5 Hand care

Hand care is an important factor to ensure hand hygiene compliance; dermatitis, cracks, cuts or scratches can negatively impact hand hygiene practices. The following are recommended:

- Take care of your hands by regularly using a protective hand cream or lotion, at least daily. Do not routinely wash hands with soap and water immediately before or after using an alcohol-based hand-rub. Do not use hot water to rinse your hands.
- Always wet hands before applying soap, as applying soap directly to the skin can be irritating to the hands;
- After hand rubbing or hand washing, let your hands dry completely before putting on gloves.
- Please remember do not wear artificial finger nails or extenders when in direct contact with patients and keep natural nails short.
- Healthcare workers should have short, clean fingernails and not wear artificial fingernails or jewelry like wedding rings etc.

1.1.6 Infrastructure

- Optimum sink to bed ratio is 1:10 at wards with availability of soap and single use towels at each sink
- In Isolation or ICU the optimum sink to bed ratio 1:1
- Point-of-care products should be accessible without having to leave the patient zone (ideally within arms reach of the healthcare worker or within 2 meters).
- Dispensers should generally have a disposable reservoir (container/bottle) that should not be refilled. If reusable reservoirs have to be used, they should be cleaned and disinfected according to the instructions (e.g. autoclaving, boiling, or chemical disinfection).

1.1.7 Hand Hygiene in non-clinical situations

Table 6: Hand hygiene in non clinical setting

Before	After
• Starting work (HCW) • Eating/handling food/drinks (whether own or patient's) • Using computer keyboard in a clinical area	• Hands become visibly soiled • Eating/handling food/drinks (whether own or patient's) • Using computer keyboard in a clinical area • Being in patient-care areas during outbreaks of infection • Removing gloves

1.1.8 Putting it into practice

1.1.8.1 Individual actions for reducing the risk

- Follow the 5 moments for hand hygiene, even when it seems that there is not enough time
- Become familiar with your facility policy on hand hygiene and follow it
- Use the appropriate product for the situation and use it as directed
- Follow facility policy on cuts and abrasions, fingernails, nail polish and jewelry
- Use hand-care products provided by your organisation; your own products may not be compatible with the hand hygiene products provided
- Minimise physical contact with patient surroundings
- Lead by example and champion hand hygiene in your setting
- Attend hand hygiene education sessions regularly to refresh your knowledge and skills
- Contact the person with designated responsibility for occupational health or infection prevention and control if you have a reaction to hand hygiene and hand-care products used in your setting
- Healthcare workers should have short, clean fingernails and not wear artificial fingernails or jewelry
- If alcohol-based hand rub is not readily accessible at key points of care in patient-care area, consider informing the management

1.1.8.2 Involving patients in hand hygiene

The following information may be provided to patients to assist them in becoming involved in identifying and reducing risks related to poor hand hygiene.

- Hand hygiene is the most important aspect of reducing the risk of infection—this applies to everyone including healthcare workers, patients and visitors
- The '5 moments for hand hygiene' tell healthcare workers, patients and visitors when hand hygiene should be performed to reduce the risk of infection
- Healthcare workers generally use alcohol-based hand rub as it is effective and easy to use but, if their hands are visibly dirty, they need to use soap and water first
- Performing hand hygiene regularly reduces the risk of infection to you and others. If in hospital, remind your visitors to use alcohol-based hand rub when they come into the ward and before they leave
- No matter what product you use to clean your hands, the solution should come into contact with all surfaces
- After hand hygiene, the hands should be dry. If alcohol-based hand rub is used, the solution will dry on the hands
- After hand hygiene with soap and water, hands should be patted dry
- It's okay to question healthcare workers about their hand hygiene practices

1.1.9 Method of local production of hand-rub preparation (WHO)

1.1.9.1 Volume of production, containers

- 10-litre preparations: glass or plastic bottles with screw threaded stoppers can be used.
- 50-litre preparations: large plastic (preferably polypropylene, translucent enough to see the liquid level) or stainless steel tanks with an 80 to100 litre capacity should be used to allow for mixing without overflowing. The tanks should be calibrated for the ethanol/isopropyl alcohol volumes and for the final volumes of either 10 or 50 litres. It is best to mark plastic tanks on the outside and stainless steel ones on the inside.

1.1.9.2 Preparation

1. The alcohol for the chosen formulation is poured into the large bottle or tank up to the graduated mark.
2. H2O2 is added using the measuring cylinder.
3. Glycerol is added using a measuring cylinder. As the glycerol is very viscous and sticks to the walls of the measuring cylinder, it can be rinsed with some sterile distilled or cold boiled water to be added and then emptied into the bottle/ tank.
4. The bottle/tank is then topped up to the corresponding mark of the volume (10-litre or 50-litre) to be prepared with the remainder of the distilled or cold, boiled water.
5. The lid or the screw cap is placed on the bottle/tank immediately after mixing to prevent evaporation.
6. The solution is mixed by gently shaking the recipient where appropriate (small quantities),or by using a wooden, plastic or metallic paddle. Electric mixers should not be used unless “EX” protected because of the danger of explosion.
7. After mixing, the solution is immediately divided into smaller containers (e.g. 1000, 500 or 100 ml plastic bottles). The bottles should be kept in quarantine for 72 hours. This allows time for any spores present in the alcohol or the new or re-used bottles to be eliminated by H2O2.

Hydrogen peroxide (H_2O_2)

While alcohol is the active component in the formulations, certain aspects of other components should be respected. All raw materials used should be preferably free of viable bacterial spores. The low concentration of H2O2 is incorporated in the formulations to help eliminate contaminating spores in the bulk solutions and excipients and is not an active substance for hand antisepsis. While the use of H2O2 adds an important safety aspect, the use of 3–6% of H2O2 for the production might be complicated by its corrosive nature and by difficult procurement in some countries. Further investigation is needed to assess H2O2 availability in different countries as well as the possibility of using a stock solution with a lower concentration.

Glycerol

Glycerol is added to the formulation as a humectant to increase the acceptability of the product. Other humectants or emollients may be used for skin care, provided that they are affordable, available locally, miscible (mixable) in water and alcohol, nontoxic, and hypoallergenic. Glycerol has been chosen because it is safe and relatively inexpensive.

Lowering the percentage of glycerol may be considered to further reduce stickiness of the handrub.

Other additives to the formulations

It is strongly recommended that no ingredients other than those specified here be added to the formulations. In the case of any additions, full justification must be provided together with documented safety of the additive, its compatibility with the other ingredients, and all relevant details should be given on the product label.

In general, it is not recommended to add any bittering agents to reduce the risk of ingestion of the handrubs. Nevertheless, in exceptional cases where the risk of ingestion might be very high (paediatric or confused patients), substances such as methylethylketone and denatonium benzoate) may be added to some household products to make them less palatable and thus reduce the risk of accidental or deliberate ingestion. However, there is no published information on the compatibility and deterrent potential of such chemicals when used in alcohol based handrubs to discourage their abuse. It is important to note that such additives may make the products toxic andadd to production costs. In addition, the bitter taste may be transferred from hands to food being handled by individuals using hand-rubs containing such agents. Therefore, compatibility and suitability, as well as cost, must be carefully considered before deciding on the use of such bittering agents. A colorant may be incorporated to differentiate the handrub from other fluids as long as such an additive is safe and compatible with the essential components of the handrubs. However, the H2O2 in the handrubs may tend to fade any colouring agent used and prior testing is recommended. No data are available to assess the suitability of adding gelling agents to the WHO-recommended liquid formulations, but this could increase potentially both production difficulties and costs, and may compromise antimicrobial efficacy. The addition of fragrances is not recommended because of the risk of allergic reactions. All handrub containers must be labelled in accordance with national/international guidelines. To further reduce the risk of abuse and to respect cultural and religious sensitivities, product containers may be labelled simplyas “antimicrobial handrubs”.

Use of proper water for the preparation of the formulations

While sterile distilled water is preferred for making the formulations, boiled and cooled tap water may also be used as long as it is free of visible particles.

1.1.9.3 Quality control

If concentrated alcohol is obtained from local production, verify the alcohol concentration and make the necessary adjustments in volume to obtain the final recommended concentration. An alcoholmeter can be used to control the alcohol concentration of the final use solution; H2O2 concentration can be measuredby titrimetry (oxydo-reduction reaction by iodine in acidicconditions). A higher level quality control can be performed using gas chromatography and the titrimetric method to control the alcohol and the hydrogen peroxide content, respectively. Moreover, the absence of microbial contamination(including spores) can be checked by filtration, according to the European Pharmacopeia specifications. For more detailed guidance on production and quality control of both formulations, see the "WHO-recommended hand antisepsis formulation - guide to local production"(Implementation Toolkit available at http://www.who.int/gpsc/en/).

1.1.9.4 Labelling of the bottles

The bottles should be labelled in accordance with national guidelines. Labels should include the following:

- Name of institution
- Date of production and batch number
- Composition: ethanol or isopropanol, glycerol and hydrogen peroxide (% v/v can also be indicated) and the following statements:
- WHO-recommended handrub formulation
- For external use only
- Avoid contact with eyes
- Keep out of reach of children
- Use: apply a palmful of alcohol-based handrub and cover all surfaces of the hands. Rub hands until dry. Flammable: keep away from flame and heat.

1.1.9.5 Production and storage

Manufacture of the WHO-recommended handrub formulations is feasible in central pharmacies or dispensaries. Whenever possible and according to local policies, governments should encourage local production, support the quality assessment process, and keep production costs as low as possible. Special requirements apply for the production and stock piling of the formulations, as well as for the storage of the raw

materials. Because undiluted ethanol is highly flammable and may ignite at temperatures as low as 10°C, production facilities should directly dilute it to the above-mentioned concentration. The flash points of ethanol 80% (v/v) and isopropyl alcohol 75% (v/v) are 17.5°C and 19°C, respectively, and special attention should be given to proper storage in tropical climates. Production and storage facilities should be ideally air-conditioned or cool rooms. Open flames and smoking must be strictly prohibited in production and storage areas. Pharmacies and small-scale production centres supplying the WHO-recommended handrub formulations are advised not to manufacture locally batches of more than 50 litres at a time. For safety reasons, it is advisable to produce smaller volumes and to adhere to local and/or national guidelines and regulations. The production should not be undertaken in central pharmacies lacking specialized air conditioning and ventilation. National safety guidelines and local legal requirements must be adhered to for the storage of ingredients and the final product.

Efficacy

It is the consensus opinion of the WHO expert group that the WHO-recommended handrub formulations can be used both for hygienic hand antisepsis and for presurgical hand preparation.

Hygienic handrub

The microbicidal activity of the two WHO-recommended formulations was tested by a WHO reference laboratory according to EN standards (EN 1500). Their activity was found to be equivalent to the reference substance (isopropanol 60 % v/v) for hygienic hand antisepsis.

Presurgical hand preparation

Both WHO-recommended handrub formulations were tested by two independent reference laboratories in different European countries to assess their suitability for use for pre-surgical hand preparation, according to the European Standard EN 12791.

Safety standards

With regard to skin reactions, hand rubbing with alcohol-based products is better tolerated than handwashing with soap and water.

In a recent study conducted among ICU HWs, the short-term skin tolerability and acceptability of the WHO-recommended hand rub formulations were significantly higher than those of a reference product.

1.1.9.6 Distribution

To avoid contamination with spore-forming organisms, disposable bottles should preferably be used although reusable sterilizable bottles may reduce production costs and waste management. To prevent evaporation, containers should have a maximum capacity of 500 ml on ward and 1 litre in operating theatres, and possibly fit into a wall dispenser. Leakage-free pocket bottles with a capacity of no more than 100 ml should also be available and distributed individually to HCWs, but it should be emphasized that the use of these products should be confined to health care only. The production or re-filling unit should follow norms on how to clean and disinfect the bottles (e.g. autoclaving, boiling, or chemical disinfection with chlorine). Autoclaving is considered the most suitable procedure. Reusable bottles should never be refilled until they have been completely emptied and then cleansed and disinfected. Cleansing and disinfection process for reusable handrub bottles: empty bottles should be brought to a central point to be reprocessed using standard operating procedures. Bottles should be thoroughly washed with detergent and tap water to eliminate any residual liquid. If they are heat-resistant, bottles should be thermally disinfected by boiling in water. Whenever possible, thermal disinfection should be chosen in preference to chemical disinfection, since chemical disinfection might not only increase costs but also needs an extra step to flush out the remains of the disinfectant. Chemical disinfection should include soaking the bottles in a solution containing 1000 ppm of chlorine for a minimum of 15 minutes and then rinsing with sterile/cooled boiled water. After thermal or chemical disinfection, bottles should be left to dry completely upside down, in a bottle rack. Dry bottles should be closed with a lid and stored, protected from dust, until use.

1.1.10 Hand Hygiene Self-Assessment Framework 2010

Introduction:

The Hand Hygiene Self-Assessment Framework is a systematic tool with which to obtain a situation analysis of hand hygiene promotion and practices within an individual health-care facility.

Monitoring hand hygiene compliance

It is important to assess hand hygiene compliance regularly. This could be done by using the WHO Hand Hygiene Self-Assessment Framework (HHSAF) as a first step to establish a baseline hand hygiene level followed by hand hygiene observation periodically. The HHSAF measures across five domains of a multimodal strategy: system change, training and education, evaluation and feedback, reminders in the workplace and institutional safety climate. The HHSAF which should be completed at least annually and thereafter, the Hand Hygiene observation form on a quarterly basis; this will be completed by facility staff under the guidance of IPC focal person.

1.1.10.1 What is its purpose?

While providing an opportunity to reflect on existing resources and achievements, the Hand Hygiene Self-Assessment Framework also helps to focus on future plans and challenges. In particular, it acts as a diagnostic tool, identifying key issues requiring attention and improvement. The results can be used to facilitate development of an action plan for the facility's hand hygiene promotion programme. Repeated use of the Hand Hygiene Self-Assessment Framework will also allow documentation of progress with time. Overall, this tool should be a catalyst for implementing and sustaining a comprehensive hand hygiene programme within a health-care facility.

1.1.10.2 Who should use the Hand Hygiene Self-Assessment Framework?

This tool should be used by professionals in charge of implementing a strategy to improve hand hygiene within a health-care facility. If no strategy is being implemented yet, then it can also be used by professionals in charge of infection control or senior managers at the facility directorate. The framework can be used globally, by health-care facilities at any level of progress as far as hand hygiene promotion is concerned.

1.1.10.3 How is it structured?

The Hand Hygiene Self-Assessment Framework is divided into five components and 27 indicators. The five components reflect the five elements of the WHO Multimodal Hand Hygiene Improvement Strategy (http://www.who.int/gpsc/5may/tools/en/index.html) and the indicators have been selected to represent the key elements of each component. These indicators are based on evidence and expert consensus and have been framed as questions with defined answers (either "Yes/No" or multiple options) to facilitate self-assessment. Based on the score achieved for the five components, the facility is assigned to one of four levels of hand hygiene promotion and practice: Inadequate, Basic, Intermediate and Advanced.

Inadequate: hand hygiene practices and hand hygiene promotion are deficient. Significant improvement is required.

Basic: some measures are in place, but not to a satisfactory standard. Further improvement is required.

Intermediate: an appropriate hand hygiene promotion strategy is in place and hand hygiene practices have improved. It is now crucial to develop long-term plans to ensure that improvement is sustained and progresses.

Advanced: hand hygiene promotion and optimal hand hygiene practices have been sustained and/or improved, helping to embed a culture of safety in the health-care setting.

Leadership criteria have also been identified to recognize facilities that are considered a reference centre and contribute to the promotion of hand hygiene through research, innovation and information sharing. The assessment according to leadership criteria should only be undertaken by facilities having reached the Advanced level.

1.1.10.4 How does it work?

While completing each component of the Hand Hygiene Self-Assessment Framework, you should circle or highlight the answer appropriate to your facility for each question. Each answer is associated with a score. After completing a component, add up the scores for the answers you have selected to give a subtotal for that component. During the interpretation process these subtotals are then added up to calculate the overall score to identify the hand hygiene level to which your health-care facility is assigned.

The assessment should not take more than 30 minutes, provided that the information is easily available.

Within the Framework you will find a column called "WHO implementation tools" listing the tools made available from the WHO First Global Patient Safety Challenge to facilitate the implementation of the WHO Multimodal Hand Hygiene Improvement Strategy

(http://www.who.int/gpsc/5may/tools/en/index.html). These tools are listed in relation to the relevant indicators included in the Framework and may be useful when developing an action plan to address areas identified as needing improvement.

Health-care facilities or national bodies may consider adopting this tool for external comparison or benchmarking. However, this was not a primary aim during the development of this tool. In particular, we would draw attention to the risks inherent in using a self-reported evaluation tool for external benchmarking and also advise the use of caution if comparing facilities of different sizes and complexity, in different socioeconomic settings. It would be essential to consider these limitations if inter-facility comparison is to be undertaken.

Table 7: Hand hygiene self assessment framework 2010

1. System Change

Question	Answer	Score	WHO improvement tools
1.1 How easily available is alcohol-based handrub in your health-care facility? **Choose one answer**	Not available	0	→ Ward Infrastructure Survey → Protocol for Evaluation of Tolerability and Acceptability of Alcohol-based Handrub in Use or Planned to be Introduced:Method 1 → Guide to Implementation II.1
	Available, but efficacy[1] and tolerability[2] have not been proven	0	
	Available only in some wards or in discontinuous supply (with efficacy[1] and tolerability[2] proven)	5	
	Available facility-wide with continuous supply (with efficacy[1] and tolerability[2] proven)	10	
	Available facility-wide with continuous supply, and at the point of care[3] in the majority of wards (with efficacy[1] and tolerability[2] proven)	30	
	Available facility-wide with continuous supply at each point of care[3] (with efficacy[1] and tolerability[2] proven)	50	
1.2 What is the sink:bed ratio? **Choose one answer**	Less than 1:10	0	→ Ward Infrastructure Survey → Guide to Implementation II.1
	At least 1:10 in most wards	5	
	At least 1:10 facility-wide and 1:1 in isolation rooms and in intensive care units	10	
1.3 Is there a continuous supply of clean, running water[4]?	No	0	→ Ward Infrastructure Survey → Guide to Implementation II.1
	Yes	10	
1.4 Is soap[5] available at each sink?	No	0	→ Ward Infrastructure Survey → Guide to Implementation II.1
	Yes	10	
1.5 Are single-use towels available at each sink?	No	0	→ Ward Infrastructure Survey → Guide to Implementation II.1
	Yes	10	
1.6 Is there dedicated/available budget for the continuous procurement of hand hygiene products (e.g. alcohol-based handrubs)?	No	0	→ Guide to Implementation II.1
	Yes	10	

Extra Question: Action plan

Answer this question ONLY if you scored less than 100 for questions 1.1 to 1.6: Is there realistic plan in place to improve the infrastructure[6] in your health-care facility?	No	0	→ Alcohol-based Handrub Planning and Costing Tool → Guide to Local Production: WHO-recommended Handrub Formulations → Guide to Implementation II.1
	Yes	5	
	System Change subtotal	**/100**	

1. Efficacy: The alcohol-based hand-rub product used should meet recognised standards of antimicrobial efficacy for hand antisepsis (ASTM or EN standards).

Alcohol-based hand-rubs with optimal antimicrobial efficacy usually contain 75 to 85% ethanol, isopropanol, or n-propanol, or a combination of these products. The WHO-recommended formulations contain either 75% v/v isopropanol, or 80% v/v ethanol.

2. Skin tolerability: The alcohol-based hand-rub product is well tolerated by health-care workers skin (i.e. it does not harm or irritate the skin) when used in clinical care, as demonstrated by reliable data. The WHO Protocol for Evaluation of Tolerability and Acceptability of Alcohol-based Handrub in Use or Planned to be Introduced can be used as a reference.

3. Point of care: The place where three elements come together: the patient, the health-care worker, and care or treatment involving contact with the patient or his/ her surroundings (within the patient zone). Point-of-care products should be accessible without having to leave the patient zone (ideally within arms reach of the healthcare worker or within 2 meters).

4. Clean, running water: A water supply that is either piped in (or where this is not available, from onsite storage with appropriate disinfection) that meets appropriate safety standards for microbial and chemical contamination. Further details can be found in Essential environmental health standards in health care (Geneva, World Health Organization, 2008, http://whqlibdoc.who.int/publications/ 2008/ 9789241547239_eng.pdf).

5. Soap: Detergent-based products that contain no added antimicrobial agents, or may contain these solely as preservatives. They are available in various forms including bar soap, tissue, leaf, and liquid preparations.

6. Infrastructure: The “infrastructure” here referred to includes facilities, equipment, and products that are required to achieve optimal hand hygiene practices within the facility. Specifically, it refers to the indicators included in questions 1.1-1.5 and detailed in the WHO Guidelines on Hand Hygiene in Health Care 2009, Part I, Chapter 23.5 (e.g. availability of alcohol based hand-rub at all points of care, a continuous supply of clean, running water and a sink:bed ratio of at least 1:10, with soap and single-use towels at each sink).

2. Training and Education

Question	Answer	Score	WHO improvement tools
2.1 Regarding training of health-care workers in your facility:			
2.1a How frequently do health-care workers receive training regarding hand hygiene[7] in your facility? **Choose one answer**	Never	0	→ Slides for Education Session for Trainers, Observers and Health-care Workers → Hand Hygiene Training Films → Slides Accompanying the Training Films → Slides for the Hand Hygiene Co-ordinator → Hand Hygiene Technical Reference Manual
	At least once	5	
	Regular training for medical and nursing staff, or all professional categories (at least annually)	10	
	Mandatory training for all professional categories at commencement of employment, then ongoing regular training (at least annually)	20	
2.1b Is a process in place to confirm that all health-care workers complete this training?	No	0	→ Hand Hygiene Why, How and When Brochure → Guide to Implementation II.2
	Yes	20	
2.2 Are the following WHO documents (available at www.who.int/gpsc/5may/tools), or similar local adaptations, easily available to all health-care workers?			→ Guide to Implementation II.2
2.2a The 'WHO Guidelines on Hand Hygiene in Health-care: A Summary'	No	0	→ WHO Guidelines on Hand Hygiene in Health Care: A Summary
	Yes	5	
2.2b The WHO 'Hand Hygiene Technical Reference Manual'	No	0	→ Hand Hygiene Technical Reference Manual
	Yes	5	
2.2c The WHO 'Hand Hygiene: Why, How and When' Brochure	No	0	→ Hand Hygiene Why, How and When Brochure
	Yes	5	
2.2d The WHO 'Glove Use Information' Leaflet	No	0	→ Glove Use Information Leaflet
	Yes	5	
2.3 Is a professional with adequate skills[8] to serve as trainer for hand hygiene educational programmes active within the health-care facility?	No	0	→ WHO Guidelines on Hand Hygiene in Health Care → Hand Hygiene Technical Reference Manual → Hand Hygiene Training Films →Slides Accompanying the Training Films → Guide to Implementation II.2
	Yes	15	
2.4 Is a system in place for training and validation of hand hygiene compliance observers?	No	0	
	Yes	15	
2.5 Is there is a dedicated budget that allows for hand hygiene training?	No	0	→ Template Letter to Advocate Hand Hygiene to Managers → Template Letter to communicate Hand Hygiene Initiatives to Managers → Template Action Plan → Guide to Implementation II.2 and III.1 (page 33)
	Yes	10	
	Training and Education subtotal	**/100**	

7. Training in hand hygiene: This training can be done using different methods but the information conveyed should be based on the WHO multimodal hand hygiene improvement strategy or similar material. Training should include the following:

   - The definition, impact and burden of health care-associated infection (HCAI)
   - Major patterns of transmission of health care-associated pathogens
   - Prevention of HCAI and the critical role of hand hygiene
   - Indications for hand hygiene (based on the WHO 'My 5 Moments for Hand Hygiene' approach) • Correct technique for hand hygiene (refer to 'How to Handrub' and 'How to Hand Wash')

8. A professional with adequate skills: Medical staff or nursing staff trained in Infection Control or Infectious Diseases, whose tasks formally include dedicated time for staff training. In some settings, this could also be medical or nursing staff involved in clinical work, with dedicated time to acquire thorough knowledge of the evidence for and correct practice of hand hygiene (the minimum required knowledge can be found in the WHO Guidelines on Hand Hygiene in Health Care and the Hand Hygiene Technical Reference Manual).Technical Reference Manual).

3. Evaluation and Feedback

Question	Answer	Score	WHO improvement tools
3.1 Are regular (at least annual) ward-based audits undertaken to assess the availability of handrub, soap, single use towels and other hand hygiene resources?	No	0	→ Ward Infrastructure Survey → Guide to Implementation II.3
	Yes	10	
3.2 Is health care worker knowledge of the following topics assessed at least annually (e.g. after education sessions)?			
3.2a. The indications for hand hygiene	No	0	→ Hand Hygiene Knowledge Questionnaire for Health-Care Workers → Guide to Implementation II.3
	Yes	5	
3.2b. The correct technique for hand hygiene	No	0	
	Yes	5	
3.3 Indirect Monitoring of Hand Hygiene Compliance			
3.3a Is consumption of alcohol-based handrub monitored regularly (at least every 3 months)?	No	0	→ Soap/Handrub Consumption Survey → Guide to Implementation II.3
	Yes	5	
3.3b Is consumption of soap monitored regularly (at least every 3 months)?	No	0	
	Yes	5	
3.3c Is alcohol based handrub consumption at least 20L per 1000 patient-days?	No (or not measured)	0	
	Yes	5	
3.4 Direct Monitoring of Hand Hygiene Compliance Only complete section 3.4 if hand hygiene compliance observers in your facility have been trained and validated and utilise the WHO 'My 5 Moments for Hand Hygiene' (or similar) methodology			
3.4a How frequently is direct observation of hand hygiene compliance performed using the WHO Hand Hygiene Observation tool (or similar technique)? **Choose one answer**	Never	0	→ WHO Hand Hygiene Observation form → Hand Hygiene Technical Reference Manual → Guide to Implementation II.3
	Irregularly	5	
	Annually	10	
	Every 3 months or more often	15	
3.4b What is the overall hand hygiene compliance rate according to the WHO Hand Hygiene Observation tool (or similar technique) in your facility? **Choose one answer**	≤ 30%	0	→ Guide to Implementation II.3 → Observation form → Data Entry Analysis tools → Instructions for Data Entry and Analysis → Epi Info™ software[a] → Data Summary Report Framework
	31 – 40%	5	
	41 – 50%	10	
	51 – 60%	15	
	61 – 70%	20	
	71 – 80%	25	
	≥ 81%	30	
3.5 Feedback			
3.5a **Immediate feedback** Is immediate feedback given to health-care workers at the end of each hand hygiene compliance observation session?	No	0	→ Guide to Implementation II.3 → Observation and Basic Compliance Calculation forms
	Yes	5	
3.5b **Systematic feedback** Is regular (at least 6 monthly) feedback of data related to hand hygiene indicators with demonstration of trends over time given to:			→ Data Summary Report Framework → Guide to Implementation II.3
3.5b.i Health-care workers?	No	0	
	Yes	7.5	
3.5b.ii Facility leadership?	No	0	
	Yes	7.5	
Evaluation and Feedback subtotal		/100	

4. Reminders in the Workplace

Question	Answer	Score	WHO improvement tools
4.1 Are the following posters (or locally produced equivalent with similar content) displayed?			→ Guide to Implementation II.4
4.1a Poster explaining the indications for hand hygiene **Choose one answer**	Not displayed	0	→ Your 5 Moments for Hand Hygiene (Poster)
	Displayed in some wards/treatment areas	15	
	Displayed in most wards/treatment areas	20	
	Displayed in all wards/treatment areas	25	
4.1b Poster explaining the correct use of handrub **Choose one answer**	Not displayed	0	→ How to Handrub (Poster)
	Displayed in some wards/treatment areas	5	
	Displayed in most wards/treatment areas	10	
	Displayed in all wards/treatment areas	15	
4.1c Poster explaining correct hand-washing technique **Choose one answer**	Not displayed	0	→ How to Handwash (Poster)
	Displayed in some wards/treatment areas	5	
	Displayed in most wards/treatment areas	7.5	
	Displayed at every sink in all wards/treatment areas	10	
4.2 How frequently does a systematic audit of all posters for evidence of damage occur, with replacement as required? **Choose one answer**	Never	0	→ Guide to Implementation II.4
	At least annually	10	
	Every 2-3 months	15	
4.3 Is hand hygiene promotion undertaken by displaying and regularly updating posters other than those mentioned above?	No	0	→ Guide to Implementation II.4
	Yes	10	
4.4 Are hand hygiene information leaflets available on wards?	No	0	→ Hand Hygiene: When and How Leaflet → Guide to Implementation II.4
	Yes	10	
4.5 Are other workplace reminders located throughout the facility? (e.g. hand hygiene campaign screensavers, badges, stickers, etc)	No	0	→ SAVE LIVES: Clean Your Hands Screensaver → Guide to Implementation II.4
	Yes	15	
	Reminders in the Workplace subtotal	**/100**	

5. Institutional Safety Climate for Hand Hygiene

Question	Answer	Score	WHO improvement tools
5.1 With regard to a hand hygiene team[10] that is dedicated to the promotion and implementation of optimal hand hygiene practice in your facility:			→ Guide to Implementation II.5
5.1a Is such a team established?	No	0	
	Yes	5	
5.1b Does this team meet on a regular basis (at least monthly)?	No	0	
	Yes	5	
5.1c Does this team have dedicated time to conduct active hand hygiene promotion? (e.g. teaching monitoring hand hygiene performance, organizing new activities)	No	0	
	Yes	5	
5.2 Have the following members of the facility leadership made a clear commitment to support hand hygiene improvement? (e.g. a written or verbal commitment to hand hygiene promotion received by the majority of health-care workers)			→ Template Letter to Advocate Hand Hygiene to Managers → Template Letter to communicate Hand Hygiene Initiatives to Managers → Guide to Implementation II.5
5.2a Chief executive officer	No	0	
	Yes	10	
5.2b Medical director	No	0	
	Yes	5	
5.2c Director of nursing	No	0	
	Yes	5	
5.3 Has a clear plan for the promotion of hand hygiene throughout the entire facility for the 5 May (Save Lives Clean Your Hands Annual Initiative) been established ?	No	0	→ Sustaining Improvement – Additional Activities for Consideration by Health-Care Facilities → Guide to Implementation II.5
	Yes	10	
5.4 Are systems for identification of Hand Hygiene Leaders from all disciplines in place?			
5.4a A system for designation of Hand Hygiene champions[11]	No	0	
	Yes	5	
5.4b A system for recognition and utilisation of Hand Hygiene role models[12]	No	0	
	Yes	5	
5.5 Regarding patient involvement in hand hygiene promotion:			→ Guidance on Engaging Patients and Patient Organizations in Hand Hygiene Initiatives → Guide to Implementation II.5
5.5a Are patients informed about the importance of hand hygiene? (e.g. with a leaflet)	No	0	
	Yes	5	
5.5b Has a formalised programme of patient engagement been undertaken?	No	0	
	Yes	10	
5.6 Are initiatives to support local continuous improvement being applied in your facility, for example:			→ Sustaining Improvement – Additional Activities for Consideration by Health-Care Facilities → Guide to Implementation II.5
5.6a Hand hygiene E-learning tools	No	0	
	Yes	5	
5.6b A hand hygiene institutional target to be achieved is established each year	No	0	
	Yes	5	
5.6c A system for intra-institutional sharing of reliable and tested local innovations	No	0	
	Yes	5	
5.6d Communications that regularly mention hand hygiene e.g. facility newsletter, clinical meetings	No	0	
	Yes	5	
5.6e System for personal accountability[13]	No	0	
	Yes	5	
5.6f A Buddy system[14] for new employees	No	0	
	Yes	5	
Institutional Safety Climate subtotal		**/100**	

9. Hand hygiene team: The make-up of this team will vary. It is likely to most frequently consist of an infection control unit, but may range (depending on resources available) from a single person with the role of managing the hand hygiene programme, to a group of staff members from various departments within the facility with meetings dedicated to the hand hygiene programme.

10. Hand hygiene champion: A person who is an advocate for the causes of patient safety and hand hygiene standards and takes on responsibility for publicizing a project in his/her ward and/or facility-wide.

11. Hand hygiene role model: A person who serves as an example, whose behaviour is emulated by others. In particular, a hand hygiene role model should have a hand hygiene compliance rate of at least 80%, be able to remind others to comply, and be able to teach practically about the WHO 5 Moments for Hand Hygiene concept.

12. System for personal accountability: explicit actions are in place to stimulate health-care workers to be accountable for their behaviour with regard to hand hygiene practices. Examples are notification by observers or infection control professionals, reproaches by peers, and reports to higher level facility authorities, with possible consequences on the individual evaluation.

13. Buddy system: A programme in which each new health-care worker is coupled with an established, trained health-care worker who takes responsibility for introducing them to the hand hygiene culture of the health-care setting (including practical training on indications and technique for performing hand hygiene, and explanation of hand hygiene promotion initiatives within the facility).

Interpretation: A Four Step Process

1.
Add up your points.

Score	
Component	**Subtotal**
1. System Change	
2. Education and Training	
3. Evaluation and Feedback	
4. Reminders in the Workplace	
5. Institutional Safety Climate	
Total	

2.
Determine the assigned 'Hand Hygiene Level' for your facility.

Total Score (range)	**Hand Hygiene Level**
0 - 125	Inadequate
126 - 250	Basic
251 - 375	Intermediate (or Consolidation)
376 - 500	Advanced (or Embedding)

3.
If your facility has reached the Advanced level, then complete the Leadership section overleaf.

(otherwise go to Step 4).

4.
Review the areas identified by this evaluation as requiring improvement in your facility and develop an action plan to address them (starting with the relevant WHO improvement tools listed). Keep a copy of this assessment to compare with repeated uses in the future.

Leadership Criteria	Answer (circle one)	
System Change		
Has a cost-benefit analysis of infrastructure changes required for the performance of optimal hand hygiene at the point of care been performed?	Yes	No
Does alcohol-based handrubbing account for at least 80% of hand hygiene actions performed in your facility?	Yes	No
Training and Education		
Has the hand hygiene team undertaken training of representatives from other facilities in the area of hand hygiene promotion?	Yes	No
Have hand hygiene principles been incorporated into local medical and nursing educational curricula?	Yes	No
Evaluation and Feedback		
Are specific healthcare associated infections (HCAIs) monitored? (eg. *Staphylococcus aureus* bacteremia, Gram negative bacteremia, device-related infections)	Yes	No
Is a system in place for monitoring of HCAI in high risk-settings? (e.g. intensive care and neonatal units)	Yes	No
Is a facility-wide prevalence survey of HCAI performed (at least) annually?	Yes	No
Are HCAI rates presented to facility leadership and to health-care workers in conjunction with hand hygiene compliance rates?	Yes	No
Is structured evaluation undertaken to understand the obstacles to optimal hand hygiene compliance and the causes of HCAI at the local level, and results reported to the facility leadership?	Yes	No
Reminders in the Workplace		
Is a system in place for creation of new posters designed by local health-care workers?	Yes	No
Are posters created in your facility used in other facilities?	Yes	No
Have innovative types of hand hygiene reminders been developed and tested at the facility?	Yes	No
Institutional Safety Climate		
Has a local hand hygiene research agenda addressing issues identified by the WHO Guidelines as requiring further investigation been developed?	Yes	No
Has your facility participated actively in publications or conference presentations (oral or poster) in the area of hand hygiene?	Yes	No
Are patients invited to remind health-care workers to perform hand hygiene?	Yes	No
Are patients and visitors educated to correctly perform hand hygiene?	Yes	No
Does your facility contribute to and support the national hand hygiene campaign (if existing)?	Yes	No
Is impact evaluation of the hand hygiene campaign incorporated into forward planning of the infection control programme?	Yes	No
Does your facility set an annual target for improvement of hand hygiene compliance facility-wide?	Yes	No
If the facility has such a target, was it achieved last year?	Yes	No
Total	**/20**	

Your facility has reached the Hand Hygiene Leadership level if you answered "yes" to at least one leadership criteria per category and its total leadership score is 12 or more. Congratulations and thank you!

WHO, 2010. Hand hygiene Self Assessment Framework-2010. Link: https://www.who.int/gpsc/country_work/hhsa_framework_October_2010.pdf?ua=1

1.1.11 Hand Hygiene compliance calculation

1.1.11.1 Hand Hygiene observation form

Date (yy/mm/dd) Start tir End tir

Facility name: Ward:

Observer: Contact number:

Are Hand hygiene supplies available on the ward? Yes No

Health care worker (HCW) code:

1 = Doctor/Physician 4 = Nurse Aide 7 = Midwife

2 = Physician Assistant 5 = Technician (lab, x-ray, etc.) 8 = Other (specify on the form)

3 = Nurse 6 = Environmental Services Worker/Cleaner

Instructions:

- Identify the facility, considering its size to inform number of observers required
- Choose a ward/unit and time that has a good flow of activity
- Introduce yourself to the staff and explain the purpose of your visit
- Ask if hand hygiene supplies (i.e. handrub, water, soap, buckets or sinks) are available at the start of the audit. If not available, do not conduct the audit. Question staff why these items are not available on the unit/ward.
- Position yourself such that you do not interfere with patient care, but where you have a good view of patient care delivery and hand wash stations.
- Always respect patient privacy – if the patient is uncomfortable, politely excuse yourself.
- Observe hand hygiene practice of the HCW:
    - Observe one health care worker for up to a maximum of 20 minutes; record the end time immediately after completing the observation session.
    - Conduct a minimum of 50 observations per ward/unit every quarter, considering different days and time (i.e. day & night shift, weekends and cadres of HCWs)-this may imply going back to the same unit/ward multiple times.
    - The observer may observe up to three HCWs at the same time, if there are many procedures or opportunities for hand hygiene by different HCWs.
    - The observer should follow the WHO five moments for hand hygiene.
- Provide immediate feedback to staff based on what you observed, letting them know what went well and what could be improved.

Figure 5: Hand Hygiene observation form

Table 8: Hand Hygiene observation sheet

HCW Code:				HCW Code:				HCW Code:			
Opp.	HH Moment	HH Method	Gloves*	Opp.	HH Moment	HH Method	Gloves*	Opp.	HH Moment	HH Method	Gloves*
1.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	1.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	1.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA
2.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	2.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	2.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA
3.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	3.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	3.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA
4.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	4.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	4.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA
5.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	5.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	5.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA
6.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	6.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	6.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA
7.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	7.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	7.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA
8.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	8.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	8.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA
9.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	9.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	9.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA
10.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	10.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA	10.	☐ Bef-pat con. ☐ Bef-aseptic ☐ Aft-body fld. ☐ Aft-pat con. ☐ Aft. pat surr.	☐ HR ☐ HW ☐ Missed	☐ Yes ☐ No ☐ NA

HCW: Health care worker; HH: Hand hygiene; HR: Handrub; HW: Handwash; Bef-pat con: Before patient contact; Bef-aseptic: Before aseptic procedure; Aft-body fld: After body fluid exposure; Aft-patient con: After patient contact; Aft-patsurr: After contact with patient surrounding or environment; missed: hand hygiene indicated but not performed; Opp.:opportunity.

*Yes: Glove use indicated, hand hygiene was performed; No: Glove use indicated, hand hygiene not performed. NA (not applicable): Glove use not indicated, hand hygiene was performed.

1.1.11.2 Hand hygiene basic compliance calculation

Table 9: Hand Hygiene basic compliance calculation (part 1)

Observation Form – Basic Compliance Calculation

	Facility:						Period:			Setting:					
	Prof.cat.			Prof.cat.			Prof.cat.			Prof.cat.			Total per session		
Session N°	Opp (n)	HW (n)	HR (n)	Opp (n)	HW (n)	HR (n)	Opp (n)	HW (n)	HR (n)	Opp (n)	HW (n)	HR (n)	Opp (n)	HW (n)	HR (n)
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
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12															
13															
14															
15															
16															
17															
18															
19															
20															
Total															
Calculation	Act (n) = / Opp (n) =			Act (n) = / Opp (n) =			Act (n) = / Opp (n) =			Act (n) = / Opp (n) =			Act (n) = / Opp (n) =		
Compliance															

Compliance (%) = $\frac{\text{Actions}}{\text{Opportunities}}$ x 100

Instructions for use

1. Define the setting outlining the scope for analysis and report related data according to the chosen setting.
2. Check data in the observation form. Hand hygiene actions not related to an indication should not be taken into account and vice versa.
3. Report the session number and the related observation data in the same line. This attribution of session number validates the fact that data has been taken into count for compliance calculation.
4. Results per professional category and per session (vertical):
   - 4.1 Sum up recorded opportunities (opp) in the case report form per professional category: report the sum in the corresponding cell in the calculation form.
   - 4.2 Sum up the positive hand hygiene actions related to the total of opportunities above, making difference between handwash (HW) and handrub (HR): report the sum in the corresponding cell in the calculation form.
   - 4.3 Proceed in the same way for each session (data record form).
   - 4.4 Add up all sums per each professional category and put the calculation to calculate the compliance rate (given in percent)
5. The addition of results of each line permits to get the global compliance at the end of the last right column.

Table 10: Hand hygiene - Optional calculation form (part 2)

Observation Form – Optional Calculation Form

(Indication-related compliance with hand hygiene)

	Facility:					Period:				Setting:					
	Before touching a patient			Before clean/ aseptic procedure			After body fluid exposure risk			After touching a patient			After touching patient surroundings		
Session N°	Indic (n)	HW (n)	HR (n)	Indic (n)	HW (n)	HR (n)	Indic (n)	HW (n)	HR (n)	Indic (n)	HW (n)	HR (n)	Indic (n)	HW (n)	HR (n)
1															
2															
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4															
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10															
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12															
13															
14															
15															
16															
17															
18															
19															
20															
Total															
Calculation	Act (n) = Indic1 (n) =			Act (n) = Indic2 (n) =			Act (n) = Indic3 (n) =			Act (n) = Indic4 (n) =			Act (n) = Indic5 (n) =		
Ratio act / indic*															

Instructions for use

1. Define the setting outlining the scope for analysis and report related data according to the chosen setting.
2. Check data in the observation form. Hand hygiene actions not related to an indication should not be taken into account and vice versa.
3. If several indications occur within the same opportunity, each one should be considered separately as well as the related action.
4. Report the session number and the related observation data in the same line. This attribution of session number validates the fact that data has been taken into count for compliance calculation.
5. Results per indication (indic) and per session (vertical):
   - 4.1 Sum up indications per indication in the observation form: report the sum in the corresponding cell in the calculation form.
   - 4.2 Sum up positive hand hygiene actions related to the total of indications above, making the difference between handwash (HW) and handrub (HR): report the sum in the corresponding cell in the calculation form.
   - 4.3 Proceed in the same way for each session (observation form).
   - 4.4 Add up all sums per each indication and put the calculation to calculate the ratio (given in percent)

*Note: This calculation is not exactly a compliance result, as the denominator of the calculation is an indication instead of an opportunity. Action is artificially overestimated according to each indication. However, the result gives an overall idea of health-care worker's behaviour towards each type of indication.

Resources:

World Health Organization, 2009. WHO guidelines on hand hygiene in health care. In WHO guidelines on hand hygiene in health care. Link: https://www.who.int/publications/i/item/9789241597906

World Health Organization, 2010. Hand Hygiene Self-Assessment Framework 2010. Link: https://www.who.int/gpsc/country_work/hhsa_framework_October_2010.pdf?ua=1

World Health Organization, 2021. IPC, hand hygiene- implementational tools.

https://www.who.int/teams/integrated-health-services/infection-prevention-control/hand-hygiene/tools-and-resources

1.2 PERSONAL PROTECTIVE EQUIPMENT

Any infectious agent transmitted by the contact or droplet route can potentially be transmitted by contamination of healthcare workers' hands, skin or clothing. Cross-contamination can then occur between the healthcare worker and other patients or healthcare workers, or between the healthcare worker and the environment. Personal protective equipment (PPE) refers to a variety of barriers, used alone or in combination, to protect mucous membranes, airways, skin and clothing from contact with infectious agents.

PPE used as part of standard precautions includes aprons, gowns, gloves, surgical masks, protective eyewear and face shields. Selection of PPE is based on the type of patient interaction, known or possible infectious agents, and/or the likely mode(s) of transmission.

1.2.1 Factors to be considered are when using PPE:

- Probability of exposure to blood and body substances
- Type of body substance involved
- Probable type and probable route of transmission of infectious agents
- Healthcare workers who provide direct care to patients and who may come in contact with blood, body fluids, excretions, and secretions.
- Support staff including cleaners, and laundry staff in situations where they may have contact with blood, body fluids, secretions, and excretions.
- Laboratory staff, who handle patient specimens.
- Family members who provide care to patients and are in a situation where they may have contact with blood, body fluids, secretions, and excretions.

Hand hygiene must be performed before putting on PPE and after removing PPE

1.2.2 Where to wear PPE

PPE is designed and issued for a particular purpose in a protected environment and should not be worn outside that area. Protective clothing provided for staff in areas where there is high risk of contamination (e.g. operating suite/room) must be removed

before leaving the area. Even where there is a lower risk of contamination, clothing that has been in contact with patients should not be worn outside the patient-care area.

1.2.3 Types of PPE and how to use them

1.2.3.1 Aprons and gowns

Isolation gowns are used as specified by Standard and Transmission-Based Precautions, to protect the HCW's arms and exposed body areas and prevent contamination of clothing with blood, body fluids, and other potentially infectious material. Clinical and laboratory coats or jackets worn over personal clothing for comfort and/or purposes of identity are not considered PPE. When applying Standard Precautions, an isolation gown is worn only if contact with blood or body fluid is anticipated.

However, when Contact Precautions are used (i.e., to prevent transmission of an infectious agent that is not interrupted by Standard Precautions alone and that is associated with environmental contamination), donning of both gown and gloves upon room entry is indicated to address unintentional contact with contaminated environmental surfaces.

The routine donning of isolation gowns upon entry into an intensive care unit or other high-risk area does not prevent or influence potential colonization or infection of patients in those areas (Siegel JD, Rhinehart E et al. 2007) Isolation gowns should be removed before leaving the patient care area to prevent possible contamination of the environment outside the patient's room.

International guidelines recommend that protective clothing (apron or gown) be worn by all healthcare workers when (Garner 1996; Pratt et al 2001; Clark et al 2002; Pratt et al 2007):

- Close contact with the patient, materials or equipment may lead to contamination of skin, uniforms or other clothing with infectious agents
- There is a risk of contamination with blood, body substances, secretions or excretions (except sweat).

The type of apron or gown required depends on the degree of risk, including the anticipated degree of contact with infectious material and the potential for blood and body substances to penetrate through to clothes or skin:

- a clean non-sterile apron or gown is generally adequate to protect skin and prevent soiling of clothing during procedures and/or patient-care activities that are likely to generate splashing or sprays of blood or body substances

- a fluid-resistant apron or gown should be worn when there is a risk that clothing may become contaminated with blood, body substances, secretions or excretions (except sweat)
- Gowns and aprons must be changed between patients

1.2.3.1.1 Considerations in choosing a type of gown (e.g. long or short-sleeved) that is appropriate for the activity are:

- the volume of body substances likely to be encountered
- the extent and type of exposure to blood and body substances
- the probable type and route of transmission of infectious agents

If a fluid-resistant full body gown is required, it is always worn in combination with gloves, and with other PPE when indicated. Full coverage of the arms and body front, from neck to the mid-thigh or below, ensures that clothing and exposed upper body areas are protected.

Table 11: Types of gown or apron: characteristics and indications

Type	Characteristics and indications
Plastic apron	• Impervious /fluid resistant • Single-use, for one procedure or episode of patient care • Disposable • Worn when there is a risk that clothing may become exposed to blood or body substances (usually from the environment) during low-risk procedures and where there is low risk of contamination to the healthcare worker's arms • Worn during contact precautions when contact with the patient or the patient environment is likely
Gown	• Single-use* • Disposable • Worn to protect skin and prevent soiling of clothing during procedures and/or patient-care activities that are likely to generate splashing or sprays of blood or body substances • Choice of sleeve length depends on the procedure being undertaken and the extent of risk • of exposure of the healthcare worker's arms
Full body gown	• Fluid resistant • Single-use* • Long sleeved • Worn when there is a risk of contact of the healthcare worker's skin with a patient's broken skin, extensive skin to skin contact (e.g. lifting a patient with scabies or non-intact skin), or a risk of contact with blood and body substances which are not contained (e.g. vomiting, uncontrolled faecal matter) • Worn when there is the possibility of extensive splashing of blood and body substances • Worn when there is a risk of exposure to large amounts of body substances eg in some • operative procedures
Sterile gowns*	• Pre-packaged • Used for procedures requiring an aseptic field

*Some gown types can be re-used. Reusable gowns need to be laundered or reprocessed according to laundry Practice

Aprons or gowns should be appropriate to the task being undertaken. They should be worn for a single procedure or episode of patient care and removed in the area where the episode of care takes place.

- Wear a gown, that is appropriate to the task, to protect skin and prevent soiling or contamination of clothing during procedures and patient-care activities when contact with blood, body fluids, secretions, or excretions is anticipated
- Wear a gown for direct patient contact if the patient has uncontained secretions or excretions

- Remove gown and perform hand hygiene before leaving the patient's environment
- Do not reuse gowns, even for repeated contacts with the same patient.
- Routine donning of gowns upon entrance into a high risk unit (e.g., ICU, NICU, HSCT unit) is not indicated

1.2.3.1.2 Removing aprons and gowns

Removal of aprons and gowns before leaving the patient-care area (e.g. in the room or anteroom) prevents possible contamination of the environment outside the patient's room. Aprons and gowns should be removed in a manner that prevents contamination of clothing or skin. The outer, contaminated, side of the gown is turned inward and rolled into a bundle, and then discarded into a designated container for waste or linen to contain contamination.

1.2.3.2 Face and eye protection: masks, goggles, face shields

The mucous membranes of the mouth, nose and eyes are portals of entry for infectious agents, as are other skin surfaces if skin integrity is compromised (e.g. by acne, dermatitis). Face and eye protection reduces the risk of exposure of healthcare workers to splashes or sprays of blood and body substances and is an important part of standard precautions. Procedures that generate splashes or sprays of blood, body substances, secretions or excretions require either a face shield or a mask worn with protective eyewear. Infectious agents transmitted through droplets can also come into contact with the mucous membranes of the healthcare worker.

1.2.3.2.1 Masks

Masks are used for three primary purposes in healthcare settings:

- Placed on healthcare personnel to protect them from contact with infectious material from patients e.g., respiratory secretions and sprays of blood or body fluids, consistent with Standard Precautions and Droplet Precautions;
- Placed on healthcare personnel when engaged in procedures requiring sterile technique to protect patients from exposure to infectious agents carried in a healthcare worker's mouth or nose, and
- Placed on coughing patients to limit potential dissemination of infectious respiratory secretions from the patient to others (i.e., Respiratory Hygiene/Cough Etiquette).

Masks may be used in combination with goggles to protect the mouth, nose and eyes, or a face shield may be used instead of a mask and goggles, to provide more complete protection for the face.

Procedures that generate splashes or sprays of blood, body fluids, secretions, or excretions (e.g., endotracheal suctioning, bronchoscopy, invasive vascular procedures) require either a face shield (disposable or reusable) or mask and goggle.

Table 12: Indications for face and eye protection

Type of care	Example	Face and eye protection required
Routine care	General examination: (e.g. medical, physiotherapy nursing Routine observation	Not required unless caring for a patient on droplet precaution (surgical mask within 3 feet of patient) Or airborne precaution (N95 respirator)
Procedures that generate splashes or sprays	Dental procedures Nasopharyngeal aspiration Emptying wound drainage /catheter bag	Protective eye wear/full length face shield Surgical mask
Procedures involving respiratory tract (including mouth)	Intubation Nasopharyngeal suction	Protective eye wear with Mask or N95 respirator (if need airborne precaution)

Surgical masks can be placed on coughing patients to limit potential dissemination of infectious respiratory secretions from the patient to others.

1.2.3.2.1.1 How to put on a face mask

1. Clean your hands with soap and water or hand sanitizer before touching the mask.
2. Remove a mask from the box and make sure there are no obvious tears or holes in either side of the mask.
3. Determine which side of the mask is the top. The side of the mask that has a stiff bendable edge is the top and is meant to mold to the shape of your nose.
4. Determine which side of the mask is the front. The colored side of the mask is usually the front and should face away from you, while the white side touches your face.
5. Follow the instructions below for the type of mask you are using.

- Face Mask with Ear loops: Hold the mask by the ear loops. Place a loop around each ear.
- Face Mask with Ties: Bring the mask to your nose level and place the ties over the crown of your head and secure with a bow.
- Face Mask with Bands: Hold the mask in your hand with the nosepiece or top of the mask at fingertips, allowing the headbands to hang freely below hands. Bring the mask to your nose level and pull the top strap over your head so that it rests over the crown of your head. Pull the bottom strap over your head so that it rests at the nape of your neck.

6. Mold or pinch the stiff edge to the shape of your nose.
7. If using a face mask with ties: Then take the bottom ties, one in each hand, and secure with a bow at the nape of your neck.
8. Pull the bottom of the mask over your mouth and chin.

1.2.3.2.1.2 How to remove a face mask

1. Clean your hands with soap and water or hand sanitizer before touching the mask. Avoid touching the front of the mask. The front of the mask is contaminated. Only touch the ear loops/ties/band. Follow the instructions below for the type of mask you are using.
2. Face Mask with Ear loops: Hold both of the ear loops and gently lift and remove the mask.
3. Face Mask with Ties: Untie the bottom bow first then untie the top bow and pull the mask away from you as the ties are loosened.
4. Face Mask with Bands: Lift the bottom strap over your head first then pull the top strap over your head.
5. Throw the mask in the trash. Clean your hands with soap and water or hand sanitizer.

1.2.3.2.1.3 Considerations when using a surgical mask include:

- Masks should be changed when they become soiled or wet
- Masks should never be reapplied after they have been removed
- Masks should not be left dangling around the neck
- Touching the front of the mask while wearing it should be avoided
- Hand hygiene should be performed upon touching or discarding a used mask.

Note: A surgical mask becomes ineffective as a barrier if the integrity is damaged or if it becomes wet (i.e., from perspiration, or if splashed with blood or other potentially infectious material). If this occurs, remove mask and replace with another.

1.2.3.2.2 Eye protection: Goggles

- Goggles with a manufacturer's anti-fog coating provide reliable, practical eye protection from splashes, sprays, and respiratory droplets from multiple angles (to be efficacious, goggles must fit snugly, particularly from the corners of the eye across the brow).
- Newer styles can fit over prescribed glasses. Personal eyeglasses and contact lenses are not considered adequate eye protection.

1.2.3.2.3 Eye protection: Face shields

- Single-use or reusable face shields may be used in addition to surgical masks, as an alternative to protective eyewear.
- Face shields extending from chin to crown provide better face and eye protection from splashes and sprays; face shields that wrap around the sides may reduce splashes around the edge of the shield.

1.2.3.2.3.1 Removing face and eye protection

- Removal of a face shield, protective eyewear and surgical mask can be performed safely after gloves have been removed and hand hygiene performed.
- The ties, earpieces and/or headband used to secure the equipment to the head are considered 'clean' and therefore safe to touch with bare hands. The front of a mask, protective eyewear or face shield is considered contaminated.

1.2.3.2.3.2 Cleaning reusable face and eye protection

Reusable face shields and protective eyewear should be cleaned according to the manufacturer's instructions, generally with detergent solution, and be completely dry before being stored.

1.2.3.3 Gloves

- Gloves are used to prevent contamination of healthcare personnel hands when anticipating direct contact with blood or body fluids, mucous membranes, non-intact skin and other potentially infectious material;
- having direct contact with patients who are colonized or infected with pathogens transmitted by the contact route e.g., VRE, MRSA, RSV; or
- handling or touching visibly or potentially contaminated patient care equipment and environmental surfaces

1.2.3.3.1 Risk assessment for glove use includes consideration of:

- who is at risk (whether it is the patient or the healthcare worker)
- whether sterile or non-sterile gloves are required, based on contact with susceptible sites or clinical devices and the aspect of care or treatment to be undertaken
- the potential for exposure to blood or body substances
- whether there will be contact with non-intact skin or mucous membranes during general care and invasive procedures
- whether contaminated instruments will be handled.
- When gloves are worn in combination with other PPE, they are put on last.

1.2.3.3.2 When should gloves be changed?

International guidance suggests that changing of gloves is necessary:

- Between episodes of care for different patients, to prevent transmission of infectious material
- During the care of a single patient, to prevent cross-contamination of body sites
- If the patient interaction involves touching portable computer keyboards or other mobile equipment that is transported from room to room.

1.2.3.3.3 Wearing of gloves

Gloves must be worn as a single-use item for:

- each invasive procedure;
- contact with sterile sites and non-intact skin or mucous membranes; and

- activity that has been assessed as carrying a risk of exposure to blood, body substances,
- secretions and excretions.
- gloves must be changed between patients and after every episode of individual patient care.

1.2.3.3.4 Types of gloves and Indications of Use

Table 13: Types of gloves and indications of use

Glove	Indication for use	Examples
Non-sterile Gloves	• Potential for exposure to blood, body substances, secretions or excretions • Contact with non-intact skin or mucous membranes	▪ Venipuncture ▪ Vaginal examination ▪ Dental examination ▪ Emptying a urinary catheter bag ▪ Naso-gastric aspiration ▪ Management of minor cuts and abrasions
Sterile gloves	• Potential for exposure to blood, body substances, secretions or excretions • Contact with susceptible sites or clinical devices where sterile conditions should be maintained	▪ Surgical aseptic technique procedures e.g. ▪ Urinary catheter insertion ▪ Complex dressings ▪ Central venous line insertion site dressing ▪ Lumbar puncture ▪ Clinical care of surgical wounds or drainage sites ▪ Dental procedures requiring a sterile field
Reusable utility gloves	• Indicated for non-patient-care activities	▪ Handling or cleaning contaminated equipment or surfaces ▪ General cleaning duties ▪ Instrument cleaning in sterilising services unit

1.2.3.3.4.1 Sterile gloves

Sterile gloves must be used for aseptic procedures and contact with sterile sites.

Points:

- Gloves must not be washed for subsequent reuse because microorganisms cannot be removed reliably from glove surfaces and continued glove integrity cannot be ensured. (glove reuse has been associated with transmission of MRSA and gram-negative bacilli)

- Hand hygiene following glove removal is important. It further ensures that the hands will not carry potentially infectious material that might have penetrated through unrecognized tears or that could contaminate the hands during glove removal.

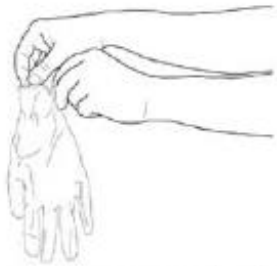
Figure 6: Gloves indications of use

1.2.3.3.5 How to put on and take off non-sterile gloves

When the hand hygiene indication occurs before a contact requiring glove use, perform hand hygiene by rubbing with an alcohol-based handrub or by washing with soap and water.

I. HOW TO DON GLOVES:

1. Take out a glove from its original box

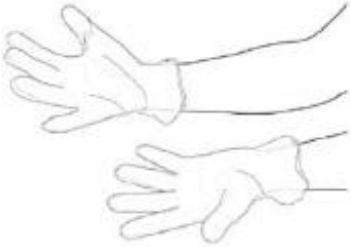


2. Touch only a restricted surface of the glove corresponding to the wrist (at the top edge of the cuff)

3. Don the first glove

4. Take the second glove with the bare hand and touch only a restricted surface of glove corresponding to the wrist

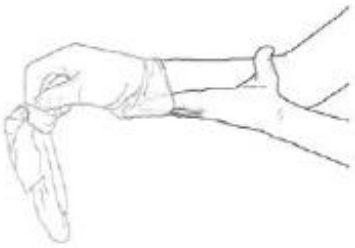
5. To avoid touching the skin of the forearm with the gloved hand, turn the external surface of the glove to be donned on the folded fingers of the gloved hand, thus permitting to glove the second hand



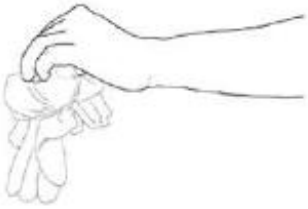
6. Once gloved, hands should not touch anything else that is not defined by indications and conditions for glove use

II. HOW TO REMOVE GLOVES:

1. Pinch one glove at the wrist level to remove it, without touching the skin of the forearm, and peel away from the hand, thus allowing the glove to turn inside out



2. Hold the removed glove in the gloved hand and slide the fingers of the ungloved hand inside between the glove and the wrist. Remove the second glove by rolling it down the hand and fold into the first glove



3. Discard the removed gloves

4. Then, perform hand hygiene by rubbing with an alcohol-based handrub or by washing with soap and water

Figure 7: How to put on gloves

1.2.3.3.6 How to put on and take off sterile gloves

The purpose of this technique is to ensure maximum asepsis for the patient and to protect the health-care worker from the patient's body fluids. To achieve this goal, the skin if the health care worker remains exclusively in contact with the inner surface if the glove and has no contact with the outer surface. Any error in the performance of this technique leads to a lack of asepsis and requiring a change of gloves

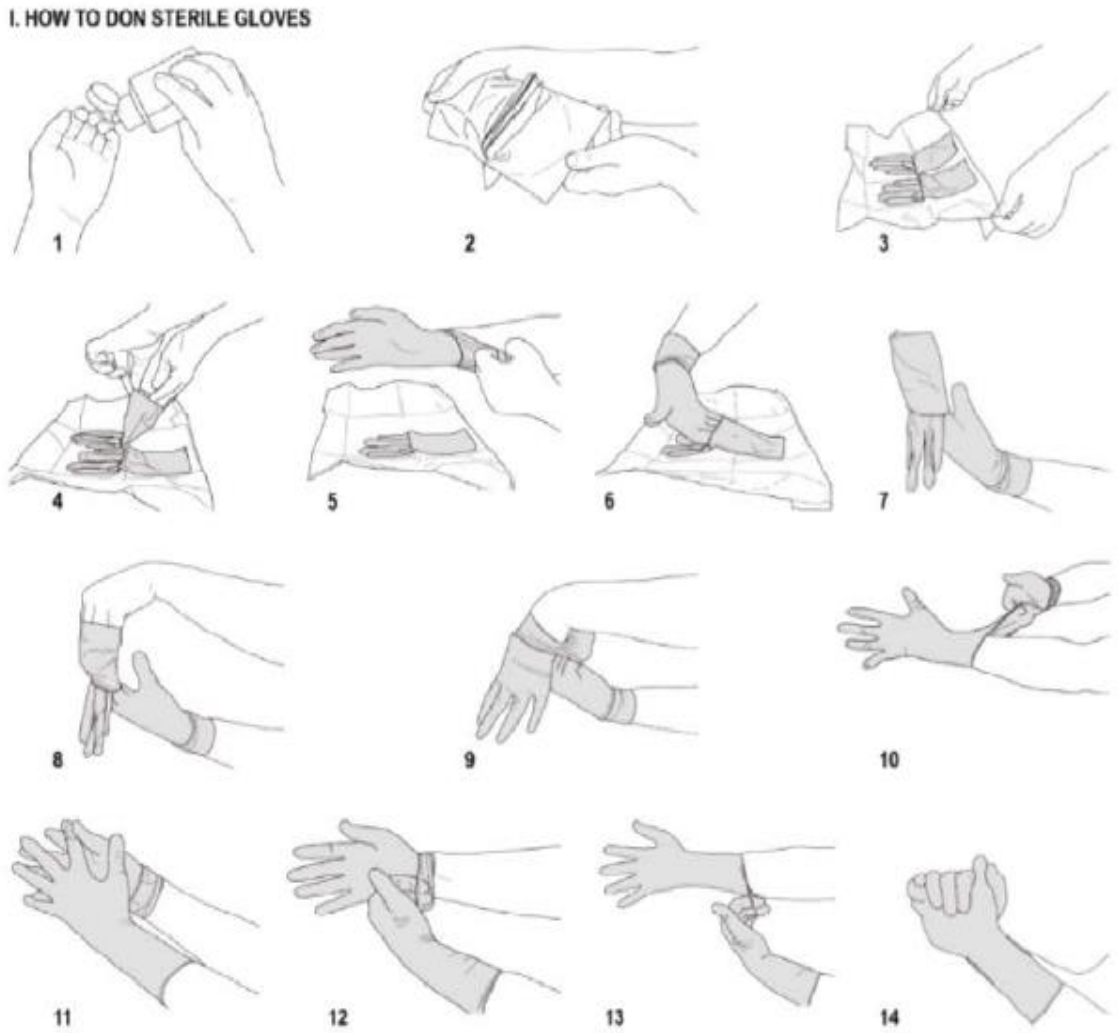


Figure 8: How to take off gloves

1- Perform hand hygiene before "aseptic procedure" by hand-rubbing or hand washing.

2- Check the package for integrity. Open the first non-sterile packaging by peeling it completely off the heat seal to expose the second sterile wrapper, but without touching it.

3- Place the second sterile package on a clean, dry surface without touching the surface. Open the package and fold it towards the bottom so as to unfold the paper and keep it open.

4- Using the thumb and index finger of one hand, carefully grasp the folded cuff edge of the gloves.

5- Slip the other hand into the glove in a single movement, keeping the folded cuff edge at the wrist level.

6-7. Pick up the second glove by sliding the fingers of the gloved hand underneath the cuff of the glove.

8-10. In a single movement, slip the second glove on to the ungloved hand while avoiding any contact/resting of the gloved hand on surfaces other than the glove to be donned (contact/resting constitute a lack of asepsis and requires a change of gloves).

11- If necessary adjust the fingers and interdigital spaces until the gloves fit comfortable.

12-13. Unfold the cuff of the first gloved hand by gently slipping the fingers of the other hand inside the fold, making sure to avoid any contact with the surface other than the outer surface of the gloves.

14. The hands are gloved and must touch exclusively sterile devices or the previously disinfected patient's body.

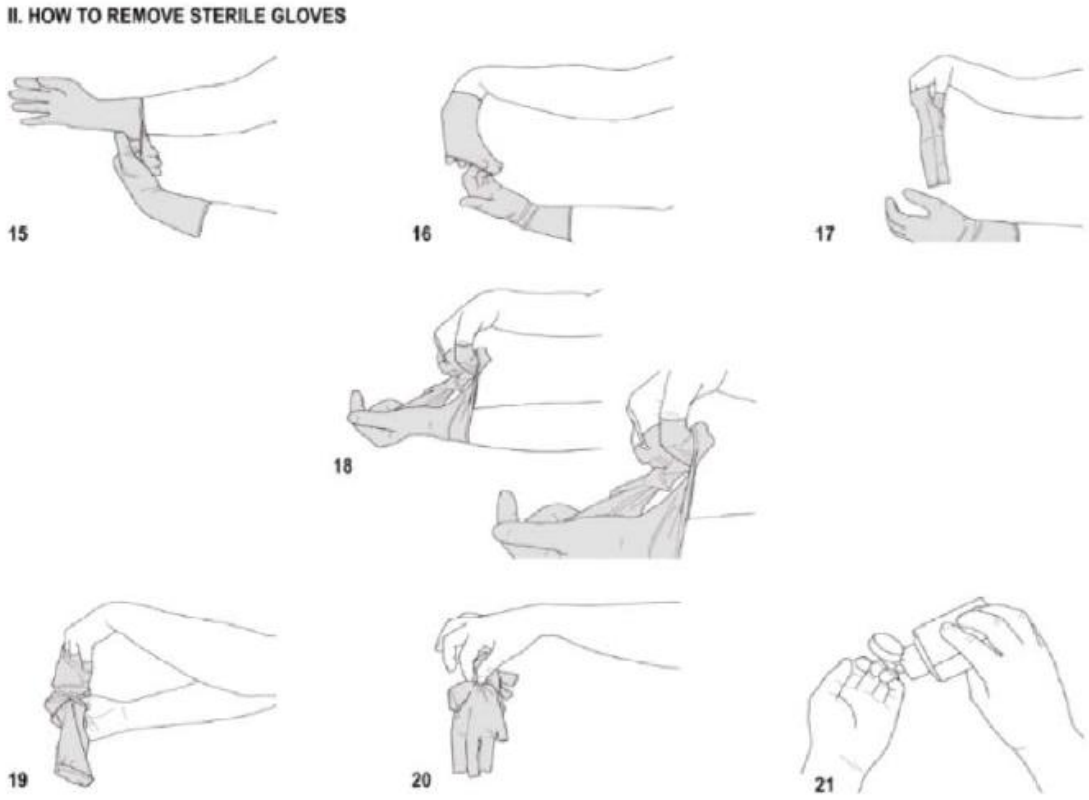


Figure 9: How to remove sterile gloves

15-17. Remove the first glove by peeling it back with the fingers of the opposite hand. Remove the glove by rolling it inside out to the second finger joints (do not remove completely).

18. Remove the other glove by turning its outer edge on the fingers of the partially gloved hand.

19. Remove the glove by turning it inside out entirely to ensure that the skin of the health-care worker is always and exclusively in contact with the inner surface of the glove.

20. Discard gloves in designated bin.

21. Perform hand hygiene after glove removal according to the recommended indication.

NB: Donning surgical sterile gloves at the time of a surgical intervention follows the same sequences except that:

- Surgical hand antisepsis is done before the procedure.
- Donning gloves is performed after putting on the sterile gown.
- The opening of the packaging (non-sterile) is done by an assistant.
- Gloves should cover the wrists of the sterile gown.

1.2.3.4 Footwear and shoe cover

Closed shoes should be worn at all times to protect feet from injury by sharps or heavy items and from contact with blood or body fluids. Wear rubber boots in areas where indicated, for example, in operating theatres, delivery rooms, mortuaries and dirty area in laundry etc.. Clean and disinfect reusable boots according to cleaning and disinfection guidelines

1.2.4 Sequence for putting on PPE

To reduce the risk of transmission of infectious agents, PPE must be used appropriately. The following table outlines sequences and procedures for putting on and removing PPE.

Hand hygiene must be performed before putting on PPE and after removing PPE.

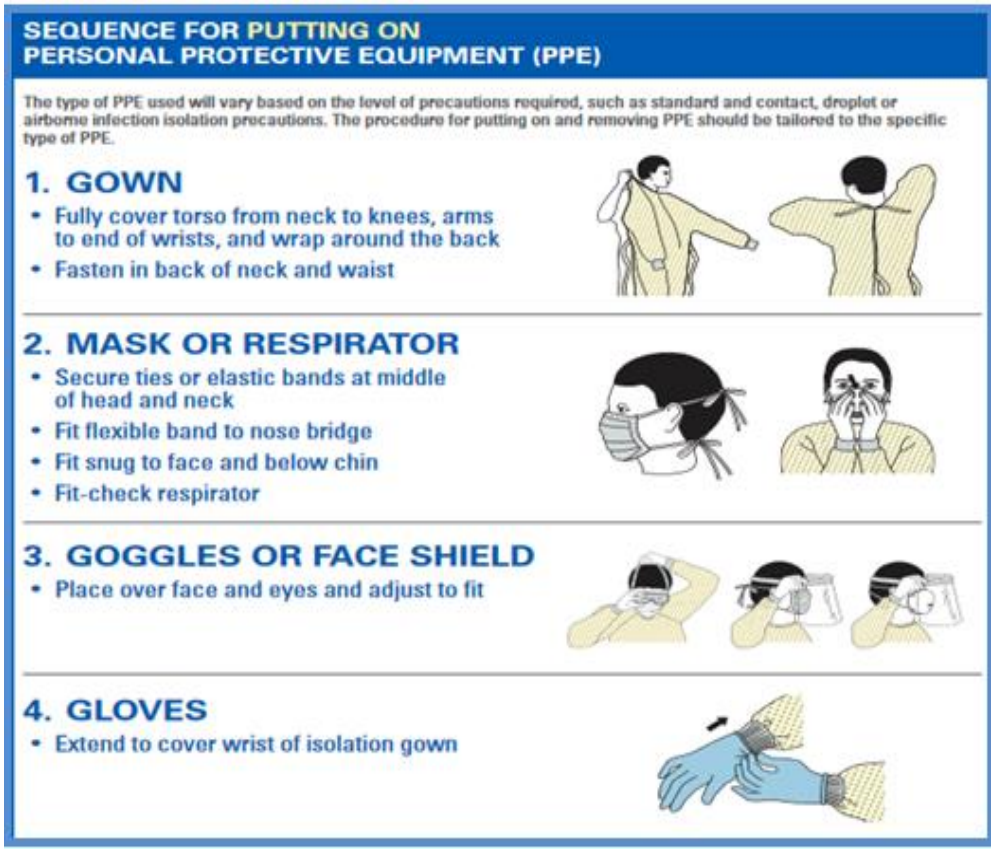


Figure 10: Sequencing of putting on PPE (donning)

1.2.5 Sequence of removing PPE

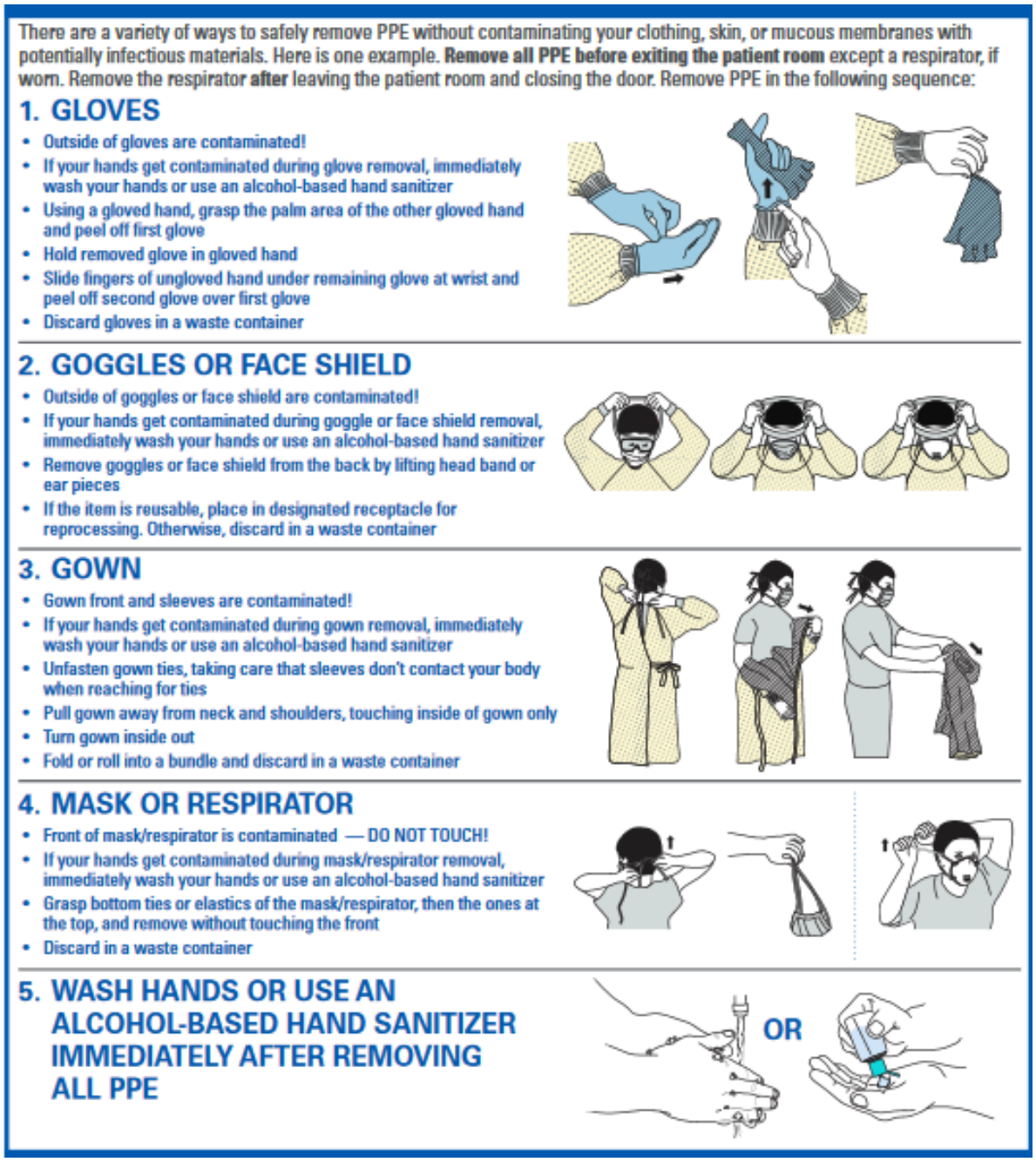


Figure 11: Sequence of removing PPE (doffing): method one

Here is another way to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GOWN AND GLOVES

- Gown front and sleeves and the outside of gloves are contaminated!
- If your hands get contaminated during gown or glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp the gown in the front and pull away from your body so that the ties break, touching outside of gown only with gloved hands
- While removing the gown, fold or roll the gown inside-out into a bundle
- As you are removing the gown, peel off your gloves at the same time, only touching the inside of the gloves and gown with your bare hands. Place the gown and gloves into a waste container

2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band and without touching the front of the goggles or face shield
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container

3. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — DO NOT TOUCH!
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in a waste container

4. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE

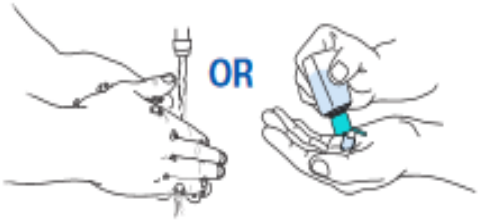


Figure 12: Sequencing of removing PPE (doffing); method 2

Source: Adapted from
http://www.cdc.gov/hicpac/2007ip/2007isolationprecautions.html.

* Note:

- Surgical masks can be removed at the point of care.
- To remove a N95 respirator, perform hand hygiene and step outside the room or into an anteroom before removing and disposing of the respirator in a closed container and performing hand hygiene again. The N95 mask and eye protection (goggles) should be removed in the anteroom or outside of the patients' room after closing the door.
- For surgical procedures and dentistry, the sequence for putting on PPE differs. In these situations, masks and protective eyewear are applied first prior to hand preparation. Gown and gloves are then put on.

1.2.6 HCW actions for reducing the risk of infection

- Before putting on PPE explain to the patient that it is a routine part of infection prevention and control
- Assess the risk of spraying or splashing in the specific situation and choose PPE accordingly
- If you have a sensitivity or allergy to latex, inform your manager and ensure you always use an alternative glove type
- Follow appropriate sequence and procedure for putting on and removing PPE outlined in table
- Remove PPE before leaving the patient-care area and follow the sequence and procedure outlined in table
- Lead by example and champion the appropriate use of PPE in your setting

1.2.6.1 Important points on PPE that patients should be informed about

- The wearing of PPE such as gowns, masks and gloves is a routine part of infection prevention and control in healthcare—it is used for everybody's safety
- The use of PPE alone is not enough—healthcare workers should perform hand hygiene before putting on and after removing the protective items
- PPE is used in the patient care area only—healthcare workers remove the equipment before they leave the area to reduce the risk of spreading infection
- Gowns or aprons are used so that the healthcare worker's clothing or skin does not become contaminated
- Healthcare workers wear a mask if there is risk of them inhaling an infectious agent
- Masks, eye protection or face shields are worn by a healthcare worker in situations where the patient's body substances may splash onto his or her face

- Healthcare workers wear gloves when they will have direct hand contact with blood or body substances, mucous membranes or wounds or if there is a chance that touching the patient could transmit infection.
- Patients who are sensitive or allergic to latex should tell their healthcare workers so that an alternative glove type can be used
- It's okay to question a healthcare worker about whether they should be using protective personal equipment or whether they are using it properly

1.2.7 PPE audit tool

Personal Protection Equipment (PPE) direct observation check list

Ward: Date: dd/mm/yyyy

Surveyor: Start time:____:____ End time: ____: _____24 hr format

Healthcare worker category:

Doctor: ☐ Nurse: ☐ Other: ☐ Detail:.....

Bed/ bed space location or number if indicated: .....

PPE used for: Standard precaution ☐ Transmission based precaution ☐

Contact precaution ☐ Droplet precaution ☐ Airborne precaution ☐

Instruction: Instructions: Select "Y" if activity was observed and completed appropriately; select "N" if activity was observed and not completed appropriately. Select "Not observed" if you were not able to observe the activity.

Donning Issues	Yes	No	Comments
Perform Hand Hygiene			
Tie gown and fastened at the neck and waist			
Selected appropriate mask or respirator			
Applied mask appropriately			
Selected eye protection if appropriate			
Applied gloves to cover cuffs			
Doffing issues			
Used proper gloves in gloves technique			
Perform Hand hygiene			
Removed face shield or goggles without touching face			
Removed gown using appropriate rolling technique			
Took care not to have inside of gown touch clothing			
Perform hand hygiene			
Observation			
Took care not to touch unprotected areas of body or clothing			
Did not adjust mask or clothing			

Figure 13: PPE audit tool

Resources:

Centre for Disease Control and Prevention (CDC). 2021. Health Care Associated Infections; Protecting Healthcare Personnel. Division of Healthcare Quality Promotion (DHQP). Link: https://www.cdc.gov/hai/prevent/ppe.html

Centre for Disease Control and Prevention (CDC), 2021. Reviews strategies to coach and train frontline health care professionals in the use of PPE and strategies for auditing appropriate PPE use to identify gaps and improve PPE adherence. https://www.cdc.gov/infectioncontrol/pdf/strive/PPE103-508.pdf

Auditing and feedback of PPE use; CDC training slides
https://www.cdc.gov/infectioncontrol/pdf/strive/PPE104-508.pdf

Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: World Health Organization; 2016. https://www.who.int/publications/i/item/9789241549929

Improving infection prevention and control at the health facility: Interim practical manual supporting implementation of the WHO Guidelines on Core Components of Infection Prevention and Control Programmes. Geneva: World Health Organization; 2018 (WHO/HIS/SDS/2018.10).
https://apps.who.int/iris/bitstream/handle/10665/279788/WHO-HIS-SDS-2018.10-eng.pdf

Ministry of Health Maldives, 2020. National Antibiotic Stewardship Program.

National Health and Medical Research Council (2019). Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra:
https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019

Ministry of Health and Family Welfare, India: Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

Organization, W. H. (2010). WHO guidelines on drawing blood: best practices in phlebotomy, World Health Organization.
https://www.euro.who.int/__data/assets/pdf_file/0005/268790/WHO-guidelines-on-drawing-blood-best-practices-in-phlebotomy-Eng.pdf

1.3 RESPIRATORY HYGIENE/COUGH ETIQUETTE

The strategy is targeted at patients and accompanying family members and friends with undiagnosed transmissible respiratory infections and applies to any person with signs of illness including cough, congestion, rhinorrhea, or increased production of respiratory secretions when entering a healthcare facility.

1.3.1 The elements of Respiratory Hygiene/Cough Etiquette include

- Education of healthcare facility staff, patients, and visitors;
- Posted signs, in language(s) appropriate to the population served, with instructions to patients and accompanying family members or friends;
- Source control measures (e.g., covering the mouth/nose with a tissue when coughing and prompt disposal of used tissues, using surgical masks on the coughing person when tolerated and appropriate)
- Hand hygiene after contact with respiratory secretions; and
- Spatial separation, ideally >3 feet, of persons with respiratory infections in common waiting areas when possible.

Covering sneezes and coughs and placing masks on coughing patients are proven means of source containment that prevent infected persons from dispersing respiratory secretions into the air. These measures should be effective in decreasing the risk of transmission of pathogens contained in large respiratory droplets (e.g., influenza virus, adenovirus, B. pertussis and Mycoplasma pneumoniae).

Healthcare personnel are advised to observe Droplet Precautions (i.e., wear a mask) and hand hygiene when examining and caring for patients with signs and symptoms of a respiratory infection.

Healthcare personnel who have a respiratory infection are advised to avoid direct patient contact, especially with high risk patients. If this is not possible, then a mask should be worn while providing patient care.

1.3.2 IPC measures at different settings

Setting or procedure	Infection control measures							
	Hand Hygiene	Gloves	Gown	Medical mask for HCW	Particulate respirator for HCW	Eye protection	Respiratory etiquette	Adequate ventilation (≥ 12 ACH)
Reception (recommended to keep partition at reception counters)				✓*		✓*	✓	
Triage/physical exam	✓			✓		✓	✓	
General nursing care	✓			✓		✓	✓	
Specimen collection (blood)	✓	✓		✓		✓	✓	
Nebulization	✓			✓		✓*		
Specimen collection (induced sputum)	✓	✓	✓		✓	✓		✓
Aerosol generating procedure	✓	✓	✓		✓	✓		✓

Figure 14: Required PPE for various procdures

HCW; health care worker, ACH; air changes per hour. * If within 1 meter of patient without a barrier / partition at counter

No anticipated close contact with the patient. *Use eye protection too if contact within 1 meter without partition at counter

Involve close contact < 1 meter with the patient

Aerosol generating procedures associated with pathogen transmission: e.g. intubation, cardio pulmonary resuscitation and related procedures (manual ventilation, suction, bronchoscopy, and autopsy or surgery involved in high speed devices

Resources:

National Health and Medical Research Council (2019). Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019

Public Health Ontaria; Provincial Infectious Diseases Advisory Committee (PIDAC), 2013. Best Practices for Prevention of Transmission of Acute Respiratory Infection. Link https://www.publichealthontario.ca/-/media/documents/B/2012/bp-prevention-transmission-ari.pdf

Centers for Disease Control and Prevention, National Center for Immunization and Respiratory Diseases (NCIRD), 2009. Respiratory Hygiene/Cough Etiquette in Healthcare Settings. Link: https://www.cdc.gov/flu/professionals/infectioncontrol/resphygiene.htm

1.4 PATIENT PLACEMENT

1.4.1 Assessment for patient placement

Every patient has different needs. Upon arrival, the capabilities of the facility—availability of staff, services, and beds or other rooms—are matched with the needs of the patient.

1.4.2 Options for patient placement

Patient placement options include: single patient rooms, two patient rooms, and multi-bed wards. In the absence of obvious infectious diseases that require specified airborne infection isolation rooms (e.g., tuberculosis, SARS, chickenpox), the risk of transmission of infectious agents is not always considered when making placement decisions.

When there are only a limited number of single-patient rooms, it is prudent to prioritize them for those patients who have conditions that facilitate transmission of infectious material to other patients (e.g., draining wounds, stool incontinence, uncontained secretions) and for those who are at increased risk of acquisition and adverse outcomes resulting from HAI (e.g., immunosuppression, open wounds, indwelling catheters, anticipated prolonged length of stay, total dependence on HCWs for activities of daily living)

1.4.2.1 Single-patient rooms

- Are always indicated for patients placed on Airborne Precautions and in a Protective Environment and
- Are preferred for patients who require Contact or Droplet Precautions (if available)
- During a suspected or proven outbreak caused by a pathogen whose reservoir is the gastrointestinal tract, use of single patient rooms with private bathrooms limits opportunities for transmission, especially when the colonized or infected patient has poor personal hygiene habits, fecal incontinence, or cannot be expected to assist in maintaining procedures that prevent transmission of microorganisms (e.g., infants, children, and patients with altered mental status or developmental delay).
    - In the absence of continued transmission, it is not necessary to provide a private bathroom for patients colonized or infected with enteric pathogens as long as personal hygiene practices and Standard Precautions, especially hand hygiene and appropriate environmental cleaning, are maintained.
    - Assignment of a dedicated commode to a patient, and cleaning and disinfecting fixtures and equipment that may have fecal contamination (e.g.,

bathrooms, commodes, scales used for weighing diapers) and the adjacent surfaces with appropriate agents may be especially important when a single-patient room cannot be used since environmental contamination with intestinal tract pathogens is likely from both continent and incontinent patients.

1.4.2.2 Cohorting

- Is the practice of grouping together patients who are colonized or infected with the same organism to confine their care to one area and prevent contact with other patients.
- Cohorts are created based on clinical diagnosis, microbiologic confirmation when available, epidemiology, and mode of transmission of the infectious agent.
- It is generally preferred not to place severely immunosuppressed patients in rooms with other patients.
- Assigning or cohorting healthcare personnel to care only for patients infected or colonized with a single target pathogen limits further transmission of the target pathogen to uninfected patients but is difficult to achieve in the face of current staffing shortages in hospital. However, when continued transmission is occurring after implementing routine infection control measures and creating patient cohorts, cohorting of healthcare personnel may be beneficial.

Patients suspected of having such an infection can wear a surgical mask for source containment, if tolerated, and should be placed in an examination room, preferably an AIIR, as soon as possible.

If this is not possible, having the patient wear a mask and segregate him/herself from other patients in the waiting area will reduce opportunities to expose others. Since the person(s) accompanying the patient also may be infectious, application of the same infection control precautions may need to be extended to these persons if they are symptomatic.

Since the person(s) accompanying the patient also may be infectious, application of the same infection control precautions may need to be extended to these persons if they are symptomatic. For example, family members accompanying children admitted with suspected M. tuberculosis have been found to have unsuspected pulmonary tuberculosis with cavitary lesions, even when asymptomatic

Patients with underlying conditions that increase their susceptibility to infection (e.g., those who are immunocompromised, or have cystic fibrosis) require special efforts to

protect them from exposures to infected patients in common waiting areas. By informing the receptionist of their infection risk upon arrival, appropriate steps may be taken to further protect them from infection.

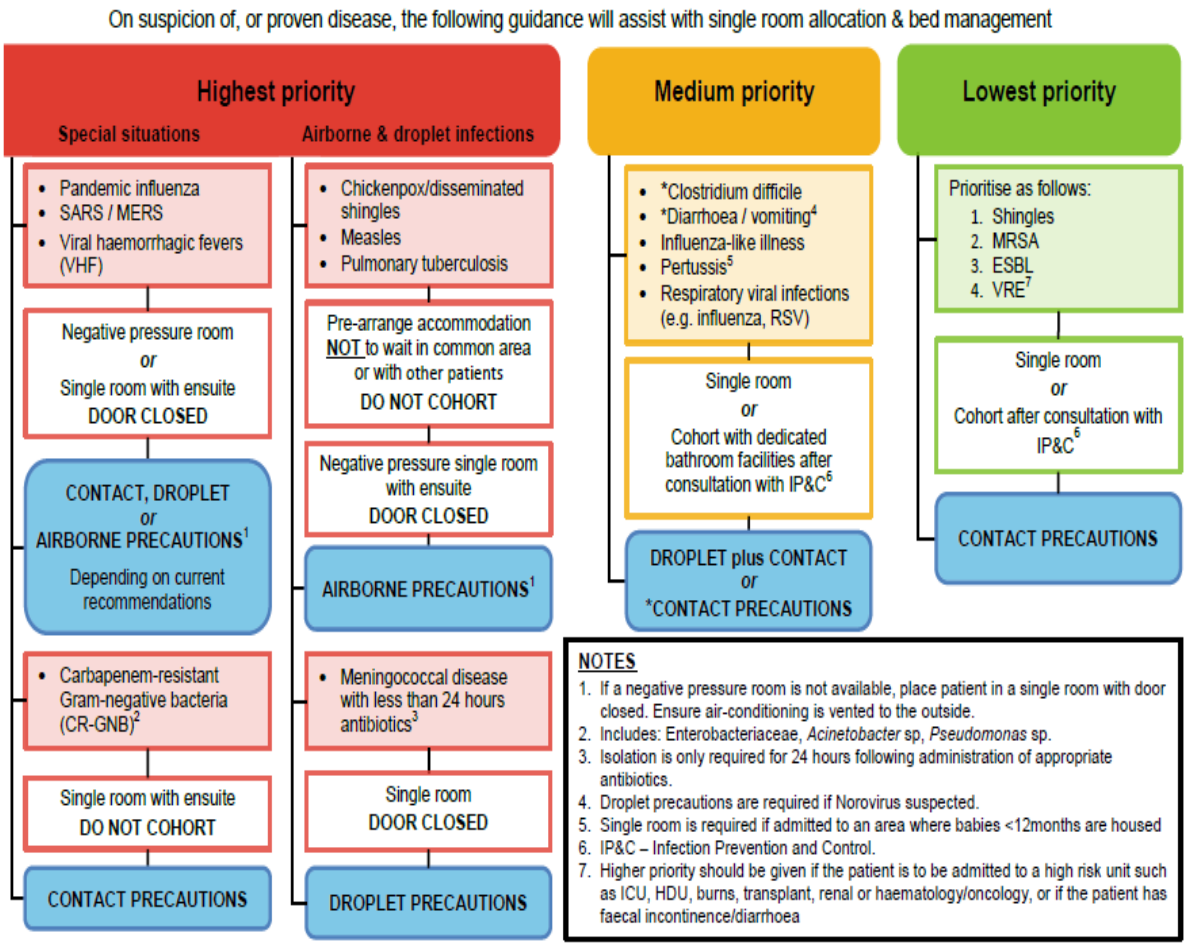


Figure 15: Diseases, level of priority and required precautions

1.4.3 Communicable disease screening in ER Triage area:

Protocol for screening and isolation protocol for a single patient entering the Emergency Department (ER) or outpatient clinic with illness concerning for a highly communicable disease of public health concern. The protocol identifies those presenting with fever and rash, fever and respiratory symptoms, or symptoms and travel history suggestive of a communicable disease of public health concern (e.g., measles, novel severe coronaviruses such as MERS and SARS, novel strains of influenza with pandemic potential such as H7N9, smallpox, viral hemorrhagic fever, or plague).

The purpose of surveillance for communicable disease of public health concern at triage is to;

- Enhance early recognition of a patient who may have a communicable disease of public health concern upon arrival at the hospital ER or clinic, and

- Prompt the rapid institution of infection control measures to minimize potential transmission to staff, patients and visitors.

1.4.3.1 Four steps in the protocol;

1. Initial patient identification
2. Initial infection control measures
3. Notification and patient evaluation
4. Identification and management of exposed persons in ER/clinics.

To get updated information on specific outbreaks may contact HPA, Maldives or get information from CDC website (www.cdc.gov).

1.4.3.1.1 Initial patient identificaiton

Effective screening for potentially infectious patients, especially those who may be at risk for airborne, droplet, or contact transmission of infectious agents to others, is critical to ensure prompt identification and isolation as soon as possible after patient arrival.

The following measures are recommended to be routinely in place to help decrease transmission of infectious agents to staff, visitors and other patients:

Place signage, surgical masks and alcohol-based hand hygiene products as close as possible to all entranceways to ER/clinics so that they are available to all patients and visitors upon entry to the ER/clinic.

Boxes of tissues, waste baskets, and alcohol-based hand hygiene products should be placed throughout the ER/clinic waiting areas and examination rooms.

- Signage should contain simple, clear messages in large font stating that all patients with fever and/or respiratory symptoms or rash should wear a mask and perform hand hygiene with the alcohol-based hand hygiene products available at the entranceway. They should then proceed directly to the registration desk and/or triage nurse and alert staff to their symptoms.

- Signage should also indicate, using simple, clear messages in large font, that patients with recent travel outside the Maldives or travel to an area with a community outbreak of a communicable disease and present with fever, cough, or rash should alert staff immediately.

- Signage should show patients how to wear masks, proper cough etiquettes and how to use the alcohol-based hand hygiene products correctly.

- Other options: Show a streaming video on TV/media equipment in ER/clinic waiting areas that demonstrate proper methods for hand hygiene, use of surgical mask, and how patients should alert ER/clinic staff if they have fever and respiratory or rash symptoms.

Triage/screening staff should have a reminder system that will prompt them to perform communicable disease screening for respiratory or rash communicable diseases of potential public health concern on ALL patients who present or self-identify with a fever.

Screening should include asking all patients with fever about the presence of respiratory symptoms (cough or shortness of breath) and rash symptoms, as well as epidemiologic risk factors, such as recent travel or contact. Suggested screening questions are provided below. These recommendations are general and may need to be modified based on current events.

1.4.3.1.1.1 Question to be asked from all patients at initial screening (See attached flow diagram):

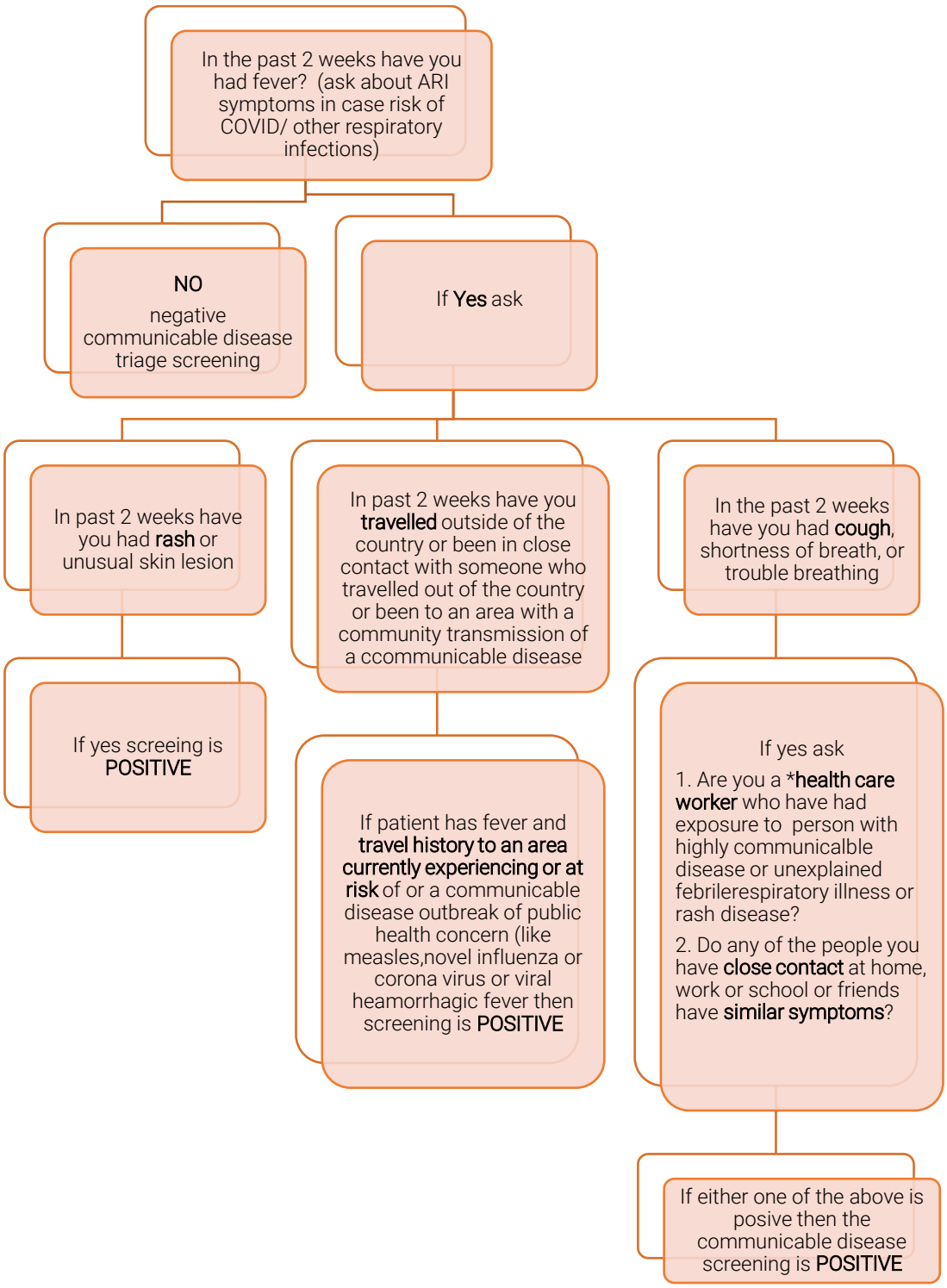


Figure 15: Initial Screening at Triage

ARI= Acute Respiratory Infections

1.4.3.1.1.2 Summary of positive screening criteria:

- Fever and rash
- Fever and travel to an outbreak area
- Fever and respiratory symptoms with epidemiologic risk factors:
  - Healthcare related exposures
  - Part of a cluster of two or more persons with similar symptoms
- Respiratory symptoms with or without fever (travel from COVID-19 risk areas)

Patients who meet criteria above for a positive communicable disease triage screen should be prioritized for individual placement in an Airborne Infection Isolation Room (AIIR) or private room with door closed pending clinical evaluation.

Both patient and triage staff should perform hand hygiene. Time that patient arrived in the ER/clinic and time that patient was placed in isolation should be documented in the patient chart.

Hospitals may consider any of the following methods to help prompt staff to routinely use this communicable disease triage screening tool:

- A poster or desk chart that is placed in a location that is easily seen by the triage or registration staff.
- Including the communicable disease triage screening questions on all paper-based registration or triage forms, or a sticker that is placed on all forms for patients who report fever.
- In hospitals with computerized ER or clinic registration systems, adding a computer prompt that asks all patients about fever symptoms. For patients who report fever, the communicable disease triage screening tool will automatically pop-up on the computer screen.

1.4.3.1.2 Infection control measures:

a. The patient should be given a surgical mask immediately, if not already wearing one. The patient should be shown how to wear the mask and instructed to wear this mask at all times. The patient should keep the mask on at all times while in the isolation room (unless it is an AIIR) in order to minimize contamination of the room. The patient should be instructed on how to perform hand hygiene after coughing or other contact with respiratory secretions, bodily fluids, or their rash.

   [NOTE: The following considerations should be made for patients who may have difficulty breathing with a mask on, such as allowing a looser fit of the surgical

mask (e.g., surgical masks with ties) or providing them with their own supply of tissues. Strict hand hygiene should be reinforced for these individuals.]

Surgical masks may not be feasible for young children with a positive communicable disease triage screen to wear. In these situations, the child and accompanying adults should be seen as quickly as possible by the triage staff and placed in an appropriate isolation room or an area in the waiting room in a way that allows at least 3 feet separation from other persons. The parents should be instructed to wash their hands and their children's hands with soap and water, or alcohol-based hand hygiene products frequently, especially after the child coughs, sneezes or has other direct contact with oral secretions or other bodily fluids.

b. Patients should be separated from other patients, visitors, and non-essential staff pending medical evaluation. Depending on the space resources available in the hospital ER or clinic, and the transmission of the suspected disease, isolation options in decreasing order of preference include (if negative pressure room/ AIIR is not available)
   I. Pre-identified enclosed private room(s): an examination room with a door that is kept closed to the hallway. (Self-closing doors are preferable). (Note: These rooms should be tested by Facility Engineering beforehand to ensure that the rooms are exhausted appropriately (i.e., not positive pressure and do not share airflow with other rooms.)
   II. Pre-identified examination area, even if not individual rooms, to cohort patients with similar symptoms. Patients should be separated from each others by at least three feet (more if possible).
   III. If an AIIR, private room or pre-identified examination area is not available, the patient should be asked to stay in an area of the waiting room that allows at least three feet of separation between the patient and others in the waiting area. The patients should be instructed to keep the surgical mask on at all times while in the waiting area and discouraged from walking around the ER/clinic.

c. Setup of the AIIR or isolation room should facilitate the use of appropriate PPE and other infection control measures (eg, hand hygiene) by healthcare workers. Appropriate infection control signage based upon the route of transmission for the suspected disease of concern and/or Hospital Infection Control policies should be posted outside the patient's isolation room signifying the need for precautions until a medical evaluation, to determine that the patient does not have a contagious disease requiring isolation.

   At a minimum, standard, droplet and contact precautions should be used for all patients with a positive communicable disease triage screen. Airborne or extended

contact precautions should be used depending on the suspected disease of concern.

The management of PPE disposal should be consistent with hospital's infection control policies.

In the absence of an anteroom, gowns and gloves should be removed inside the patient's room and discarded in a waste receptacle just inside the room by the door. Hand hygiene products should be placed right outside the door so that staff can use immediately after removal of respiratory protection and other PPE. Doing this prevents staff from wearing the same gloves and gowns after leaving the isolation room and contaminating other areas of the ER/clinic.

1.4.3.1.3 Notification and Evaluation:

Once triage staff has identified a patient with a positive communicable disease triage screen, prompt notification of appropriate staff should be instituted to ensure rapid evaluation of the patient for a potentially communicable disease of public health concern. It is crucial to identify key staff ahead of time to ensure notification occurs rapidly.

1.4.3.1.4 Identification and Management of Exposed Persons in the ER/clinic:

As soon as it is determined that a patient has a suspected or confirmed communicable disease of public health concern, it will be essential to identify all contacts in the ER or clinic (including other patients and visitors in the waiting area during the time the patient was there). The need for and extent of contact tracing will depend on both the disease and the patient's condition and symptoms. Clinical laboratory workers who had contact with patient specimens may also need to be identified. This should be done in coordination with the HPA.

In Maldives the most common communicable disease of public health concern with greater likelihood of spreading include; COVID-19 disease, Chicken pox, TB and imported Measles cases.

- Any patient presenting with fever with maculopapular rash needs to be reported to HPA (by phone and fill the fever with rash reporting form). A blood sample for measles and Rubella IgM and a throat swab for viral PCR (measles/rubella) need to be taken and send to IGMH the national reference laboratory.

- Patients presenting with Acute Respiratory tract infection/Sever Acute Respiratory Tract Infection need to be reported to HPA by filling the appropriate forms and send PCR for Influenza and consider for testing for other viruses such as SARS-CoV2 as applicable.
- Other communicable diseases can be reported in the common communicable disease reporting form of HPA (Appendix 7)

1.4.3.2 Some important communicable diseases of public health concern

Table 14: Communicable diseases of public health concerns, etiological agents and suggested precautions

Examples of Communicable Diseases of Public Health Concern: Diseases with greater likelihood to spread to others, and with higher likelihood of more severe morbidity or mortality		
	Potential Pathogens: The organisms listed in this column are not intended to represent the complete, or even most likely, diagnoses, but rather possible etiologic agents that require additional precautions beyond Standard Precautions until they can be ruled out.	Empiric Precautions: Infection control professionals should modify or adapt this table according to local conditions.
Rash or Exanthems, generalized, etiology unknown		
Petechial/ecchymotic with fever If positive history of travel to an area with an ongoing outbreak of VHF in the 10 days before onset of fever	Neisseria meningitides Ebola, Lassa, Marburg viruses	Droplet for first 24 hours of antimicrobial therapy Droplet Precautions plus Contact Precautions, with face/eye protection, emphasizing safety sharps and barrier precautions when blood exposure likely. Use N95 or higher respiratory protection when aerosol-generating procedure performed

Vesicular	Varicella, smallpox	Airborne infection isolation plus Contact
Maculopapular with cough, coryza and fever	Rubeola (measles) virus	Airborne infection isolation
Respiratory Infections		
Cough/fever/upper lobe pulmonary infiltrate in HIV-negative patient or a patient at low risk for HIV	M. tuberculosis, Respiratory viruses	Airborne Precautions plus Contact precautions; add eye protection if history of SARS exposure or travel
Cough/fever/ pulmonary infiltrate in any lung location in an HIV-infected patient or a patient at high risk for HIV infection	M. tuberculosis, Respiratory viruses	Airborne Precautions plus Contact Precautions Use eye/face protection if aerosol-generating procedure performed or contact with respiratory secretions anticipated. If tuberculosis is unlikely and there are no AIIRs and/or respirators available, use Droplet Precautions instead of Airborne Precautions Tuberculosis more likely in HIV-infected individual than in HIV negative individual

1.4.4 Transport of Patients

Several principles are used to guide transport of patients requiring Transmission-Based Precautions. In the inpatient and residential settings these include

- Limiting transport of such patients to essential purposes, such as diagnostic and therapeutic procedures that cannot be performed in the patient's room;
- When transport is necessary, using appropriate barriers on the patient (e.g., mask, gown, wrapping in sheets or use of impervious dressings to cover the affected area(s) when infectious skin lesions or drainage are present, consistent with the route and risk of transmission)
- Notifying healthcare personnel in the receiving area of the impending arrival of the patient and of the precautions necessary to prevent transmission; and
- For patients being transported outside the facility, informing the receiving facility and the medi-van or emergency vehicle personnel in advance about the type of Transmission-Based Precautions being used.
- For tuberculosis, additional precautions may be needed in a small shared air space such as in an ambulance. When transporting a patient on droplet or airborne precaution it is recommended to have a vehicle with separate driver's compartment. When travelling the windows of the vehicle should be kept open (to decrease transmission risk to paramedics/ patients assistants) and the vehicle should take the shorted route. Anyone assisting or travelling in the patient compartment of the vehicle should be wearing appropriate PPE.

Resources:

National Health and Medical Research Council (2019). Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019

Public Health Ontaria; Provincial Infectious Diseases Advisory Committee (PIDAC), 2013. Best Practices for Prevention of Transmission of Acute Respiratory Infection. Link https://www.publichealthontario.ca/-/media/documents/B/2012/bp-prevention-transmission-ari.pdf

Centers for Disease Control and Prevention, National Center for Immunization and Respiratory Diseases (NCIRD), 2009. Respiratory Hygiene/Cough Etiquette in Healthcare Settings. Link: https://www.cdc.gov/flu/professionals/infectioncontrol/resphygiene.htm

NYC DOHMH, 2014. Guidance Document for Development of Protocols for Management of Patients Presenting to Hospital Emergency Departments and Clinics with Potentially Communicable Diseases of Public Health Concern. Link: https://www1.nyc.gov/assets/doh/downloads/pdf/em/screening-isolation-acute-care.pdf

Siegel JD, Rhinehart E, Jackson M, Chiarello L; Health Care Infection Control Practices Advisory Committee. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Health Care Settings. Am J Infect Control. 2007 Dec;35(10 Suppl 2):S65-164. doi: 10.1016/j.ajic.2007.10.007. PMID: 18068815; PMCID: PMC7119119.

National Health and Medical Research Council (2019). Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019

Ministry of Health and Family Welfare, India: Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

1.5 REPROCESSING OF PATIENT CARE EQUIPMENT

Shared patient equipment must undergo routine cleaning and disinfection or sterilization as required as part of the standard or transmission-based precautions. Because sterilization of all patient-care items is not necessary, health-care policies must identify, primarily on the basis of the items' intended use, whether cleaning, disinfection, or sterilization is indicated.

1.5.1 The goals of safe reprocessing of medical devices

- Protecting patients, visitors, caretakers and staff from infection risks via contaminated medical devices and equipment;
- Eradicating or significantly reducing the number of microorganisms on medical devices and equipment;
- Minimizing damage to medical devices from foreign material (e.g. blood, body fluids, saline and medications) or inappropriate handling;
- Ensure the health care facility meets the Ministry of Health requirements and fulfils its responsibility to provide a safe environment for patients, visitors and staff.

1.5.2 Definitions of key terms

Table 15: Definitions of key terms

Key term	Definition
Cleaning	The step required to physically remove contamination by foreign material (e.g. dust, soil) to prepare a medical device for disinfection or sterilization. Pre cleaning occurs prior to clean if medical devices are grossly contaminated. Thorough cleaning is essential before high-level disinfection and sterilization because inorganic and organic materials that remain on the surfaces of instruments interfere with the effectiveness of these processes
Contamination	The soiling of inanimate objects or living material with harmful, potential infectious or unwanted matter.
Decontamination	Removes soil and pathogenic microorganisms from objects so they are safe to handle, subject to further processing, use or discard
Disinfectant	A chemical agent that is capable of killing most pathogenic microorganisms under defined conditions, but not necessarily bacterial spores. It is a substance that is recommended for application to inanimate surfaces to kill a range of microorganisms. The equivalent agent, which kills microorganisms present on skin and mucous membrane, is called an antiseptic.
Disinfection	A process to reduce the number of viable microorganisms to a less harmful level. This process may not inactivate bacterial spores, prions and some viruses. In health-care settings, objects usually are disinfected by liquid chemicals or wet pasteurization.
Sterilization	A validated process used to render an object free from viable microorganisms, including viruses and bacterial spores, but not prions. Steam under pressure, dry heat, EtO gas, hydrogen peroxide gas plasma, and liquid chemicals are the principal sterilizing agents used in health-care facilities.

Medical device	Any instrument, apparatus, appliance, material or other article, where used alone or in combination, intended by the manufacturer to be used in humans for the purpose of the diagnosis, prevention, monitoring, treatment or alleviation of, or compensation for an injury or handicap.
Pre-cleaning	This is cleaning at the point of use; rinsing gross organic material (e.g. blood clot, vomitus, stool) off and placing in a container
Reprocessing	All steps that is necessary to make a contaminated reusable medical device ready for its intended use. These steps may include cleaning, functional testing, packaging, labelling, disinfection and sterilization
	Medical devices that enter sterile tissues, including the vascular system (e.g. surgical instruments, biopsy forceps, dental pieces and equipment, etc.). Critical medical devices present a high risk of infection if the device is contaminated with any microorganisms, including bacterial spores.
	Any agent that is biological in nature, capable of self-replication, and has the capacity to produce harmful effects upon biological organisms. Biohazards agents include, but are not limited to; bacteria; fungi; viruses; rickettsia; chlamydia; parasites; recombinant products; allergens; cultured human and animal cells and the potentially bio hazardous agents these cells may contain; clinical specimens; tissue from experimental animals; toxins of biological origin; other bio hazardous agents like prions
Pressurized Steam Sterilization/ Autoclave	A simple yet very effective decontamination method. Sterilization is achieved by exposing products to saturated steam at high temperatures (121°C to 134°C). Product(s) are placed in a device called the autoclave and heated through pressurized steam to kill all microorganisms including spores.
Biological Indicator (BI)	A test system containing viable bacterial spores providing a defined resistance to a specified sterilization process.
Chemical Indicator (CI)	A system that reveals a change in one or more predefined process variables based on a chemical or physical change resulting from exposure to the process

1.5.3 Stakeholders and their responsibilities

Table 16: Stakeholders and their responsibilities

Stakeholders	Responsibility and Accountability
Infection Prevention and Control Unit/ QID	Consultant to CSSD on sterilization and disinfection issues Works closely with CSSD on recall events Conducts regular audits at CSSD to ensure compliance with practice standards
IPC committee	Reviews and approves the policies and guidelines on sterilization and disinfection of instruments used in the healthcare facility. Receives report on recall events
Central Supply Sterile Department (CSSD)	Provide disinfection and sterilization for instruments & medical devices hospital wide Ensure healthy workforce in compliance to institution recommendations on staff immunization and checks Ensures appropriate training for staff to do their work safely and well Reports recall events to IPC and Quality/Risk Management
Clinical areas e.g. operating room, outpatient clinics, intensive care units, endoscopy centres	Safe handling of used instruments Keep used instruments moist with enzymatic cleanser Safe transportation to CSSD/TSSU for re-processing Proper storage of sterile items in clinical areas (if any)
Quality / Risk management	Assists in investigations of recall events

1.5.4 Best practices in reprocessing medical equipment/devices must include the following:

1. Adequate review by all parties whenever new equipment/devices are being considered for purchase (e.g. Central Sterile Supplies Department [CSSD], Infection Prevention and Control, engineer, etc.);
2. A centralized area for reprocessing (CSSD) or an area that complies with the requirements for reprocessing;
3. Written policies and procedures for reprocessing each type of medical equipment/device including single use items;
4. Training of all staff who perform reprocessing at initiation of employment and at least yearly thereafter through yearly competency testing (written and observation);
5. Verification of cleanliness, decontamination or sterility and function of the reprocessed equipment/ device;
6. Continual monitoring of reprocessing procedures to ensure their quality;
7. A corporate strategy for dealing with single-use and single-patient use medical equipment/devices;
8. Reporting and investigation of medical incidents (e.g. a root cause analysis may be done to identify areas for improvement);
9. Management and reporting of safety-related accidents;
10. Complete and proper documentation of all reprocessed items for traceability, recall of improperly reprocessed devices and legal purposes.
11. Procedures to be followed in emergency situations (e.g. utilities shutdowns, compromised packaging, biological indicators (BI) testing failures).

1.5.5 Recommendations for facility design: Environmental requirements for reprocessing areas

The CSSD size is appropriately designed with regard to anticipated volume. The central processing area(s) ideally should be divided into at least three areas: cleaning, packaging, and sterilization and storage. Physical barriers should separate the cleaning area from the other sections to contain contamination on used items.

Occupational exposure limits such as ceiling exposure value (CEV) for chemical agents (e.g. glutaraldehyde, ethylene oxide) are to be complied with in accordance to nationally if available or internationally accepted environmental law such those from Occupational Safety and Health Administration (OSHA) recommendations from United States of America.

(https://www.osha.gov/etools/hospitals/central-supply/hazardous-chemicals)

For example:

- Etyhylene oxide (Eto): The employer must ensure that no employee is exposed to an airborne concentration of EtO in excess of
  - one (1) part EtO per million parts of air (1 ppm) as an (8)-hour time-weighted average (8-hour TWA)
  - 5 parts of EtO per million parts of air (5 ppm) as averaged over a sampling period of fifteen (15) minutes.

The health care setting must have air changes; temperature and humidity appropriate to the process/product being used. In health care settings where there are dedicated central reprocessing areas, negative pressure airflow must be maintained in cleaning areas and positive pressure airflow must be maintained in clean areas and be monitored regularly. If monitoring is done centrally externally, the CSSD should be alerted when relative humidity or temperature are out of specified range so that immediate necessary actions can be taken.

1 The CSSD is designed so that it is physically separated from all other work areas and does not interfere with routine clinical practice. The design should to allow segregation of “dirty” and “clean” activities. The cleaning work area must be physically separated from clean areas by walls or partitions.
2 The CSSD is designed to facilitate a unidirectional flow from the “dirty” area to the “clean” area.
3 The CSSD will have a dedicated staff area in proximity for changing into work wear, which includes a shower, toilet facilities and lockers
4 Access to the dirty and “clean” areas, such as the Inspection, Assembly and Packing (IAP) room, should be through separate, dedicated gowning rooms provided with hand hygiene facilities.
5 The dirty area, IAP, sterilizing and sterilizer unloading area should be free from windows that can be opened, ledges and difficult-to-clean areas.
6 The dirty area, clean area room, IAP area and sterilizing area should be designed to minimize the ambient sound levels within the rooms. This will require particular attention to the installation of equipment, building finishes and maintenance of machines.
7 Reprocessing performed outside the CSSD must be kept to a minimum and must be approved by the Infection Prevention and Control Committee or those accountable for safe reprocessing practices and must conform to the requirements for reprocessing space.
8 Wherever chemical disinfection/sterilisation is performed, air quality must be monitored when using products that produce toxic vapours and mists (e.g. ethylene oxide gas (Eto).
9 There must be a regular schedule for environmental cleaning in the CSSD that includes written procedures and clearly defined responsibilities.
10 Environmental controls
   10.4 Ventilation: A minimum of 10 to 20 air changes per hour for the dirty area and 12 to 20 air changes per hour for the clean area has been recommended.

The dirty area or wash rooms should be negative to the pressure in Inspection, Assembly and packing (IAP) area.

10.5 Humidity: 40-60%

10.6 Temperature

10.7 Decontamination area 18-20 0C

10.8 Clean areas 18-23 0C

10.9 Sterile storage 15-25 0C

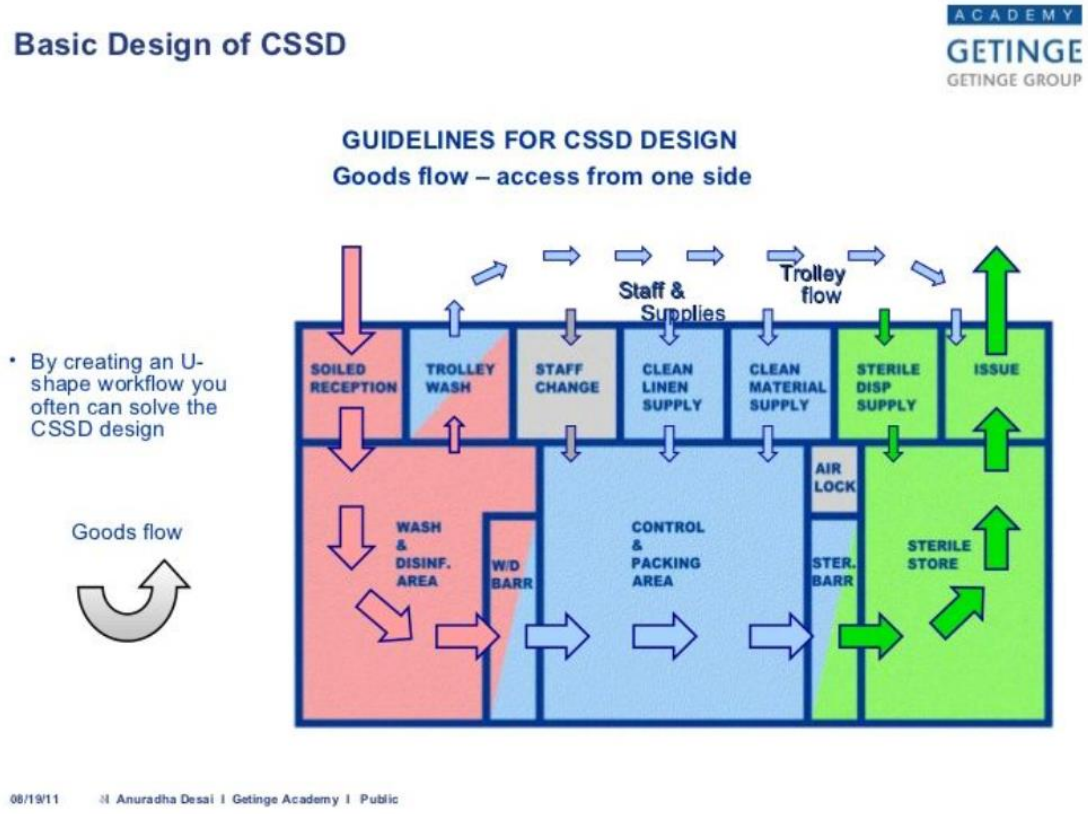


Figure 17: Basic design for CSSD

1.5.6 Recommendations for policies and procedures

Policies and procedures must be established to ensure that the disinfection and sterilization processes follow the principles of infection prevention They must be readily accessible to staff doing the reprocessing. Review of reprocessing policies and procedures must take place at least annually.

1. The health care facility will, as a minimum, have policies and procedures for all aspects of reprocessing that are based on current recognized standards/recommendations and that are reviewed at least annually.
2. All policies and procedures for reprocessing medical equipment/devices require review and approval by the Infection Prevention and Control Committee.
3. Procedures for disinfection and sterilization must include statements and information regarding the type, concentration and testing of chemical products; duration and temperature of exposure; and physical and chemical properties that might have an impact on the efficacy of the process. These procedures must be readily accessible to staff performing the function.
4. The reprocessing method and products required for medical equipment/devices will depend on the intended use of the equipment/device and the potential risk of infection involved in the use of the equipment/device.
5. A procedure should be established for the recall of improperly reprocessed medical equipment/devices.
6. The recall procedure should include assessment of patient risk and a procedure for subsequent notification of physicians, patients, other facilities and/or regulatory bodies if indicated. Thus a traceability process for critical and semi-critical equipment, instruments and devices that is capable of identifying the patient, the procedure, the reusable equipment, instruments and devices that were used for the procedure is recommended.
7. A process for receiving and disseminating medical device alerts and recalls originating from manufacturers or government agencies should be described.
8. Products used for any/all stages in reprocessing (i.e., cleaning, disinfection, sterilization) must be approved by the committee responsible for product selection, by an individual with reprocessing expertise and by an individual with infection prevention and control expertise.
9. Products used for any/all stages in reprocessing must be appropriate to the level of reprocessing that is required for the use of the medical equipment/device.
10. The process and products used for cleaning, disinfection and/or sterilization of medical equipment/devices must be compatible with the equipment/devices.
11. All medical equipment/devices that will be purchased and will be reprocessed must have written device-specific manufacturer's cleaning, disinfection and sterilization instruction. If disassembly or reassembly is required, detailed instructions with pictures are highly recommended. Staff training must be provided on these processes before the medical equipment/device is placed into circulation.

1.5.7 Recommendations for occupational health and safety for reprocessing

An Occupational Health and Safety review is recommended for all protocols for reprocessing medical equipment/devices to verify that staff safety measures are followed

- Occupational Health and Safety for the healthcare setting will review all protocols for reprocessing medical equipment/devices to verify that worker safety measures and procedures to eliminate or minimize the risk of exposure are followed.
- There is a policy that prohibits eating/drinking, storage of food, smoking, application of cosmetics or/and handling contact lenses in the reprocessing area.
- Appropriate personal protective equipment (PPE) should be worn for all reprocessing activities. (Table 17).

Table 17: PPE in different zones of CSSD

CSSD zone	Recommended PPE
Decontamination	Hair covering Water resistance gown Heavy duty disposable gloves Water resistant mask Face shield or goggles
Preparation and packing	Scrubs Hair covering Mask
Sterilization	Scrubs Hair covering Mask
Sterile storage	Scrubs Hair covering Mask
Dispatching	Scrubs Hair covering
Additional PPE should be worn for chemical spills and handling of hot objects	

- All staff working in reprocessing shall be offered Hepatitis B immunization unless they have documented immunity to Hepatitis B.
- Measures and procedures shall be written to prevent and manage injuries from sharp objects.
- Measures and procedures shall be in place for immediate response to worker exposure to blood and body fluids.
- Health care personnel should also be offered vaccines for vaccine preventable diseases as per institutional policy (e.g., COVID-19 vaccine, mumps-measles-rubella, varicella, influenza, tetanus-diphtheria or tetanus-diphtheria-acellular pertussis).

1.5.8 Recommendations for handling and transportation of used medical equipment / devices

- Gross soil should be removed immediately after use by an assigned trained person.
- Disposable components shall be disposed prior to transportation. Disposable sharps shall be disposed of in an appropriate puncture-resistant sharps container at point of use, prior to transportation. Used items should be kept moist.
- Used items must be handled in a manner that reduces the risk of exposure and/or injury to personnel and clients/patients/residents, or contamination of environmental surfaces. These may be identified by colour code to indicate that these are dirty items.
- Used items should not be transported through high traffic (public) areas, designated areas for storage of clean or sterile supplies, or client/patient/resident care areas.
- Sterile/ clean and used items shall not be transported together.
- Transport carts shall be cleaned and dried between uses. There should be a physical barrier between the bottom shelf and the floor.

1.5.9 Recommendations for cleaning and verification of reusable medical equipment/devices

Policies and procedures for cleaning medical equipment/devices shall be based on the manufacturer's instructions and must be developed in consultation with Infection Prevention and Control, Occupational Health and Safety, Biomedical Engineering and Environmental Services. Full PPE shall be worn for handling and cleaning contaminated equipment/devices.

- Reusable medical equipment/devices must be thoroughly cleaned prior to before disinfection or sterilization.
- Factors that affect the ability to effectively clean medical equipment/devices shall be considered prior to cleaning.
- Personnel must use appropriate PPE whenever cleaning reusable medical equipment/ devices.
- The process for cleaning shall include written protocols for disassembly, sorting, soaking, manual or mechanical cleaning, rinsing and drying.
- There shall be a process to ensure that item which have been cleaned can be reliably differentiated from equipment/devices which have not been cleaned (e.g., colour coding).
- Products shall be approved by the committee/ team responsible for product selection; by an individual with reprocessing expertise and by infection prevention expertise.
- Products that are used in cleaning process must be compatible with equipment/ device to be reprocessed and used according to manufacturer's instructions.
- Audits of the cleaning process shall be done on a regular basis.

1.5.10 Recommendations for instrumentation inspection, Preparation & Packaging

After reusable medical equipment/devices have been cleaned they are then inspected, assembled into sets and trays, and packaged for subsequent terminal sterilization. Inspection is required to confirm cleanliness and function. Only packaging materials intended for this use are to be used.

- Reusable medical equipment/devices must be thoroughly inspected, prepared before packaging and sterilized ready to use and ensure patient safety.
- Effective packaging materials for sterilization should, as a minimum, allow adequate air removal, sterilizing agent penetration, provide an adequate barrier to microorganisms, resist tearing or puncture, provide complete seal and integrity, free of toxic ingredients, non-linting and cost-effective.
- Rigid container systems should be cleaned after each use. All components including filters should be disassembled for proper cleaning following manufacturer's instruction for us [IFU].

1.5.11 Spaulding classification of medical/surgical devices

Medical/surgical devices are classified in to three categories; critical, semi-critical and non-critical. This classification is useful for understanding the method of decontamination required to ensure safety according to the degree of risk for infection involved.

Table 18: Spaulding's classification of Medical Equipment/Devices and Required Processing/Reprocessing

Risk category	Definition	Example of device	Recommended level of decontamination
High (critical)	Instruments that are involved with a break in skin or mucous membrane or entering a sterile body cavity	Biopsy forceps, surgical instruments and devices, implants, dental instruments and dressings	Sterilization (using heat or chemical sterilants)
Intermediate (semi-critical)	Instruments that come into contact with mucous membranes or body fluids	Urine bottles, respiratory and anesthesia equipment, non-invasive flexible endoscopes, and vaginal specula	High-level disinfection (HLD)
Low (non-critical)	Instruments that come into contact with intact skin	Stethoscopes, blood pressure cuffs, bedpans, bedside tables, walls, floors, basins, and toilets	Cleaning/Low-level disinfection (LLD)

1.5.12 Disinfection of reusable medical devices

Disinfection is a process to reduce the number of viable microorganisms to a less harmful level. This process may not inactivate bacterial spores, prions and some viruses. In health-care settings, objects usually are disinfected by liquid chemicals or wet pasteurization.

There are three levels/categories of disinfection (low, intermediate and high level) and various types of disinfectants available within each category.

Table 19: Levels of disinfection provided by various disinfectants

Level of disinfection	Disinfectant
High-level disinfection (HLD)	Pressure Cookers ** 2% glutaraldehyde, 6% hydrogen peroxide 0.2% peracetic acid 7% accelerated hydrogen peroxide 0.55% ortho-phthalaldehyde (OPA).
Intermediate-level disinfection (ILD)	Alcohol 70% Iodophor disinfectants *Hypochlorite/Chlorine compounds (only for environmental decontamination)
Low-level disinfection (LLD)	Phenolic (e.g. Dettol) Quaternary Ammonium Compounds

* Hypochlorite/chlorine compounds result in ILD, but should only be used for environmental decontamination and not for decontamination of reusable medical devices

** Pressure cookers only result in sterilization if temperature, pressure, and time parameters are met.

1.5.12.1 Important points to consider when selecting a disinfectant method for reprocessing medical equipment/devices in the health care setting

a. Efficacy for the intended use;
b. Non-critical medical equipment/devices are to be cleaned then disinfected using a low-level disinfectant.
c. Semi-critical medical equipment/devices require at a minimum, high-level disinfection but sterilization is preferred.
d. Compatibility with the equipment/device and surfaces to be disinfected;
    i. The chemical disinfectant used for disinfecting medical equipment/devices must be compatible with both the equipment/device manufacturer's

instructions for disinfection and the cleaning products involved in the reprocessing of the equipment/device

e. The intended end use of the equipment/devices to be disinfected;
f. The method for monitoring the product concentration;
g. Recommendations for rinsing following disinfection (e.g., water quality, volume, time);
h. Safety for use, with minimal toxic and irritating effects to staff; and
i. Environmental safety and biodegradability.
j. The process of high-level disinfection requires monitoring and auditing. If a chemical product is used, the concentration of the active ingredient(s) must be verified and a logbook of daily concentration test results is to be maintained.
k. The manufacturer's recommendations for chemical disinfectants must be followed pertaining to Disinfectant manufacturers must supply recommended usage for the disinfectant to ensure that it is compatible with the medical equipment/devices on which it will be used).
    i. Usage - disinfectant manufacturers must supply recommended usage for the disinfectant to ensure that it is compatible with the medical equipment/devices on which it will be used;
    ii. Contact time (NOTE: where the manufacturer recommends a shorter contact time with a particular product than is required to achieve the desired level of disinfection/sterilization, an infection prevention and control professional must be consulted for advice);
    iii. Use life;
    iv. Proper disposal;
    v. Storage;
    vi. Appropriate dilution; and
    vii. Required PPE.
    viii. Manufacturer's instructions for installation, operation and on-going maintenance of equipments.

A preventive maintenance program for equipment must be implemented and documented. For guidance purposes; every 6 months limited preventive technical control of all critical machines and extensive technical control followed by validation annually is recommended.

1.5.13 Sterilization of reusable medical devices

Sterilization is a validated process used to render an object free from viable microorganisms, including viruses and bacterial spores, but not prions. It is recommended to be used on critical medical devices and, whenever possible, semi-critical medical devices. For equipment that cannot withstand heat sterilization chemical sterilants can be used. Steam Sterilization (Autoclaving) is the preferred method of decontamination for semi-critical medical equipment

The sterilization method chosen must be compatible with the item to be sterilized to avoid damage and must be able to achieve 6 log reduction demonstrating sterility assurance. The sterilizer manufacturer's instructions should be followed for correct loading and operation of individual sterilizers. Chemical and biological methods of monitoring are to be designed for the purpose and stored and used in accordance with the indicator manufacturer's instructions for use. Sterilization is a process not an event.

Routine monitoring (physical, biological and chemical monitoring) is done to verify the function of sterilizers and the sterilization process. Monitoring is done when a sterilizer is first installed before it is put into general use and to assess routine performance thereafter as recommended in the IFUs. Performance monitoring using all three types of monitors must be completed in all sterilizers to ensure that effective sterilization has been achieved.

Routine monitoring consists of monitoring every package and sterilization load, sterilizer efficacy and periodic product quality assurance testing.

1.5.13.1 Policies and procedures for sterilization process

1. Policies and procedures for sterilizing processes, including loading and unloading the sterilizer, operation of the sterilizer, testing and monitoring, are documented and available.
2. A preventive maintenance program for equipment must be implemented and documented. For guidance purposes; every 6 months limited preventive technical control of all critical machines and extensive technical control followed by validation annually is recommended.
3. Sterilizer manufacturer's written instructions for use are available and loading configurations and cycle parameters are followed. Safety data sheets are available for chemical sterilization.
4. Medical device manufacturer's instructions for use, including sterilizing type and cycle parameters are available, including for loan sets.
5. Policies and procedures specific to immediate use steam sterilization (IUSS) are documented and available. Records are maintained, reviewed and demonstrates use of IUSS is restricted and not used for implantable devices.

6. Procedure for loading shall ensure similar items requiring the same cycle parameters are grouped together. Loading configuration of sterilizer carriages includes;
7. Allowing space between packs;
8. Carriages are not overloaded;
9. Packages do not touch the sterilizer chamber walls;
10. Metal items are placed below textiles and pouches;
11. Hollow ware, i.e. bowls are placed on edge to allow condensate to drain;
12. Paper-plastic pouches arranged in a basket on edge or on steriliser carriage with paper side down in a single layer for large items; and
13. Rigid containers placed on carriages according to the manufacturer's recommendations.
14. Devices shall be removed from the sterilizer at the completion of the cycle and shall remain on the carriage for at least 30 min or until the outside is cool to the touch. For small sterilizers the load shall be removed from the chamber and placed on a rack to cool. Sterilized devices are cooled in low traffic areas with no air conditioning.
15. Sterilisation loads, including IUSS, are documented, results of load indicators recorded and parameters achieved verified and load released for use. Checks made are:
16. Parameters verified by reviewing the printout and signing exposure time and cycle completion;
17. Bowie Dick test (residual or dynamic air removal test) completed daily;
18. Biological monitoring completed at least daily, in every load containing implants and each load for gaseous sterilization methods;
19. Internal chemical indicator placed in each package; and
20. External indicators achieved correct change
21. A policy and procedure is in place for the recall of improperly reprocessed medical devices. Records demonstrate adherence to policy and procedure. Policy must include requirement for review of all recalls required.

1.5.13.2 Sterilization methods for reusable medical devices

Sterilization is the elimination of all disease-producing microorganisms (bacteria, viruses, fungi and parasites), including bacterial spores. Sterilization is recommended to be used on critical medical devices and, whenever possible, semi-critical medical devices. Items and equipment can be sterilized by the following physical or chemical methods:

- Steam or Moist heat sterilization – available in selected facilities (autoclave)
- Cold sterilization (using chemical sterilants)

1.5.13.2.1 Steam sterilization

Moist heat or steam sterilization is a process that uses saturated steam under pressure as the sterilants. It is the preferred method of sterilizing medical devices; as it is effective, all medical devices including cotton and gauze can be sterilized and stored. The removal of air is essential to ensure an efficient sterilization process sterilization cannot occur in the presence of air.

1.5.13.2.1.1 Autoclaving:

The autoclave uses high pressure steam to sterilize medical equipment or instruments depending on the context. Types of autoclaves:

1.5.13.2.1.1.1 Pressure cooker:

- can be used as steam sterilizers adequate for sterilization of solid items such as scissors and forceps (but not for hollow bore items) as long as temperature, pressure, and time parameters are met.
- Temperature should be at 1210 C (249 F) for 15- 20 minutes depending on the load and content. Mixing of equipment and overloading should be avoided.
- If it is not possible to monitor the entire sterilization process (e.g. pressure gauge is not working, temperature cannot be monitored, etc.) the equipment cannot be considered sterile, and is instead classified as highly disinfected.
- Items sterilized using a pressure cooker should be re-sterilized immediately before use if they are to be used in critical procedures.

1.5.13.2.1.1.2 Pre-vacuum (porous load) sterilizers:

- suitable for sterilization of wrapped clean instruments, gowns, drapes, toweling and other dry materials that are required for surgery.

1.5.13.3 Sterilization packaging material

The following packaging is recommended:

- **Sterilization wrap** made from cellulose fibres and non-woven from a combination of cellulosic and synthetic fibres. Both types are suitable for porous load steam sterilization and most gas processes because they are permeable to air, steam and other gases
- **Rigid reusable sterilization containers** (metal containers designed for sterilization) should be suitable for the method of sterilization used and compatible with the cleaning method and cleaning agent.

The following packaging is not recommended:

- **Metal (sterilization) drum trays** with holes that can be opened and closed manually. These do not guarantee sterility of its contents
- **Newspapers, brown paper bags** and other products that do not allow air removal or penetration of steam must not be used
- **Recycled material packaging** because these have lost their integrity and the bacterial barrier and do not allow adequate air removal or steam penetration.

1.5.14 Recommendations for reprocessing endoscopy equipment/devices

Due to the complexity of their design, flexible fibreoptic and video endoscopes ('semi-critical endoscopes') require special cleaning and handling. Since flexible bronchoscopes and cystoscopes are entering a sterile cavity, it is highly recommended that these be sterilized; however, if they are not compatible with sterilization, high-level disinfection is the minimum requirement.

Individuals responsible for reprocessing endoscopes require training and must have thorough knowledge about the health care facilities written endoscope processing requirements, which include on-going education and training.

To minimize the immediate risk, it is recommended to adhere to current endoscope reprocessing guidelines where pre-cleaning is done with aim to decrease organic load especially at the elevator with any one of the following methods for reprocessing duodenoscopes (priority ranked):

1. Ethylene oxide sterilization after HLD with periodic microbiologic surveillance
2. HLD done twice with periodic microbiologic surveillance
3. HLD with scope quarantine until negative culture
4. Liquid chemical sterilant processing system using peracetic acid (rinsed with extensively treated potable water) with periodic microbiologic surveillance
5. Other FDA-cleared low-temperature sterilization technology (provided material compatibility and sterilization validation testing performed using the sterilizer and endoscope) after HLD, with periodic microbiologic surveillance
6. HLD with periodic microbiologic surveillance

1.5.14.1 Responsibilities

1. Individuals responsible for reprocessing endoscopes shall be specially trained and shall meet the facility's written endoscope processing competency requirements, including ongoing education and training and annual competency check
2. Each health care setting in which endoscopic procedures are performed shall have written, detailed procedures for the cleaning and handling of endoscopes.
3. Critical endoscopes shall be sterilized prior to use.

4. Semi-critical endoscopes require a minimum of high-level disinfection prior to use.
5. Adequate ventilation is required to remove toxic vapours generated by, or emitted from, cleaning or disinfecting agents.
6. Endoscope cleaning shall commence immediately following completion of the clinical procedure.
7. Patency and integrity of the endoscope sheath shall be verified through leak testing, performed after each use.
8. Endoscopic equipment/devices shall be rinsed and excess water removed prior to disinfection or sterilization.
9. Endoscopic accessories (e.g., biopsy forceps and brushes) that enter sterile tissue or the vascular system shall be disposable or sterilized after each use.
10. Final drying of semi critical endoscopes shall be facilitated by flushing all channels with filtered air, followed by 70% isopropyl alcohol, followed by forced air purging of the channels.
11. Semi critical endoscopes shall be stored in a dedicated, closed, ventilated cabinet outside of the reprocessing area and procedure room.
12. The water bottle and its connecting tube, used for cleaning the endoscope lens and irrigation during ERCP (endoscopic retrograde cholangiopancreatography) procedures, shall be cleaned and sterilized following manufacturer's instructions.
13. A preventive maintenance program for automated endoscope reprocessor (AER) shall be implemented and documented.
14. Healthcare settings shall have policies in place providing a permanent record of endoscope use and reprocessing, as well as a system to track endoscopes and patients that includes recording the endoscope number in the patient record.
15. Enhancement in methods for reprocessing duodenoscopes should be followed and documented.
16. Regular surveillance for bacterial contamination of duodenoscopes after reprocessing using a special culture method and test is recommended.

1.5.15 Indicators used in monitoring process of reprocessing

- A physical (or mechanical) control is a device that monitors the physical parameters of a sterilizer, such as time, temperature and pressure, which are measured during the sterilization cycle and recorded at the end of each cycle (on a printed statement or in an electronic file). These should be monitored with every cycle. Printouts should be stored safely per institutional policy for guideline purposes, recommended to keep for up to 7 years.
- A chemical indicator (CI) is a system that responds to a change to one or more predefined process variables with a physical or chemical change i.e. colour changing tape. A CI does not indicate sterilization, but rather that a package has undergone a sterilization cycle. Apply chemical indicator on the outside and inside of every package.
    - External indicators (Type 1, Category) identify processed from non-processed items.

- Internal indicators (Type 3, 4, 5, 6, Category) verify the sterilizing agent has reached the contents of the package and critical variables of the process have been met. The variables monitored will depend on the specific type of internal chemical indicator.
- A biological indicator (BI)* is a test system containing viable microorganisms (e.g. Strips or vials loaded with spores) providing a defined resistance to a particular sterilization process. If a sterilizer is used frequently (e.g., several loads per day), daily use of biological indicators allows earlier discovery of equipment malfunctions or procedural errors and thus minimizes the extent of patient surveillance and product recall needed in the event of a positive biological indicator. BIs should be used
    - Ideally daily with the first package of the day (it is acceptable to use atleast weekly in units not running multiple loads per day)
    - With each load for
        - Loads containing implants
        - A new type of packaging material or tray
        - After training new personnel
        - After repairing a sterilizer
        - After any change in the sterilizing process

Table 20: Monitoring of equipment reprocessing procedures

PROCESS	WHAT IS MEASURED AND WHEN	
	Daily	Per Item
Cleaning	Use of detergent and disinfectant	Cleaning results by visual control or by using a clean test
Disinfection	Use of disinfectant by concentration, temperature and pH of disinfectant	Per load Time of exposure
Chemical sterilizers		Per process Physical indicators Chemical indicators Biological Indicators Per item Chemical indicators: internal (if the internal chemical indicator is not visible

		from the outside of the package, an external indicator should also be used).
	Bowie Dick test (residual or dynamic air removal test) for steam penetration in porous loads (pre-vacuum autoclave) (Helix test for hollow lumen instruments as used for Dental practices). Clean the chamber every week.	Per process Physical indicators Chemical indicators Biological Indicators (ideally daily in first load or in each load as indicated) Per item Chemical indicator: Internal (if the internal chemical indicator is not visible from the outside of the package, an external indicator should also be used)

1.5.16 Recommendations for release to sterile storage and distribution to point of use

Procedures for the review of records and release of the medical devices from the sterilizing processes are to be specified and documented. The following visual checks need to be completed at a minimum;

- Packaging used is suitable for the sterilizing process and is the correct size for the device sterilized
- The pack is labelled correctly to identify the contents, the seal is intact and the processing chemical indicator has a correct change
- The cycle parameters are achieved and signed as having been checked
- Loads containing biological indicators are quarantined until the results are known and recorded. The load can be released when there is a no growth result on the processed BI PCDs if used, are read and correct
- There is no visible moisture or droplets.

No device should be released if criteria have not been met. The recall policy and procedure must be followed where there are non-conforming sterilized devices.

Information collected as part of the release of sterilized devices should form part of the traceability records so that the patient can be tracked back to the process. IUSS devices should be released in the same way as devices going through the usual processes.

1. Written policies and procedures are available for storage, handling, rotation and labelling of sterile packs.
2. Reprocessed medical devices shall be stored in a clean, dry location in a manner that minimizes contamination or damage. Traffic in the sterile storage area is controlled to limit access; no external shipping cartons are present. Shelving is at

least 20 – 25 cm above the floor, at least 45 cm from the ceiling or sprinkler heads, and at least 5 cm from outside walls. Supplies are only stored on designated shelving, counter and carts (not on windowsills, floors etc.).
3. Correctly choose the containers for storage of sterile supplies (or HDL). They should be moisture resistantand cleanable i.e., do not use cardboard boxes.
4. Sterile storage area is generally 24-28 °C, relative humidity does not exceed 70% (keep between 30-60% where possible), minimum air changes per hour of 4 downward-draft type.
5. Rotation of stock is maintained on a first in first out (FIFO) basis.
6. At point of use, upon opening the reprocessed medical device, check for integrity of the packaging and the device; validate results of chemical monitors if present; and reassemble device if required.

1.5.17 Recommendations for calibration and maintenance of reprocessing equipment

Instrumentation used to control or monitor reprocessing equipment, e.g. timers, gauges and temperature monitoring devices, shall be recalibrated regularly to prove their accuracy, at least annually and immediately prior to requalification.

Preventative maintenance should be carried out in accordance with the equipment manufacturer's instructions for use. To achieve this, a qualified individual should carry out maintenance of the equipment. Particular attention should be given to inspection, maintenance and replacement of components subject to normal wear and tear such as recording devices, filters, steam traps, drain pipes, valves and door gaskets. A schedule for maintenance and the work carried out shall be maintained for each piece of reprocessing equipment.

1. A schedule and maintenance record is kept and available for each piece of reprocessing equipment. These demonstrate planned preventive maintenance is being undertaken according to the equipment manufacturer's instructions for use.
2. Calibration of instruments used to control and monitor the equipment is carried out periodically according to the equipment manufacturer's instructions for use and at other times where a replaced component requires it.
3. A qualification test is to be done after new installation, relocation, major repairs and any other environmental changes. The process must be fully documented, all test results documented and the documentation reviewed.

1.5.18 Recommendations for education and training

The manager and all supervisors involved in reprocessing must, as a minimum, have experience and knowledge on reprocessing practices. A plan must be in place for each person involved in reprocessing to obtain proper training under the guidance of the supervisors. It is strongly recommended that continuing education and or re-certification be obtained at a regular interval and at least annually.

- The policies of the healthcare setting shall specify the requirements for, and frequency of, education and training as well as competency assessment for all personnel involved in the reprocessing of medical equipment/devices.
- All aspects of reprocessing shall be supervised and shall be performed by knowledgeable, trained personnel.
- Managers, supervisors and staff involved in reprocessing have knowledge and experience in reprocessing practices.
- It is advisable for the managers and supervisors and other staff involved in reprocessing to obtain certification qualification.

1.5.19 Recommendation for Staffing Ratios

The structure and number of staff vary greatly and there are no clear published guidelines on how to calculate staffing ratios. However, an examples for the number of staff based on two parameters are shown below.

- The number of operations or consultant episodes – calculated at 3000 per year per staff member.
- The number of operating theatre (surgical) trays processed. If there are automated wash processes, a rough guide would be one member of staff for every 1500-2000 trays per year.
- Another method is a time and motion study of a broad range of complexities (from simple to single RMD or complex tray) and specialities. Determine the mean, e.g. 10 minutes labour for reprocessing. Multiple by the number processed in a month e.g. 30,000 = 300,000 minutes = divide by 60 = 5000 hours = divide by 8 = 625 shifts for months and then work out staffing levels.
- Staffing levels will depend also upon the facility financial investment in CSSD services. If the CSSD operators are also used as porters to transport clean and used equipment, it provides a point-of-use service.

1.5.19.1 Recommendation of staffing structures

The recommendations on structure differ slightly from one system to another. However, an example of a basic structure is shown FIG. In smaller CSSDs, the quality assessment manager and the training manager might be a combined post, unlike a larger CSSD where these are two separate posts. Supervisors work in shifts and oversee the performance of the operators working in that particular area or station. The minimum requirement is at least one supervisor each for the dirty area and clean areas, but more may be necessary in larger CSSDs.

Resources:

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National Health and Medical Research Council (2019). Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: https://www.nhmrc.gov.au/about-us/publications/australian ustralian-guidelines-prevention-and-control-infection-healthcare-2019

World Health Organization. (2016). Decontamination and reprocessing of medical devices for health-care facilities. https://apps.who.int/iris/bitstream/handle/10665/250232/9789241549851-eng.pdf

Ministry of Health, Republic of Liberia, Quality Management Unit (QMU).2018. National Infection Prevention and Control Guidelines

Australian Commission on Safety and Quality in Health Care. 2019. Reprocessing of reusable medical devices in health service organizations. https://www.safetyandquality.gov.au/sites/default/files/2019-12/as1807_reprocessing_of_reusable_medical_devices_in_health_service_organisations_december_2019.pdf

The Joint Commission (2021). Guidance for Storage of Sterile Supplies- Temperature and Humidity Requirement. Do we need to monitor the temperature and humidity of the rooms where sterile supplies are stored? Link: https://www.jointcommission.org/standards/standard-faqs/ambulatory/environment-of-care-ec/000001275/

Occupational Safety & Health Administration (OSHA), Central Sterile supply-Hazardous Chemicals (Standard-29 CFR 1910.1047). (https://www.osha.gov/etools/hospitals/central-supply/hazardous-chemicals)

1.6 ENVIRONMENTAL CLEANING

To prevent HAIs, a clean environment is essential. Many factors including the design and planning of facilities, air quality, water availability, proper cleaning of the premises and an efficient laundry system can significantly influence the risk of contamination

Environmental cleaning of health care facilities refers to cleaning floors, walls, fixed and mobile medical equipment, furniture and accessories which may come in direct or indirect contact with patients. If the environment is not routinely cleaned, microorganisms can reside in the environment and subsequently be transmitted to patients, visitors, caretakers and staff.

1.6.1 General Principles:

- Cleaning is necessary to remove dirt, debris and other materials that can decrease the effectiveness of many chemical disinfectants
- Scrubbing (friction) is the best way to physically remove dirt, debris and microorganisms;
- Always wear risk appropriate PPE when performing any type of cleaning or decontamination, especially when there are risks of splashes or sprays of blood or body fluids
- Always clean from the least contaminated (cleanest) to most contaminated (dirtiest) area and from highest level to lowest level so that the dirtiest areas and debris that falls to the ground are cleaned last
- Avoid dry sweeping and dusting to prevent dust, debris and microorganisms from landing on clean surfaces
- Follow the correct dilution instructions for disinfectants as per the manufacturer's instructions. Poor dilution may reduce the effectiveness of disinfectants
- Follow the correct dilution instructions for disinfectants as per the manufacturer's instructions and replace these with fresh solution frequently (e.g., replace floor mopping solution every three patient rooms, change at least every 60-minute intervals), according to the facility's policy.
- Decontaminate mop heads and cleaning cloths regularly to prevent contamination (e.g., launder and dry at least daily).
- Disinfect noncritical surfaces with an EPA-registered hospital disinfectant according to the label's safety precautions and use directions. Most EPA-registered hospital disinfectants have a label contact time of 10 minutes (contact time is the time the solution is required to stay on the surface).
- Do not use disinfectants to clean infant bassinets and incubators while these items are occupied. If disinfectants (e.g., phenolics) are used for the terminal cleaning of infant bassinets and incubators, thoroughly rinse the surfaces of these items with water and dry them before these items are reused.
- Cleaning methods and schedules should be written, documented and done according to standards;

- Cleaners should be trained on how to perform their assigned tasks, understand potential risks associated with cleaning activities and be regularly monitored with feedback provided.
- In units with high rates of endemic Clostridium difficile infection or in an outbreak setting, use dilute solutions of 5.25%–6.15% sodium hypochlorite (e.g., 1:10 dilution of household bleach) for routine environmental disinfection. Currently, no products are EPA-registered specifically for inactivating C. difficile spores. The windows should be open and cleaner should use proper PPE with mask and eye cover and patient should not be in the room.

1.6.2 Cleaning frequency

- The frequency of cleaning surfaces in a particular area or department depends on:
- Whether surfaces are frequently or infrequently touched (these are also called 'high-touch' and 'low-touch' surfaces);
- The type of activity taking place in the area and the risk of infection associated with it (e.g. critical care areas vs. meeting rooms);
- The vulnerability of patients in the area (e.g. immunosuppressed patients);
- The probability of contamination based on the amount of body fluid contaminating surfaces in the area (like operation theatre, labour room).

Cleaning frequency recommendations by items or surface type

Table 21: Cleaning frequency recommendation by items or surface type

Item/Surface	Frequency
Frequently touched, for example: • Tables and countertops • Beds and chairs • IV poles	At least twice daily AND when visibly soiled
Infrequently touched, for example: • Floors and walls	At least once daily AND when visibly soiled
Plates and utensils	After every patient
Reusable PPE	• After all procedures • After exiting an isolation area • When visibly soiled
Linen and mattresses	After every patient and when visibly soiled

Cleaning frequency recommendations by area

Place/Area	Frequency
Screening area	At least twice daily AND after a patient with a suspected infectious disease
Isolation room	At least twice daily AND after each patient discharge
Offices/ administration areas	Once daily
Inpatient areas	At least twice daily AND when visibly soiled
Latrines/toilets	At least twice daily AND after a patient with a suspected infectious disease

1.6.3 How to clean blood spills

Blood spillage may occur because a laboratory sample breaks in the phlebotomy area or during transportation, or because there is excessive bleeding during the procedure. In this situation, clean up the spillage and record the incident, using the following procedure (Organization 2010).

1. Block off area until clean up and disinfection is completed
2. Wear a pair of non-sterile gloves, mask, goggles/face shield and gown or aprons.
3. Ensure good ventilation in room.
4. Use tongs or a pan and brush to sweep up as much of the broken glass (or container) as possible. Do not pick up pieces with your hands. (if highly infectious or small bits of glass present paper towels can be placed over sharps and disinfected pored over and remove the small pieces of glass together with paper towels with tongs or scoop and pan).
5. Discard the broken glass in a sharps container. If this is not possible due to the size of the broken glass, wrap the glass or container in several layers of paper and discard it carefully in a separate container. Do not place it in the regular waste container.
6. Use disposable paper towels to absorb as much of the body fluids as possible. If large spills or highly infectious materials cover the paper towels with bleach solution (1ml bleach in 9 ml water or 0.5% sodium hypochlorite solution) and leave for 10 to 20 minutes.
7. Discard the paper towels in an infectious waste container. If have small pieces of glass use scoop and pan or tongs. Do not use hands if any sharp material likely to be present.
8. Wipe the area with water and detergent until it is visibly clean.
9. Saturate the area again with sodium hypochlorite 0.5% (10 000 ppm available chlorine) for 10-20 minutes. This is a 1:10 dilution of 5.25% sodium hypochlorite bleach, which should be prepared daily. It should not be mixed with other cleaning solutions.
10. Clean and disinfect tongs, brush and pan.
11. Remove gloves and discard them.
12. Wash hands carefully with soap and water, and dry thoroughly with single-use towels.
13. Record the incident in the incident book if a specimen was lost, or persons were exposed to blood and body fluids.

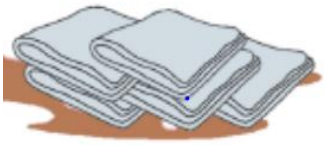
How to clean blood spill

1. Block the area until clean-up and disinfection is complete.

2. Put on an apron, disposable latex gloves and face shield/goggles to prevent contamination of hands.

3. Ensure good ventilation in room when using chlorine products

4. Use tongs or a pan and brush to sweep up as much of the broken glass (or container) as possible. Do not pick up pieces with your hands. Discard in sharps container. If this is not possible due to the size of the broken glass, wrap the glass or container in several layers of paper and discard it carefully in a separate container. Do not place it in the regular waste container. If highly infectious or small bits of glass present paper towels can be placed over sharps and disinfected pored over and remove the small pieces of glass together with paper towels with tongs or scoop and pan.



1. Cover the spill with paper towels or absorbent material. If highly infectious material or large spill bleach solution (1ml bleach in 9 ml water or 0.5% sodium hypochlorite solution) for 10-20 minutes

2. Discard the paper towels in an infectious waste container. If have any pieces of glass present, use scoop and pan or tongs. DO NOT use hands if any sharp material likely to be present.

3. Discard paper towels as infectious waste

4. Wipe the area with water and detergent until it is visibly clean. Use tongs if suspicious of persistent small glass pieces. Discard as infectious waste

9. Saturate the area again with bleach solution (1ml bleach in 9ml of water) for 10-20 minutes.

10. Clean and disinfect tongs or scoop and pan if using reusable ones

11. Discard gloves and PPE
12. Wash hands with soap and water

13.Recod and report incident

Note: Video link to how to clean blood spill: Office of Environment and Safety, Georgetown university, Washington DC. Blood borne pathogens (BBP) video on procedures to follow in the event of a blood spill. Accessed on 9th December 2021.

Link: https://ehs.georgetown.edu/biological/bbp/

1.6.4 Laboratory Specimens handling and transportation

Standard precautions should be followed when handling all laboratory specimens.

- The validity of test results is as much a function of the laboratory analysis as of the proper collection and handling of specimens.
- Specimens from all patients shall be treated as potentially infectious.
- All specimens for laboratory examination shall be carefully collected using Standard operating procedures/precautions.
- Precautions in their collection and transported to the laboratory in such a manner to prevent breakage or spillage. The caps of all containers shall be tightly sealed and the requisition forms placed in a separate envelope rather than wrapped around the specimen container. This separation will prevent the forms getting contaminated.
- Specimens shall be collected in designated containers with a secure lid to prevent leakage during transport.
- All specimens submitted to the laboratory shall be accompanied by a completed requisition form issued by the department for which testing will be done. Requisition forms shall be completed properly so that all data required by the headings on the forms are provided.
- Additional information relevant to the nature of the specimen, time of collection, treatment regimen of the patient, which may impact on the testing and reporting, shall be supplied.
- Requisition sheets shall be affixed to, but not stapled to, the outside of the plastic bag.
- Transportation of specimens to the laboratory shall be under the conditions required for preservation of the specimen's integrity and protection of the health care worker.
- Gloves shall be worn when handling and processing specimens.
- Laboratory procedures shall minimize splashing, spattering and generation of droplets.
- Laboratory workers shall follow mechanical pipetting procedures.
- Work areas shall be decontaminated after spills of blood, body fluids, or other potentially infectious material and after completion of work.
- Contaminated equipment needing servicing or repair shall be decontaminated externally and internally.
- Disposable specimen containers shall be encouraged where ever feasible.

1.6.5 General Cleaning

- Lint-free dusters/ mops should be used; and washed with soap and water after every use, and dried.
- Brooms are not to be used in the hospital.
- The three-bucket technique should be used on every floor to facilitate hygienic cleaning of environment.

Housekeeping in the isolation room

- Before admission: The admitting physician should inform the nurse in-charge of isolation ward at least one hour before admission, mentioning the diagnosis, sex and the general state of the patient.
- Prerequisites for isolation
  - A handwashing sink and running water or alcohol based hand rub should be available at the entrance of each room to facilitate hand hygiene.
  - Cover the mattress and pillows with an impervious cover such as Mackintosh so that it can easily be damp dusted. Clean gowns should always be available.
  - Separate urinals, bedpans and thermometers/ BP apparatus are to be used for each patient.
  - Bins lined with the appropriate colour-coded (infectious- yellow bags) plastic liner should be available in each room for disposal of biomedical waste.
  - Rooms should be well lit, and isolated according to disease conditions.
- Cleaning procedure for isolation room
  - Linen should be stripped from the bed with care taken not to shake the linen during this action. Linen should be soaked in disinfectant, i.e. hypochlorite 1:50 for 20 minutes for white clothes and coloured linen as per hospital policy suitable high-level disinfectant to be used and then sent to the laundry.
  - All other articles such as IV stands and furniture should be cleaned with detergent and disinfected followed by high-level disinfectant.
  - Walls should be cleaned with detergent and mopped with a high-level disinfectant.
  - The bathrooms should be cleaned with detergent and water followed by disinfection with hypochlorite 1:50 dilution.
- At discharge (terminal disinfection):
  - The pillows and mattress covers are to be cleaned with detergent, disinfected with a high level disinfectant and sent to the laundry.
  - Bed sheets, curtains, gowns and dusters must be removed, soaked in with a high-level disinfectant for one hour and then sent to laundry.
  - After disinfection, wash the room, wall, window, doors, bathroom, sink and furniture with soap solution after doing thorough high dusting in that cubicle.
  - Soak bed pan, urinal, kidney basin in with a high-level disinfectant for one hour, wash with detergent and dry it under sunlight.

- Bath basin, multi-bin, bucket, jugs, mugs are washed with soap solution and dried in sunlight.
- Rubber sheets (Mackintosh) are to be cleaned with detergent and water, dried, powdered and replaced.

Note: Refer to appendix 3 for further details

1.6.6 Specific cleaning procedures for the operating room

The cleanliness of the operating room has direct influence on the control of infection in the operation room and the outcome of the surgical intervention. Therefore, at the beginning of each day, all flat surfaces should be wiped with a clean, damp lint to remove dust and lint. The total cleaning is not required between each case for surgery. The total cleaning or terminal cleaning of the operating room should be done at the end of each day. All the operating room surfaces, handwashing sinks, dressing and storage areas, hallways and equipment should be cleaned completely, regardless of whether they were used or not during last 24 hours.

1.6.6.1 General principles

- The perioperative team share the responsibility and accountability for ensuring a clean environment for each patient.
  - Don appropriate Personal Protective Equipment (PPE) according to Routine Practices;
  - Gloves: some products may require the use of nitrile gloves.
  - Masks and eye protection: to protect the mucous membranes of the eyes, nose, and mouth from inadvertent exposure to blood and body fluids as well as to cleaning products (corrective lenses are not considered adequate eye protection).
  - Gowns protect the uniform from contact with blood and body fluids and splashing.
- When disinfectant products are chosen the following characteristics should be given consideration:
  - Targeted microorganisms
  - Product must remain wet for duration of contact time to ensure effectiveness.
  - Ease of use
  - Manufacturer's instructions for use
  - Compatibility with surfaces, cleaning materials, and equipment
  - Patient population (i.e. Neonates)
  - Safety
- Ensure Safety Data Sheets are available and accessible
- Reusable or single use low-lint cleaning materials should be used.

- Mop heads are to be changed after each use and not reintroduced into the bucket.
- Equipment stored in the OR Theatre should be kept to a minimum.
- OR doors shall remain closed at all times including during cleaning.
- Perioperative RN should visually inspect the OR for cleanliness before the case carts, supplies, and equipment are brought into the room.

1.6.6.2 Preliminary Cleaning:

- Damp dust horizontal surfaces prior to first case.
  - Use a clean, lint-free cloth moistened with low-level disinfectant.
  - Start at higher surfaces and work down in a clockwise manner.
  - Damp dust equipment before it is brought into or out of the OR theatre.
- Use clean cloths for each OR theater
- Inspect OR Theatre lights for cleanliness before the first case of the day

1.6.6.3 Between Procedure:

- Each OR theatre must be cleaned and disinfected immediately after each case.
- Prior to cleaning, remove all trash, linen, and recycling from the room including soiled anesthesia equipment and supplies.
- All surfaces that have been in direct or indirect contact with the patient or body fluids are considered to be contaminated and therefore are to be cleaned/disinfected with a hospital approved disinfectant.
- It is the responsibility of the perioperative nurse to ensure OR Theatres are cleaned/disinfected as required after each patient.
- Environmental cleaning of the OR Theatre will begin after the patient has left the area.
- Wipe touched objects and areas after each procedure (i.e., control panel, switches, knobs, work area, handles, computer keyboards and components) with a hospital approved disinfectant.
- Cleaning and disinfectant should progress from least contaminated to most contaminated and top to bottom areas.
- Clean floors within 1.5 meters of the operative area, extend area if visibly soiled, including floor area under the OR bed.
- Clean and disinfect walls if soiled or potentially soiled.
- Items used for patient care and during a surgical or invasive procedure should be cleaned and disinfected, including but not limited to:
  - OR beds and reusable straps
  - OR bed attachments (i.e., arm boards, stirrups, head rests)
  - positioning devices (i.e., gel rolls, vacuum pack positioning devices)
  - patient transfer devices
  - overhead procedure lights
  - tables and Mayo stands

- mobile and fixed equipment (i.e., suction regulators, medical gas regulators, imaging viewers, viewing monitors, radiology equipment, electrosurgical units, microscopes, robots, lasers).

- Note: Items used for anesthesia during patient care should be cleaned and disinfected after each patient use, including:
  - Anesthesia carts
  - Equipment (i.e., IV poles, IV pumps)
  - Anesthesia machines
  - Patient monitors
  - Non-critical equipment such as blood pressure cuffs.

1.6.6.4 Terminal cleaning at the end of each day, perform the following:

- Staff preforming cleaning may be required to wear additional PPE during terminal cleaning after procedures with Additional Precautions.
- OR Theaters are to be terminally cleaned at minimum once every 24 hours during a regular work week regardless of whether the theatre has been used.
- All floors should be cleaned using a wet vacuum or single-use mop and a disinfectant (follow dwell time indicated on manufacturer's instructions).
- Floor cleaning should progress from cleanest area to dirtiest, from perimeter of the room to the centre
- Selecting the appropriate Personal Protective Equipment
- Remove contaminated waste containers used and replace them with clean containers.
- Close and remove sharps containers if they are three quarters full.
- Remove the dirty laundry in sealed waterproof containers.
- Wipe all up and down surfaces with a disinfectant and cleaning solution.
- Wipe all surfaces that may have been in contact with a patient or body fluids of a patient with cleaning solution (soap and water) and use water to rinse, then disinfect with a 0.5% chlorine solution or other approved disinfectant and allow to dry. Wiping the surface with cleaning solution and rinsing before using bleach is important because organic material inactivates bleach.
- To reduce microbial contamination of exposed surfaces, scrub with a disinfectant cleaning solution. This is safer, faster and more effective than fumigation with a dilute solution of formaldehyde, which is inefficient, time consuming and release toxic fumes. Exposed surfaces include but not limited to:
  - Anesthesia carts and equipment
  - Anesthesia machine
  - Patient monitors
  - OR beds
  - Reusable straps
  - Bed attachments
  - Positioning devices
  - Transfer devices

- Overhead lights
- Tables and Mayo stands
- Mobile and fixed equipment
- Storage cabinets, supply carts, and furniture (including wheels/casters)
- Light switches
- Door handles and push plates
- Telephones and mobile communication devices
- Computer accessories
- Chairs, stools, and step stools
- Trash and linen receptacles
- OR theater walls
- Scrub sinks and surrounding walls.

1.6.6.5 Cleaning soiled and contaminated cleaning equipment:

- Wash cleaning buckets, rags, brushes and brooms with detergent and water daily or as needed if visibly soiled.
- Decontaminate cleaning equipment that has been contaminated with blood or body fluids by soaking for 10 minutes in a 0.5% chlorine solution or any other disinfectant approved by the hospital.
- Rinse with clean water
- Dry thoroughly before re-placing them upside down
- Generally, wet cloths and mop heads are highly contaminated with microorganisms
- If mops are not available, clean thick towels are preferable

1.6.7 Cleaning procedure for labour room and delivery

At the beginning of each day, all flat surfaces should be wiped with a clean, damp cloth to remove dust and lint. All instruments must be decontaminated, washed and sterilized after each use. The delivery table and the floor will be cleaned at the end of each delivery. The total cleaning or terminal cleaning of the delivery room must be made at the end of each day. All sectors in the delivery room, including sinks, bed and its components, the bedside table and equipment will be fully cleaned daily, regardless of whether they were used in the last 24 hours.

1.6.7.1 Between each case, clean using the following guidelines:

- Clean up spills of body fluids with a 0.5% chlorine solution; if a significant amount of organic liquid is present on the surfaces of the room, flood the area with a solution of chlorine to 0.5%. Wait ten minutes, clean and disinfect again. Or any other EPA registered hospital grade disinfectant maybe used.

- Wipe all surfaces and mattress with a disinfectant cleaning solution.
- Wipe all flat surfaces that were in contact with a patient or body fluids of a patient with a disinfectant solution.
- Blot the center of the delivery room (around the delivery table) with a disinfectant cleaning solution.
- Collect all waste in the delivery room in closed airtight containers.
- Linens: The linen shall be bagged and taken to the soiled linen area.
- Close and remove sharps containers in the delivery room when they are ¾ full.
- Change the instruments covered containers that have disinfection solution, clean the containers and add a new solution. Instruments should not be put in chlorine solution.
- Remove soiled linen in a container covered with a waterproof canvas.

1.6.7.2 At the end of each day, perform the following:

- Prepare a freshly solution of 0.5% chlorine for decontamination;
- Remove contaminated waste containers used and replace them with clean containers;
- Close and remove sharps containers if they are three quarters full;
- Remove the dirty laundry in sealed waterproof containers;
- Wipe all surfaces with a disinfectant and cleaning solution;
- Wipe all surfaces that may have been in contact with a patient or body fluids of a patient, then disinfect with a 0.5% chlorine solution. Once clean, use a disinfectant solution and allow to dry.
- To reduce microbial contamination of environmental surfaces such as walls, ceilings and floors, scrubbing with a disinfectant cleaning solution. This is safer, faster and more effective than spraying with a dilute solution of formaldehyde, which is inefficient, time consuming and release toxic fumes.

1.6.8 Cleaning soiled and contaminated cleaning equipment:

Decontaminate cleaning equipment that has been contaminated with blood or body fluids by soaking for 10 minutes in a 0.5% chlorine solution. Wash cleaning buckets, rags, brushes and brooms with detergent and water daily or as needed if visibly soiled. Rinse with clean water. Dry thoroughly before re-placing them upside down. Generally, wet cloths and mop heads are highly contaminated with microorganisms. If mops are not available, clean thick towels are preferable.

Resources:

National Health and Medical Research Council (2019). Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019

Ministry of Health and Family Welfare, India: Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

Video link to how to clean blood spill: Office of Environment and Safety, Georgetown university, Washington DC. Blood borne pathogens (BBP) video on procedures to follow in the event of a blood spill. Accessed on 9th December 2021. Link: https://ehs.georgetown.edu/biological/bbp/

WHO, 2010. WHO guidelines on drawing blood: best practices in phlebotomy. Link: https://www.euro.who.int/__data/assets/pdf_file/0005/268790/WHO-guidelines-on-drawing-blood-best-practices-in-phlebotomy-Eng.pdf

CDC, 2008. Guideline for Disinfection and Sterilization in Healthcare Facilities. Link: https://www.cdc.gov/infectioncontrol/guidelines/disinfection/index.html

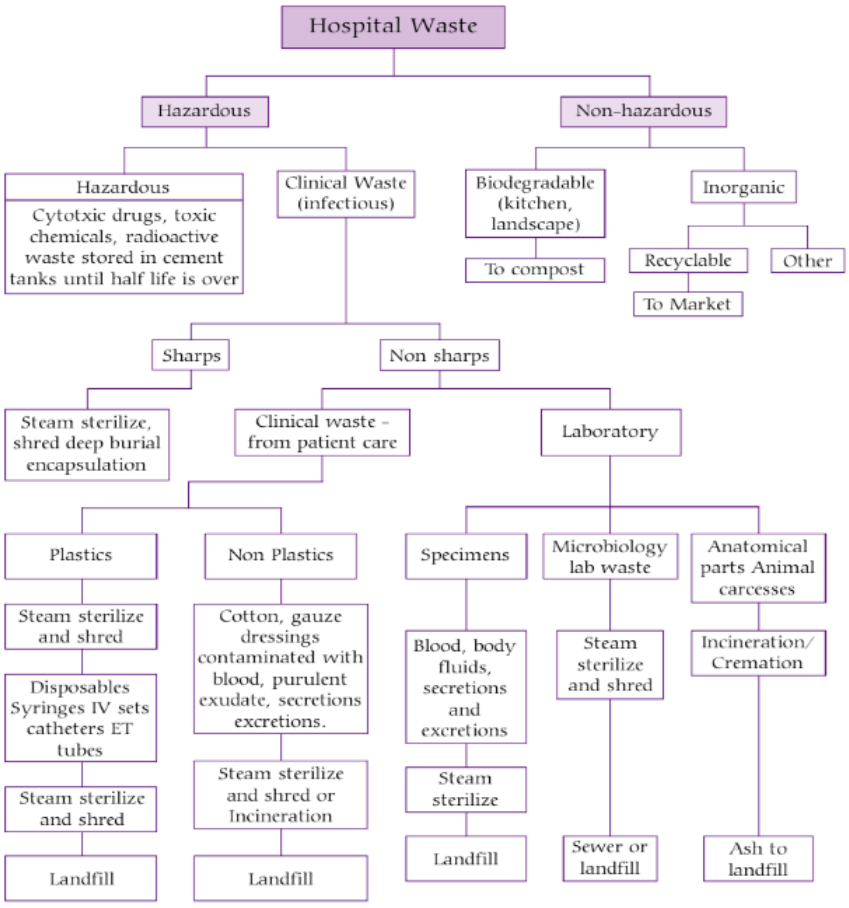
Winipeg Region Health Authority, 2017. Guidelines for Routine Environmental Cleaning of the Operating Room. Link: https://professionals.wrha.mb.ca/old/extranet/eipt/files/EIPT-053-001.pdf

Ministry of Health, Republic of Liberia, Quality Management Unit (QMU).2018. National Infection Prevention and Control Guidelines

1.7 HANDLING OF WASTE AND LINEN

1.7.1 Health care or biomedical waste disposal

The most updated National waste disposal policy should be followed in all health care facilities. The diagram given below gives types and methods of hospital waste disposal.



Source: Prüss A, Giroult E and Rushbrook P, eds. *Safe Management of Wastes from Health-care Activities*. Geneva, World Health Organization, 1999, page 168. Electronic access: http://whqlibdoc.who.int/publiations/9241545259.pdf

Figure 19: Treatment of hazardous and non-hazardous waste

When developing institutional waste management protocols follow the latest National Healthcare Waste disposal guidelines.

1.7.1.1 General recommendations for healthcare waste disposal:

- Segregation of healthcare waste must be done at the point of generation of the waste. To encourage segregation at source, (reusable) containers or baskets with liners of the correct size and thickness should be placed as close to the point of generation as possible.
- Bins and bags should be properly colour-coded.
  - Red with infectious/ biohazard waste label: infectious waste
  - Biohazard bags (usually these bags are yellow and leak proof): Body parts/anatomical waste
  - Blue with infectious/ biohazard waste label: infectious plastic waste
  - Pink: Pharmaceutical waste
  - Pink with genotoxic or cytotoxic label: Chemotherapeutic/ cytotoxic waste
  - Rigid puncture proof white container labelled as Sharps biohazardous waste: Sharp box for syringes and needles (ready made sharp boxes or containers maybe also be available in red or yellow colour)
  - White translucent puncture proof container with Sharp biohazard label: broken vials/ampoules, glass bottles, scalpels, blades
  - Black: non- infectious waste
- When they are 3/4 full, the liners should be closed with plastic cable ties or string and placed into larger containers or liners at the intermediate storage areas.
- Suitable latex gloves must always be used when handling infectious waste.
- Sharps should be segregated at the point of use and collected directly in sharps container
  - Health care workers should NOT recap or bend needles
  - Locate needle cutters near point of generation to facilitate disposal
  - Immediately after administrating injection, the needle of the syringe shall be cut using mechanical syringe cutter (in such a way that the needle gets broken and plastic hub of syringe through which root of needle is attached also gets detached from syringe). There shall be a puncture proof sturdy white translucent container below the needle cutter blades so that the detached needle automatically falls in the container.
  - Syringe after the needle is removed after cutting should be segregated into a blue container as this is no longer in sharps category but an infectious plastic waste.
  - The other categories of sharps wastes such as broken vials/ampoules, glass bottles, seizures, scalpels, blades etc. shall be segregated in white translucent puncture proof container.
  - Sharps containers should only be filled up ¾ full

Note: In case the recommended coloured liner or bin is not available, ensure segregation with proper labelling of bins and containers; e.g. Label as Infectious or biohazardous waste or Biohazardous Sharps waste etc. Some available sharp boxes maybe in red or yellow colour.

Resources:

WHO, 2018. Core questions and indicators for monitoring WASH in health care facilities in the Sustainable Development Goals. Geneva: World Health Organization and the United Nations Children's Fund (UNICEF), 2018. Licence: CC BY-NC-SA 3.0 IGO.

Ministry of Health (MOH), 2016. National Health care waste management policy.

Ministry of Health, 2008. Minimum standards for HCW management at health facilities 2008

1.7.2 Management of linen

The risk of disease transmission is very low if basic hygiene and common-sense storage and handling of soiled and cleaned linen is practiced. Good laundry practice requires that work procedures and guidelines for precautions are followed when handling all soiled linen.

1.7.2.1 Categories of linen for infection control:

- Clean: Linen washed and ready to be reissued to the service.
- Used: All used linen in the ward setting not contaminated by blood or body fluids
- Infectious: All linen used by a person known or suspected to be infectious and linen that is contaminated with blood or other body fluids e.g. faeces.

Note: Used or infectious linen may also be categorised as heat-labile. Heat-labile Linen that may be damaged (shrinkage/stretching) by thermal disinfection

1.7.2.2 Recommended colour coding for linen hampers to denote various categories of linen.

- Used non infectious : white
- Infectious: red (to prevent leaks, put clothes in a plastic bag before placing it in the cloth hamper).
- Heat labile: Blue
- Green bags maybe used for laundry from special departments like operating rooms and labour and delivery rooms

1.7.2.3 Sorting of dirty and potentially infectious laundry

- Always wear appropriate PPE (goggles, utility heavy duty gloves preferably up to elbow, rubber boots and plastic apron) when handling dirty linen to protect from potential cross infection.
- At the point of use, separate all linen based on the categories above and place in appropriate bags.
- All dirty and soiled linen should be transported to the hospital Laundry room as soon as possible.
- Handle dirty and soiled linen with minimum agitation and shaking to avoid contamination of the air, surfaces and persons.
- All dirty and soiled linen should be held away from the body and uniform
- Drop wet clothes in a laundry waterproof bag or a plastic garbage bag before dropping it in a cloth bag for dirty laundry.

- Drop soiled linen with biological substances or other fluids in appropriate waterproof bags and close them safely. Carry the bag to prevent spills or drops of blood, body fluids, secretions or excretions.
- Handle contaminated laundry as little as possible with minimal agitation. Bag contaminated laundry at the location of use. Do not sort or rinse laundry at the location where it was used. The area for handling dirty laundry should be separated from other areas, such as those used for folding and storage of clean linen.
- Large amounts of feces or blood clots should be removed from the linen with a gloved hand and toilet paper, put in a basin and disposed of in a toilet or pit latrine, as soon as possible.
- Ensure adequate ventilation and a physical barrier between the clean and dirty linen areas.
- Wash hands before and after removing PPE.
- Cloth bags are sufficient for the majority of laundry patients care area (except for soiled linen with biological substance or other fluids). The bags require the same treatment as their content. This helps prevent the spread of microorganisms in the environment, to staff and other patients.

1.7.2.4 Collecting soiled linen

- Remove soiled linen from wards/patient rooms on a daily basis, or as needed

And from other areas after invasive medical or surgical procedures;

- Soiled linen bags must be transported to the laundry in covered containers or covered carts.

Contaminated textiles and fabrics often contain high numbers of microorganisms from body substances, including blood, skin, stool, urine, vomitus, and other body tissues and fluids. When textiles are heavily contaminated with potentially infective body substances, they can contain bacterial loads of 106 –108 CFU/100 cm2 of fabric.

Disease transmission that may be attributed to health-care laundry has involved contaminated fabrics that were handled inappropriately (i.e., the shaking of soiled linens). Some examples include Bacteria (Salmonella spp., Bacillus cereus), viruses (hepatitis B virus [HBV]), fungi (Microsporum canis), and ectoparasites (scabies) presumably have been transmitted from contaminated textiles and fabrics to workers via

a. Direct contact or
b. Aerosols of contaminated lint generated from sorting and handling contaminated textiles.

Contaminated laundry is considered to be laundry which has been soiled with blood or other potentially infectious material or may contain sharps. Contaminated laundry should not be sorted or rinsed at the location where contamination occurred. Contaminated textiles and fabrics are placed into bags or other appropriate containment in this location; these bags are then securely tied or otherwise closed to prevent leakage. Single bags of sufficient tensile strength are adequate for containing laundry, but leak-resistant containment is needed if the laundry is wet and capable of soaking through a cloth bag.

1.7.2.4.1 Use of water-soluble (alginate) bags

Some countries use water soluble bags (also referred to as alginate bags) for the storage and transport of infectious linen. The entire inner bag is made from either a soluble material or the bag is impermeable but has soluble seams so that linen is released on contact with water. These bags are intended to be placed directly into the washing machine to minimise operator contact with infectious linen.

The capabilities of the equipment and composition of the load should be determined in advance of linen reprocessing. Alginate bags must be placed in a clear polythene bag before being secured in a laundry bag.

> Infectious linen from suspected or confirmed category 4 infections (e.g. viral haemorrhagic fevers) should not be returned to the laundry. These items should be disposed of as category A waste and incinerated. The laundry department should be informed if any items of linen are sent for incineration.

1.7.2.5 Transport of linen

- All linen bags (hampers) must be labelled with the hospital, care area/ward/department, and dated by the ward staff. Laundry staff at collection point should ensure that the linen is appropriately bagged and labelled before they are accepted.
- Trolleys used for transporting linen must be impervious and have a documented cleaning schedule in place following use (responsibility to be assigned by laundry manager).
- All reusable transport containers and cages should be decontaminated daily (responsibility to be assigned by laundry manager). Carts can be cleaned with a detergent and water, then disinfect with a 0.5% chlorine solution
- Clean linen must be protected from environmental contamination, e.g. with an impervious protective covering. Clean linen should be stored separately (or physically separated, i.e. a separate compartment) from all other linen.

It is recommended that there should be at least one laundry facility in each hospital or health center. Laundry facilities should be well-designed with enough space to allow sorting, washing and temporary storage of clean linen. Good drainage system should be in place and all laundry facilities should be kept dry to avoid the accumulation of moisture.

1.7.2.5.1 Where linen maybe taken out of the health care facility for laundry, the following steps for safe management of linen in transfer vehicles may be followed:

- Clean and used/infectious linen should not be transported in the same vehicle unless they can be physically separated, i.e. in a separate, covered cage or trolley.
- Drivers should have access to hand washing facilities at pickup and delivery points and carry a personal alcohol based hand rub.
- Spill kits for managing body fluids spillages should be available in all linen transfer vehicles.
- All vehicles must have a documented cleaning schedule in place for both internal and external cleaning.

1.7.2.6 Receipt of linen to laundry

All linen arriving at the laundry must be identified by the hospital, care area/ward/department, and dated.

- Upon arrival, linen should be held in a designated storage area until a viable complete load has been gathered.
- The designated storage area for used/infectious linen should be secure and inaccessible to the public.
- In the laundry room, carefully sort all the linen before washing. Do not pre-sort or wash the soiled sheets at the point of use. Sorting must be done carefully because:
  - Dirty laundry from the operating room or other services performing procedures may contain sharps (knives, sharp tip scissors, hypodermic needles and sutures, etc.).
  - Bedding from wards/patient rooms may contain dirty bandages, blood stained or soaked with other bodily fluids.
- After reprocessing, clean linen must be protected from environmental and microbial contamination.
- Clean linen must be physically separated from used and infectious linen at all times during laundry reprocessing.
- Processed (clean) linen should be kept in a designated area that is not within the ‘dirty’ or ‘washing’ areas of the laundry. If this is not possible clean linen should be protected with an impervious cover. Clean linen must be stored above floor level.

1.7.2.7 Washing and production processes

The purpose of linen reprocessing is to remove or kill microbial contamination. The linen wash process consists of 3 stages: washing, disinfection and dilution. These stages are required regardless of whether linen is used or infectious.

- The wash stages should ensure that all linen is visibly clean by removing contamination from the fabric;
- Chemical or thermal disinfection stage should be performed on all linen to reduce the number of viable microorganisms by killing;
- The number of viable microorganisms on the fabric is reduced by dilution, a minimum of two rinse cycles should be performed to reduce the microbial burden and remove detergents and disinfectants in the wash effluent.
- Washing processes for used/infectious linen should be carried out in a defined, functionally separate area from clean linen storage.
- Wash colored and white linen separately;
- Wash clothes from a nursery separately;

All processed linen should look visibly clean and should not be damaged or discoloured. Processed linen that does not meet these criteria should be disposed of via the domestic waste stream and the department/ward of origin notified if required.

1.7.2.7.1 Decanting linen/machine loading

Linen hampers should be opened as close to the machine as possible and never emptied onto the floor.

- All clear polythene bags should be disposed of as healthcare waste.
- If a water-soluble bag is present (as for infectious linen) this should not be opened but instead placed directly into the machine. Use a dedicated machine for infectious linen during the recommended wash cycles.
- After decanting the linen, place any reusable hampers directly into the machine.
- Follow the manufacturer's instructions for maximum and minimum load weights.

1.7.2.7.2 Wash (used and infectious) – thermal disinfection

- The washing process for both used and infectious linen should include a disinfection cycle where the temperature should be maintained at:
  - infected linen=High temperature: A temperature of at least 71ºC (160ºF) for a minimum of 25 minutes is normally recommended for the hot water wash cycle.
  - Used linen=Low temperature: A lower temperature of 22ºC-25ºC (71ºF-77ºF) can satisfactorily reduce microbial contamination in the washer
- A sluicing cycle should be included as necessary when dealing heavily soiled linen.

1.7.2.7.3 Where machine may not be available, when washing linen by hand, follow these instructions:

- Use appropriate PPE(heavy duty gloves, plastic apron, goggles/face shield, mask, rubber boots)
- Wash heavily soiled linen separately from other gently used articles
- Wash with hot water and detergent (60-90 degrees C)and soak in bleach solution. A final concentration of 150 ppm available chlorine must be achieved for a minimum of 5 minutes exposure time.
- Wash all linen in water with soap to remove any dirt, even if no dirt is visible;
- Use warm water and add bleach to facilitate cleaning and bactericidal action;
- If available, add a little soft acetic acid to prevent yellowing the linen;
- Rinse the linen with clean water;
- Check items for cleanliness. Rewash if they are dirty or stained.

1.7.2.7.4 Heat labile linen

Heat labile linen will be damaged (shrinkage/stretching) by temperatures above 40°C and therefore cannot be subjected to thermal disinfection. The majority of heat labile linen will be personal items/clothing belonging to a patient; in this case patients should have been offered the opportunity to take these belongings home to wash. It is unlikely that these items will present at the laundry facility

1.7.2.7.4.1 Current recommended treatment to ensure disinfection of heat labile linen

- These items need to be washed at ~40oC, so the wash temperature is insufficient to disinfect, and chemical alternatives are required;
- Addition of hypochlorite may be possible, but efficacy may be reduced by the presence of soiling, detergents and alkalis in the main wash;
- Disinfection with hypochlorite is only reliable if the linen can tolerate its addition and if sodium hypochlorite is added during the penultimate rinse of the cycle;
- A final concentration of 150 ppm available chlorine must be achieved for a minimum of 5 minutes exposure time.
- Use of a commercial laundry detergent with household bleach (according to product instructions and where suitable for fabrics) and a normal machine wash and machine dry are sufficient to clean soiled linen in a community living or home care setting.
- Machine drying or hanging clothing and linens on a clothesline at the home care site is also a suitable method for drying.

1.7.2.7.5 Patient items:

Domestic-type washing machines must only be used for a patient's personal items (not other linen). Washing must involve the use of an appropriate detergent and hot water. If hot water is not available, only individual patient loads can be washed at one time.

1.7.2.8 Drying, checking, ironing and folding linen

The steps of drying, checking, ironing and folding linen are the same for both machine and hand washing methods:

- Linen should be completely dry prior to further processing. Dry outdoors in the sun, if possible, keeping the fabric off the ground as well as free of dust and moisture;
- When the linen is completely dry, check for holes and/or worn areas;
- Iron and fold clean linen, including curtains, if possible. Do not iron and fold the linen that will be sterilized (ironing the material dries it out, making autoclaving more difficult). If surgical drapes should be sterilized, do not iron.

All linen should be removed from outdoor lines or machines at the end of the day and not left overnight.

1.7.2.9 Laundry environment/design

- Laundry facilities should be situated in an area that is separate from patient care areas and is not accessible to the public.
- The facilities/area should be used solely for linen processing and should be accessible only to those staff involved in these activities.
- There should be separate, secure areas for the processing and separate holding area for used/infectious and storage area for clean linen.
- The laundry should be designed to minimise frequent movement between areas for storing/processing used/infectious linen and clean linen.
- Drainage and water systems should be designed to minimise the spread of infectious agents in aerosols; closed drainage systems should be used where possible and any open drains should be covered.
- Routine environmental cleaning should be in place in addition to cleaning and disinfection of equipment. containing contaminated laundry must be clearly identified with labels, color-coding (yellow for infectious), so that health-care workers is able to handle these items safely.

1.7.2.10 Sterile linen

Surgical gowns and linens used in sterile procedures shall be sterilized by steam after the normal washing and drying cycle to destroy any residual spores. If surgical drapes should be sterilized, do not iron. Disposable items for use in sterile procedures may be more cost-effective in some situations.

1.7.2.11 Protection of laundry workers

To protect against infection and cross-contamination, staff should be provided with uniforms and personal protective equipment (PPE). All staff should be trained and competent in the use of PPE, including the safe removal and disposal of PPE.

- Staff changing facilities should be provided
- Hand washing facilities should be provided at entry/exit points of all washing/reprocessing areas.
- Staff handling linen should ensure that any abrasions or cuts on the hands are covered with a waterproof dressing.
- Staff should wear PPE at all times when handling linen, such as:
  - disposable gloves (puncture resistant if necessary);
  - disposable plastic aprons.
- PPE should be safely removed and disposed of when moving between dirty and clean areas.
- Laundry workers, as other health care workers, shall be offered immunization against vaccine preventable diseases specially Hepatitis B.
- Laundry workers are at risk from contaminated sharps, instruments or broken glass that may be contained with linen in the laundry bags. It is recommended that staff should wear heavy duty gloves when handling dirty laundry.

Resources:

Health protection Scotland, Linen Services Advisory group, 2018.National Guidance for Safe Management of Linen in NHS Scotland Health and Care Environments For laundry services/distribution

https://hpspubsrepo.blob.core.windows.net/hps-website/nss/1814/documents/1_linen-guidance-v2.2-may-2018.pdf

Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee. Best practices for environmental cleaning for prevention and control of infections in all health care settings. 3rd ed. Toronto, ON: Queen's Printer for Ontario; 2018. Link: https://www.publichealthontario.ca/-/media/documents/B/2018/bp-environmental-cleaning.pdf

Health and Safety Executive (HSE). Guidance Topics on Biosafety Blood borne viruses (BBV): Decontamination, Laundry treatments at high and low temperatures. Link: http://www.hse.gov.uk/biosafety/blood-borne-viruses/laundry-treatments.htm

CDC, 2003. Environmental Infection Control Guideline; Laundry and bedding. Link: https://www.cdc.gov/infectioncontrol/guidelines/environmental/background/laundry.html

WHO, Water, sanitation, hygiene, and waste management for SARS-CoV-2, the virus that causes COVID-19 Interim guidance 29 July 2020. Link file:///C:/Users/Nazla%20M/Dropbox/PC/Downloads/WHO-2019-nCoV-IPC_WASH-2020.4-eng.pdf

1.8 ASEPTIC TECHNIQUE

Aseptic technique refers to practices designed to render and maintain objects and areas maximally free from microorganisms and aid in the prevention of surgical site, urinary tract, bloodstream, and pneumonia infections that may be device or procedure-related.

It protects patients during invasive clinical procedures by employing infection control measures that minimise, as far as practicably possible, the presence of pathogenic microorganisms.

1.8.1 Aseptic non-touch technique (ANTT)

ANTT is a technique used to prevent contamination of key parts and key sites by microorganisms that could cause infection. In ANTT, asepsis is ensured by identifying and then protecting key parts and key sites by hand hygiene, non-touch technique, using new sterilised equipment and/or cleaning existing key parts to a standard that renders them aseptic prior to use.

1.8.2 Risk assessment

While the principles of ANTT remain constant for all clinical procedures, the level of practice will change depending upon a standard ANTT risk assessment. Taking into account the technical difficulty of the procedure and his or her own competence, the healthcare worker assesses whether procedures can be performed without touching key parts and key sites directly. Infective precautions are then selected to counter the risks identified. For example, if it were necessary to touch a key part directly, sterile gloves would be the gloves of choice. Otherwise non-sterile gloves would be used.

1.8.3 Core infection control components of ANTT

1.8.3.1 Key part and key site identification and protection

Key parts must be identified and protected at all times. Aseptic key parts must only come into contact with other aseptic key parts and/or key sites.

1.8.3.2 Hand hygiene

Effective hand hygiene is an essential component of ANTT. In Standard ANTT, hand hygiene should be performed as outlined. In Surgical ANTT, a surgical hand scrub is required

1.8.3.3 Glove use

Gloves are single-use items. In ANTT, if it is necessary to touch key parts or key sites directly, sterile gloves are used to minimise the risk of contamination. Otherwise, non-sterile gloves are typically the gloves of choice.

1.8.3.4 Aseptic fields

A controlled aseptic working space help promote or ensure the integrity of asepsis during clinical procedures. It is also important that aseptic fields are fit for purpose. In ANTT, aseptic fields are increased in size and sterilised drapes added on the basis of procedure complexity; for example in IV therapy, 'mobile' aseptic fields such as plastic trays should be large enough and with high sides to provide an adequate working space to contain equipment, sharps and spillages. ANTT employs two types of aseptic field that require different management depending on whether the primary purpose is to promote or ensure asepsis.

Critical aseptic fields; ensuring asepsis

Critical aseptic fields are used when key parts and/or key sites, usually due to their size or number, cannot easily be protected at all times with covers and caps, or handled at all times by a non-touch technique (such as in PICC line, urinary catheter insertion, complex wound care etc), or when particularly open and invasive procedures demand large aseptic working areas for long durations, as in the operating room. In such cases, the critical aseptic field demands to be managed as a key part (i.e. only equipment that has been sterilised can come into contact with it). Such a critical aseptic field demands the use of sterilised gloves and, often, full barrier precautions (Pratt et al 2007). Large main critical aseptic fields are used in Surgical ANTT and as a result, technique is more complicated.

A sub-type of a main critical aseptic field is the critical micro aseptic field. Traditional nontouch/ clean techniques have protected key parts by syringe caps, sheathed needles, covers or packaging etc. This often-understated approach is given new emphasis in ANTT, because the inside of such caps and covers have been sterilized and thus provide an optimum all-encompassing aseptic field for key parts.

General aseptic fields; promoting asepsis

General aseptic fields are used in Standard ANTT when key parts can easily and optimally be protected by critical micro aseptic fields and a non-touch technique. The main general aseptic field does not have to be managed as a key part and is essentially promoting rather than ensuring asepsis.

Subsequently, aseptic technique is considerably simplified and typically involves non-sterile gloves.

Standard ANTT and the use of a general main aseptic field and critical

Figure 21: Standard ANTT

Surgical ANTT and the use of a main critical aseptic field

Figure 20: Surgical ANTT

Key parts are the sterile components of equipment used during the procedure.

Examples include bungs, needle hubs, syringe tips, dressing packs etc.

Key sites include any non-intact skin and insertion or access sites for medical devices connected to the patient.

Examples include insertion/access sites of intravenous devices, urinary devices, open wounds etc.

1.8.3.5 Environmental control

Prior to aseptic procedures, healthcare workers must ensure that there are no avoidable nearby environmental risk factors, such as bed making or patients using commodes.

1.8.3.6 Sequencing

When performing a procedure, practice must be sequenced to ensure an efficient, logical and safe order of procedure events. Practice guidelines provide direction as to the correct order in which preparation and completion of the procedure should be undertaken.

Clinicians should be familiar with the sequence of these events prior to commencing the procedure to ensure preparation for the procedure is complete and to ensure adherence to AT. ANTT practice is sequenced to ensure an efficient, logical and safe order of procedure events.

Table 22: Required ANTT for various procedures and rationale

Procedure	Standard /Surgical ANTT	Rationale/typical procedure
IV therapy	Standard ANTT	Key parts can typically be protected by optimal critical micro fields and non-touch technique. Key sites are small. Procedures are technically simple and <20 mins duration
Simple wound dressings	Standard ANTT	Key parts and sites can be protected by optimal critical micro fields and non-touch technique. Procedures are technically simple and <20 mins duration
Complex or large wound dressings	Surgical ANTT	The complexity, duration or number of key parts may demand a critical aseptic field.
Urinary catheterisation	Standard/ Surgical ANTT	An experienced healthcare worker can perform Catheterization with the use of a main general aseptic field, micro-aseptic-fields and a non-touch technique. However, less experienced healthcare workers may require a critical aseptic field.
Cannulation	Standard/ Surgical ANTT	Although technically quite simple the close proximity of healthcare worker hands to the puncture site and key parts may demand sterile

		gloves – dependant upon healthcare worker competency.
PICC/CVC insertion	Surgical ANTT	The size of the CVC or PICC line, invasiveness, numerous key parts and equipment and duration will demand a critical aseptic field and full barrier precautions
Surgery Surgical	Surgical ANTT	Surgical access involves deep or large exposed wounds, numerous key parts and equipment and long procedures. Standard operating room precautions required.

Resources:

National Health and Medical Research Council (2019). Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019

1.9 HANDLING AND DISPOSAL OF SHARPS

Refer to the waste management section 1.7

Refer to occupational health section for management of sharp injury 1.10

The use of sharp devices exposes healthcare workers to the risk of injury and potential exposure to bloodborne infectious agents, including hepatitis B virus, hepatitis C virus and human immunodeficiency virus (HIV)

1.9.1 Risk of blood borne virus (BBV) transmission after a needle stick injury

Table 23: Risk of BBV transmission after needle stick injury

Infection	Risk of infection in healthcare worker
Hepatitis B (HBV)	Up to 30%*
Hepatitis C (HCV)	1-3%
HIV	0.3%

*non immune HCW exposed to HBeAg positive source

Sharps injuries can occur in any healthcare setting, including non-hospital settings such as in office based practices, home health care and long-term care facilities. Hollow bore needles are of particular concern, especially those used for blood collection or intravascular catheter insertion, as they are likely to contain residual blood and are associated with an increased risk for bloodborne virus transmission. Non-hollow bore sharps such as glass vials and butterfly needles have also been involved in sharps incidents.

Table 24: Examples of hollow bore and non hollow bow sharps

Hollow bore sharps	Non-hollow bore sharps
Disposable needles/ syringes	Glass vials
Steel-winged (butterfly) needles	Dental probes
Intravenous catheter stylets	Scalpel blades
Multi-sample blood collection needles	Suture needles

Arterial blood collection syringe needles Aspiration needles Injector pen needles	Retractors Skin or bone hooks Sharp electrosurgical tips

1.9.2 When is a sharp injury most likely to occur

- during use of a sharp device on a patient (41%);
- after use and before disposal of a sharp device (40%);
- during or after appropriate or inappropriate disposal of sharp devices (15%).

1.9.2.1 Standard measures to avoid sharps injuries

These include handling sharp devices in a way that prevents injury to the user and to others who may encounter the device during or after a procedure.

- Verbal announcements when passing sharps
- Avoiding hand-to-hand passage of sharp instruments by using a basin or neutral zone
- Using round-tipped scalpel blades instead of pointed sharp-tipped blades.
- Health care workers should NOT recap or bend or break needles by hand
- Use of instruments, rather than fingers, to grasp needles, retract tissue, and load/unload needles and scalpels
- Incidences of sharp injury or HCW exposed to risk of sharp injury (missed event) should be reported according to the institutional incident reporting mechanism.

1.9.2.2 Disposing of sharps and syringes

- Sharps should be segregated at the point of use and collected directly in sharps container
- Discard sharps items and complete needle and syringe units directly into sharps box immediately after use.
- Where possible, used sharps should not be taken to the sharps box, the box should be taken to the patient bedside.

- Place sharps boxes at eye level and within arm's reach and must be easily available in all areas where clinical sharps are used, but must not be accessible by children/young people.
- Establish means for the safe handling and disposal of sharps devices before the beginning of a procedure
- Sharp box colour : white (commercially provided sharp boxes may also be red or yellow)
    - Must be rigid and puncture proof and should have been approved by the Infection Prevention & Control Team
    - Must be assembled correctly and checked to ensure all connections are solid.
    - MUST NOT be overfilled (not more than ¾ th full). DO NOT OVER FILL THE SHARPS CONTAINERS
    - Must be made secure prior to placing for collection and must not be left where there may be access by children/young people.
    - Must be labelled with the:
        - Hospital name, ward/department/clinic.
        - Name of the individual who assembled box, and date of assembly.
        - Name of individual who closed and locked/disposed of it.
    - The box must be dated before being sent for disposal as stated.
    - DO NOT attempt to remedy the situation by pushing the items inside, if any sharps are protruding through the container or opening,
    - DO NOT decant any of the contents. If a container has been overfilled, If possible place inside a larger sharps container and arrange for disposal. An incident form should be completed as a 'near miss' and the head of department informed.
- Locate needle cutters near point of generation to facilitate disposal
- Immediately after administrating injection, the needle of the syringe shall be cut using mechanical syringe cutter (in such a way that the needle gets broken and plastic hub of syringe through which root of needle is attached also gets detached from syringe). There shall be a puncture proof sturdy white translucent container below the needle cutter blades so that the detached needle automatically falls in the container.
- Syringe after the needle is removed after cutting should be segregated into a blue container as this is no longer in sharps category but an infectious plastic waste.

- The other categories of sharps wastes such as broken vials/ampoules, glass bottles, seizures, scalpels, blades etc. shall be segregated in white translucent puncture proof container.

Resources:

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep 2018;67(No. RR-1):1–31. DOI: http://dx.doi.org/10.15585/mmwr.rr6701a1

National Occupational Research Agenda (NORA) CDC, 2019. What to do following a sharp injury. Link: https://www.cdc.gov/nora/councils/hcsa/stopsticks/whattodo.html

National Health and Medical Research Council (2019). Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019

Public Health England, 2019. Guidance on management of potential exposure to blood-borne viruses in emergency workers: For occupational health service providers and frontline staff. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/835888/Guidance_on_management_of_potential_exposure_to_blood__2_.pdf

Indian Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

1.10 OCCUPATIONAL HEALTH IN INFECTION CONTROL

The prevention of infectious disease transmission among HCW and patients is a critical component of safe healthcare delivery in all healthcare settings. OHS provides occupational IPC expertise to an HCO and services to HCP

Major components aimed at reducing risks of acquiring infections for HCW include:

- Health status screening and immunization
- Education on safe work practices that minimise the transmission of infection
- Safe systems of work, with workplaces designed to allow clinical practice that minimizes transmission of infection
- Physical protection, involving the use of PPE and PEP
- Reporting systems for compliance and identifying breaches of infection prevention and control protocols.

1.10.1 Health status screening

Routine screening at the start of employment occurs in three forms:

- Personal assessment of disease and immune status—a questionnaire (with recording of information gained) should check for details of medical history particularly for rubella, measles, chickenpox (varicella), hepatitis B, immunization: MMR, Hep B, dTaP/dT/ Chicken pox, immune disorders, skin conditions and pregnancy.
- Immunization records (childhood and adult vaccination records)
- Laboratory and other screening: HCW need to have documentation of their HIV, Hepatitis B and HCV (pre- employment health screening and CXR as needed if any significant history identified during screening). Pre-employment screening will conform to the national and institutional policies.

1.10.2 Immunization

Employers should take all reasonable steps to ensure that staff members are protected against vaccine-preventable diseases. Where healthcare workers may be at significant occupational risk of acquiring or transmitting a vaccine-preventable disease, a comprehensive occupational vaccination program should be implemented. Such a program should include:

- a vaccination policy

- maintenance of current staff vaccination records
- provision of information about the relevant vaccine-preventable diseases
- the management of vaccine refusal (which should, for example, include reducing the risk of a healthcare worker transmitting disease to a vulnerable patient).

1.10.2.1 Recommended vaccination for all health care worker directly involved in patient care

- Hepatitis B vaccination (3 dose series)
- Annual Influenza vaccination
- MMR (preferred) /MR vaccination (2 doses)
- COVID-19 vaccination and boosters as relevant for the period

1.10.2.2 Further vaccines which maybe offered to HCW

- Varicella vaccination two doses (if no past history of documented chicken pox disease, immunity or vaccination); particularly for those working with high risk patients such as neonates and immunocompromised patients
- Tdap if not received previously received (and required during each pregnancy for female HCW)
- Td is required every 10 yearly

Table 29: Exposer risk categories and examples

Category	Risk	Example
A	Direct contact with blood or body substances. This category includes all persons who have physical contact with, or potential exposure to, blood or body substances	Dentists, medical practitioners, nurses, allied health practitioners, health care students, laboratory staff, maintenance engineers who service equipment, sterilizing service staff, cleaners, and staff responsible for the decontamination and disposal of contaminated materials.
B	Indirect contact with blood and body substances Rarely have direct contact with blood or body substances. These employees may be exposed to infections spread by the airborne or droplet	Catering staff and ward clerks

	routes, but are unlikely to be at occupational risk from blood borne diseases.	
C	Minimal patient contact Occupational groups that have no greater exposure to infectious diseases than do the general public. The exact nature of job responsibilities should be considered when deciding immunisation requirements and all staff should be encouraged to be fully vaccinated.	Office clerical staff, gardening staff and kitchen staff
Laboratory staff	May have additional vaccination requirements if they are working with or may be exposed to specific agents, e.g. Q Fever, anthrax, poliomyelitis, Japanese encephalitis	

Table 30: Immunization in health care setting and occupational risk consideration

Vaccine	Risk category	Vaccination/screening notes	Occupational consideration
Hepatitis A	A	Two doses at 6 to 12 months apart	Recommended for healthcare workers who work with persons with intellectual disabilities, child care staff, maintenance staff in contact with sewage.
Hepatitis B	A	If there is no documented evidence of completed hepatitis B vaccination or up-to-date serological evidence: • Give 3 doses at (0,1,6m) • And get antiHBs serology done 1-2 months after 3rd dose To be considered immune a blood test result (anti-HBs) must be provided. Anti-HBs ≥10 IU/L at any stage post vaccination indicates lifelong immunity to hepatitis B. Pre-employment screening if the antiHBS <10 IU/L and with no documented antiHBS titer done after primary series then one dose of Hep B vaccination can be given with antiHBS titer 1-2 months after the booster dose. If antiHBS titer still low after booster then complete the second series and recheck anti-HBS titer.	Non responders to initial vaccination series can be offered another 3 doses series and antibody level retested. If antibody level is still low HCW would remain susceptible to HBV infection and would also need to have an HBsAg test done for confirmation of status.

Hepatitis C	A	No available vaccine	Ensure appropriate standard and transmission-based precaution
HIV	A	No available vaccine	Ensure appropriate standard and transmission-based precaution
Influenza	A, B	One dose of influenza vaccine annually	Annual influenza vaccine may be offered to all staff
Measles, mumps and rubella	A, B	It is recommended for all HCW get 2 doses of measles and rubella containing vaccine taken at least one month apart or HCW should have documented evidence of receipt of the 2 doses.	Category C staff should be included as measles is highly infectious
Pertussis	A, B	One dose Tdap if not immunized with dTap during or after adolescent period (regardless when previous Td was given).	Staff working with neonates and pregnant women are at high risk of exposure and of transmitting infection to vulnerable patients Tdap for all pregnant HCW
Tuberculosis (TB)	A	Medical health check before employment and CXR as needed	
Chicken pox	A, B	Healthcare workers can be considered immune if they have a documented medical history of chicken pox or shingles. Healthcare workers with an unsure history can get vaccinated with 2 doses 4 weeks apart	To be considered for healthcare workers with patient contact especially those taking care of high risk patients like neonates and immunocompromised patients.
Td vaccination	A, B	10 yearly	Also recommended for those collecting waste

1.10.3 Healthcare workers with specific circumstances

Where a healthcare worker is known to be particularly susceptible to healthcare associated infections, work duties are assessed to ensure that the welfare of that person, patients and other healthcare workers is safeguarded. This may involve appropriate work placements, adjustments or restrictions, or deployment to a role involving less risk. Healthcare workers in this situation may require counseling on what tasks they can perform, what they should avoid and the possible impact of their work on their health.

1.10.3.1 Pregnant heath worker

Employers should provide information on the risks associated with pregnancy and should assist pregnant healthcare workers to avoid infectious circumstances that may present a risk to her or the baby. It is the responsibility of pregnant healthcare workers to advise their doctor and employer of their pregnancy; this information must remain confidential.

All pregnant healthcare workers should adhere to standard and transmission-based precautions and ensure that they are appropriately vaccinated. However, pregnant non-immune healthcare workers should be given the opportunity to avoid patients with specific infections such as given below;

- Rubella, measles, Chicken pox, Pertussis and Parvo B19 infection.

1.10.3.2 Immunocompromised healthcare workers

Healthcare workers with immune deficiencies are more at risk of acquiring infections. The type of employment they can undertake should include only duties that will minimise their exposure to infections. Predisposing conditions include neutropenia, disseminated malignancy and infections that produce immunodeficiency (e.g. HIV).

1.10.3.3 Healthcare worker with skin condition

Skin integrity is the ultimate barrier to transmission of infectious agents. When staff members have damaged skin or weeping skin conditions (e.g. allergic eczema, psoriasis, exfoliating dermatitis), they may be readily colonised by healthcare associated microorganisms and may become a vehicle for disseminating these organisms.

- Healthcare workers in this situation should be identified by personal history screening when they start employment and need to be informed of the risks they may pose to patients.
- Any damaged skin must be appropriately covered before healthcare workers carry out procedures.
- Consideration must be given to providing these staff members with appropriate, individual PPE such as specific types of gloves, or glove liners, hand hygiene product and moisturising lotion.

1.10.4 Occupational exposures in healthcare

Exposure prone procedures (EPPs) are invasive procedures where there is potential for direct contact between the skin, usually finger or thumb of the healthcare worker, and sharp surgical instruments, needles, or sharp body parts (e.g. fractured bones), spicules of bone or teeth in body cavities or in poorly visualised or confined body sites, including the mouth of the patient.

During EPPs, there is an increased risk of transmitting bloodborne viruses between healthcare workers and patients. Risk of BBV transmission is present with percutaneous exposure and mucous membrane exposure. Exposures that involve intact skin do not have risk of BBV transmission and exposures to body fluids like feces, nasal secretions, saliva, sputum, sweat, tears, urine and vomitus do not carry a risk of blood borne pathogen transmission unless these are visibly contaminated with blood.

1.10.4.1 Risk of blood borne virus (BBV) transmission after a needle stick injury

Factors that may increase the risk of blood borne virus (BBV) transmission and influence management of the incident are:

- percutaneous injury rather than mucous membrane or broken skin exposure
- injury with a device from a source patient's artery or vein
- blood exposure rather than exposure to blood stained fluid, diluted blood (for example in local anaesthetic solution) or other body fluid
- injury from hollow bore rather than solid bore needle
- injury from wide gauge rather than narrow gauge needle
- deep rather than superficial injury
- visible blood on the device
- no protective equipment used (like gloves, double gloves, eye protection)
- first aid measures not implemented (washing, bleeding)
- HCV RNA detectable in source patient on most recent blood test
- high viral load of HIV in source patient
- HBeAg detectable in source patient blood
- exposed person not, or inadequately, immunised against hepatitis B
- source patient co-infected with more than one BBV.

Table 32: Risk of BBV transmission after needle stick injury

Infection	Risk of infection in healthcare worker
Hepatitis B (HBV)	Up to 30%*
Hepatitis C (HCV)	1-3%
HIV	0.3%

*non immune HCW exposed to HBeAg positive source

1.10.4.2 The three categories of exposure prone procedures:

Table 31: Categories of exposure prone procedures

Category 1	A procedure where the hands and fingertips of the healthcare worker are usually visible and outside the body most of the time and the possibility of injury to the worker's gloved hands from sharp instruments and/or tissues is slight. This means that the risk of the healthcare worker bleeding into a patient's open tissues should be remote (e.g. insertion of a chest drain).
Category 2	A procedure where the fingertips may not be visible at all times but injury to the healthcare worker's gloved hands from sharp instruments and/or tissues is unlikely. If injury occurs it is likely to be noticed and acted upon quickly to avoid the healthcare worker's blood contaminating a patient's open tissues (e.g. appendectomy).
Category 3	A procedure where the fingertips are out of sight for a significant part of the procedure, or during certain critical stages, and in which there is a distinct risk of injury to the healthcare worker's gloved hands from sharp instruments and/or tissues. In such circumstances it is possible that exposure of the patient's open tissues to the healthcare worker's blood may go unnoticed or would not be noticed immediately (e.g. hysterectomy).

1.10.4.3 Elimination of sharp hazard

1.10.4.3.1 Removal of all unsafe devices

Complete removal of a hazard from the work are is the most effective way to control hazards; this approach should be used whenever possible.

Examples include:

- Removing sharps and needles when possible e.g. substituting jet injectors for needles and syringes or using needles less intravenous systems.

- eliminating all unnecessary injections
- eliminating unnecessary sharps such as towel clips

1.10.4.3.2 Work controls

These controls to change the behaviour of workers to reduce exposure to occupational hazards. Examples of work controls to prevent blood born virus exposure (BBV) include:

- no needle recapping or resheathing
- safe construction of sharps containers
- placing sharps containers at eye level and within arms
- disposing of sharps immediately after use in designated sharps containers
- sealing and discarding sharps containers when they are three quarters full
- establishing means for the safe handling and disposal of sharps devices
- use of sharps protection devices for all procedures (devices with needles that retract, sheathe or blunt immediately after use)
- Ensure good lighting and adequate space to carry out the procedure.
- Personal Protective equipment: These provide barriers and filters between the worker and the hazard. They will prevent exposures to blood splashes but will not prevent needle stick injuries.
    - Gloves: Although a needle or sharp instrument can easily penetrate a glove, the risk of transmission of infection is significantly reduced. The glove material will remove up to 86 per cent of the blood on the outside of a needle. An inner glove will remove most of blood not removed by the outer glove. Double gloving therefore substantially reduces the risk of blood-borne virus transmission from a sharps injury.
    - Eye protection: This is important wherever blood or other body fluids could splash into the eye. Ordinary prescription spectacles offer some, but inadequate, protection, as they are not generally designed for this purpose. Eye protection should therefore be worn routinely not just in operating theatres, delivery suites and endoscopy suites, but also in accident and emergency departments and any other clinical areas where pressure may lead to spurting or splashing of body fluids, such as when unblocking or irrigating lines and tubes. Blood may become aerosolized due to surgical drilling techniques, such as those used in orthopedic surgery, and mucous membrane exposure may not always be recognized. There

are many designs of safety spectacles now available, many of which will fit over prescription lenses and frames.

1.10.4.3.3 Administrative controls with promotion of no blame culture

These are policies such, which aim to limit exposure to the hazard. Examples include:

Health and safety responsibilities of all staff are clear, well coordinated and adequately resourced. Sharps injury prevention committee (may be part of health and safety committee) a sharps policy which covers exposure prevention as well as treatment (e.g. access to care, especially after hours), follow up reference and feed back to sharps injury prevention in infection control and procurement policies. Healthcare workers should be aware that they must report occupational exposures immediately.

1.10.4.3.4 Consistent information and training

Should include safe systems of work, correct use and disposal of sharps, the use of medical devices incorporating sharps protection mechanisms, measures to be taken in the event of a sharps injury, how to use any PPE provided.

1.10.4.4 Other exposures and recommended PEP

Neisseria meningitides infection:

N. meningitides can be transmitted through respiratory secretions. Occupational infections are rare, but the severity of the disease warrants appropriate chemoprophylaxis for close contact between patients and health care workers.

Close contact is defined as direct mouth-to-mouth contact as in resuscitation attempts. Recommended prophylaxis includes one of the following: a single dose of ciprofloxacin (500 mg), or a single dose of ceftriaxone (250 mg) IM. Rifampicin is not recommended for chemoprophylaxis in view of high prevalence of tuberculosis in India.

Mycobacterium tuberculosis:

Transmission to hospital staff occurs through airborne droplet nuclei, usually from patients with pulmonary tuberculosis. The association of tuberculosis with HIV infection and multidrug-resistant tuberculosis are a current major concern. Refer to National TB PEP guideline.

Other infections (Varicella, Hepatitis A and E, Influenza, Pertussis and Diphtheria):

Transmission of these microorganisms may be uncommon, but policies to manage staff exposure should be developed.

Table 33: Post Exposure Prophylaxis (PEP) for other important infectious agents

Disease	Route of transmission	Incubation period	PEP indication	PEP Regime	Comment
Meningococcal	Droplet	1-10days (usually < 4 days)	High risk contact: Mouth to mouth resuscitation, unprotected contact during endotracheal intubation at any time 7 days before onset of illness	Ciprofloxacin 500mg PO one dose	Patient is infectious till 24 hours after initiation of appropriate antibiotics
Pertussis	Droplet	7-10 days (range 5-21)	Those who had unprotected exposure to pertussis and likely to be exposed to patient with risk of severe pertussis (hospitalized neonates and pregnant women)	Azithromycin PO 500mg single dose on day 1 followed by 250mg single dose from day 2 to 5	Patient is infectious till complete 5 days of appropriate antibiotics or till 21 days after onset of symptoms if no antibiotic given One dose of Tdap to HCW who previously have not received Tdap
Chicken Pox	Airborne	14-16 days (10-21days)	HCW with no evidence of varicella immunity: 2 doses of varicella vaccine Evidence of varicella infection	Varicella vaccine within 3 to 5 days after exposure	Infectious period 1-2 days before onset of rash till all lesions have crusted (minimum 5 days)
Hepatitis A	Feco-oral	15-50 days (average 28 days)	Exposed HCW without documented evidence of HAV vaccine	≤ 40 years HAV vaccine (2nd dose after 6 months) ≥41 years IVIG (within 2 weeks of	Standard and contact precaution for diapered and incontinent patient till 1 week after onset of symptoms

				exposure) or if not available HAV vaccine	
Measles	airborne	8-14 days (range 7-21 days)	Exposed HCW without evidence of 2 doses of measles containing vaccine	Measles vaccine within 72 hours exposure limit/ modify infection	Measles is contagious 4 days before to 4 days after rash and need airborne precaution in hospital

1.10.5 Exclusion periods for healthcare workers with acute infections

It is recommended that every healthcare facility to have comprehensive written policies regarding disease-specific work restriction and exclusion, which include a statement of authority defining who can implement such policies. Please follow the latest national guidelines for specific diseases.

Any employee who has an infectious disease has a responsibility to:

consult with an appropriate medical practitioner to determine that they are capable of performing their tasks without putting patients or other workers at risk

undergo regular medical follow-up and comply with all aspects of informed clinical management regarding their condition.

These policies should encourage healthcare workers to seek appropriate preventive and curative care and report their illnesses, medical conditions, or treatments that can render them more susceptible to opportunistic infection or exposures. They should not penalise healthcare workers with loss of wages, benefits, or job status.

Table 34: Recommended exclusion periods for healthcare workers with different infections

Acute infection	Exclusion period
Conjunctivitis	Must not provide patient care for the duration of symptoms (i.e. while eye discharge is present)
Gastroenteritis	Must not come to work while symptomatic (e.g. diarrhea and/or vomiting) and until 24 hours after symptoms have resolved *for norovirus 2 days after diarrhea cease
Glandular fever (Infectious mononucleosis)	NO need for exclusion, even if having direct patient contact, provided staff members are well enough to return to work and employ standard precautions
Herpes Simplex (cold sores)	Must not provide direct care to neonates, newborns, patients in delivery suites, severely immunocompromised patients, burns patients, patients with extensive eczema, or patients in operating room if there is an exposed herpetic lesion May provide direct patient care to other patients, do not need to wear a mask
Herpes Zoster (Shingles)	Must not provide ANY direct patient care if lesions cannot be covered (e.g. ophthalmic zoster) If active lesions can be covered, can provide care to all patients except for pregnant women, neonates, severely immunocompromised patients, burns patients and patients with extensive eczema.
Influenza	Employees should remain off work for 5–6 days or until they are symptom free
Norovirus	Must not come to work while symptomatic (e.g. diarrhea and/or vomiting) and until 48 hours after symptoms have resolved
Pertussis (Whooping Cough)	Remain away from work until at least 5 days after commencement of appropriate antibiotic therapy; or for 21 days after the onset of symptoms if not receiving antibiotic treatment (especially not to work with infants and pregnant patients).
Staphylococcal infection	Any staphylococcal lesions (e.g. boils, wound infections) must be covered with an occlusive dressing while at work. If lesions cannot be covered, must not perform patient care or prepare hospital food until they have received appropriate antibiotic therapy and the infection has resolved
Streptococcal infection	Any employee with streptococcal lesions (e.g. impetigo, tonsillitis) must ensure that lesions are covered with an occlusive dressing while at work. If lesions cannot be covered, employees must not provide direct patient care nor prepare hospital food until 24 hours after commencement of appropriate antibiotic therapy. Employees with pharyngitis/tonsillitis should avoid patient contact for at least 24 hours after starting appropriate antibiotic therapy.

Tuberculosis (TB)	If TB disease is suspected or is present, staff to be notified to TB specialists and treated. Any personnel with pulmonary TB is to be excluded from the workplace until cleared by specialist. Any active TB must be monitored.
Viral rashes	Measles (Rubeola)—If suspected, must remain off of work until appropriate test results are known. May return to work if they have serological evidence of immunity (i.e. are IgG seropositive and IgM sero-negative); but must be excluded until 4 days after the appearance of the rash if they develop measles. Mumps—If suspected, must remain off work until appropriate test results are known. May return to work if they have serological evidence of immunity (i.e. are IgG sero-positive and IgM sero-negative). Must be excluded from work for 9 days after the onset of parotid gland swelling if they develop mumps. Rubella (German Measles)—If suspected, must remain off work until appropriate test results are known. May return to work if they have serological evidence of immunity (i.e. are IgG seropositive and IgM sero-negative). Personnel must be excluded for 4 days after the appearance of the rash if they develop Rubella. Chickenpox (Varicella)—Before starting employment, personnel should be screened by completing a pre-employment health assessment; non immune staff should be offered vaccination unless contraindicated; personnel must be until all blisters have dried. Human Parvovirus B19 (Slapped Face)—does not require exclusion from work, non-infectious once rash develops.
Viral respiratory tract infections (e.g. common cold)	Staff should be excluded from contact with susceptible persons, until they are no longer symptomatic and recommended for Staff with viral respiratory tract infections to at home until they feel well.
SARS-CoV infection*follow latest National Guidelines	Mild infections 14 days from symptoms onset with At least 3 days (72 hours) without symptoms (without fever* and respiratory symptoms) (If symptomatic with fever, cough or shortness of breath at the end of 14 days, should seek medical care and continue to isolate for a duration of 21 days 14 days from onset of symptoms) Moderate to severe infections: 21 days from the date of obtaining the sample of the positive PCR test and At least 3 days (72 hours) without symptoms (without fever and respiratory symptoms)

1.10.6 Healthcare workers Education

Healthcare workers should be given Infection Prevention and Control orientation session at the time of joining and continued medical education at regular intervals

At a minimum, all staff (both clinical and non clinical) should be educated about:

- modes of transmission of infectious agents
- risk identification, assessment and management strategies including transmission-based precautions
- orientation to the physical work environment with a focus on its risks for infection
- safe work procedures
- correct use of standard precautions
- correct choice and use of PPE, including procedures for putting on and removing PPE and fit
- checking of respirators
- appropriate attire (shoes/hair/nails/jewelry)
- hand hygiene practices
- levels of cleaning required for clinical areas and equipment
- how to deal with spills
- safe handling and disposal of sharps
- reporting requirements of incidents such as sharps injuries and exposures
- waste management
- antibiotic policy and practice

1.10.7 Responsibilities of employer

Employers must ensure that employees who perform EPPs have access to appropriate information,

testing, training, counselling and vaccination programs. Serological testing may be provided by

the healthcare facility or healthcare workers may choose to seek testing from outside sources.

Healthcare facilities should aim to achieve voluntary compliance and self-disclosure by providing

an environment in which healthcare workers know their confidentiality will be maintained

1.10.8 Responsibilities of employer and healthcare worker

Healthcare workers who undertake EPPs have a responsibility to know their infectious status with regard to bloodborne viruses such as hepatitis B virus, hepatitis C virus and HIV, and should be given relevant information about the tests available and encouraged to have voluntary testing Healthcare workers who carry a bloodborne virus have a clear responsibility to follow the treatment recommended by their doctor and modify their involvement in direct patient care.

They must not perform EPPs if they are:

- HIV antibody positive
- Hepatitis B e antigen (HBeAg) positive and/or hepatitis B DNA positive at high titres
- Hepatitis C RNA positive (by nucleic acid test).

Healthcare workers who carry a bloodborne virus and are not in these categories must not perform EPPs until specialist medical advice has been sought. Healthcare workers who are currently hepatitis B surface antigen (HBsAg) positive and hepatitis B DNA negative or hepatitis C antibody positive and hepatitis C RNA negative must obtain ongoing medical advice regarding their potential infectiousness and the appropriateness of their continued performance of EPPs.

1.10.9 Protocol for percutaneous exposure

HC facility must have a protocol for management of sharp injuries. The protocol should include information on:

- Importance of seek care immediately if you sustain a sharps injury and first response
    - If skin is penetrated, wash the affected area immediately with soap and running water. Alcohol-based handrub can be used to clean the area if soap and water are not available.
    - Do not squeeze the affected area.
- Incident reporting to supervisor
- Complete an accident / incident report form, including the date and time of the exposure, how it happened, and name of the source individual (if known).
- Assessment for further intervention:
    - source patient if known
    - Status of exposed health care worker
- Appropriate management of Post-exposure prophylaxis if necessary (is most effective if implemented soon after the incident)
- Follow up care.

1.10.9.1 The source patient

- Known or unknown?
- If unknown, is there any indication of the origin of the device or body fluid? For example, was the device from a unit or area with patients known to have hepatitis B or C or HIV?
- If known, is the source patient known to be infected with hepatitis B, hepatitis C or HIV? The validity of negative results varies depending on how long ago the tests were done and current risks factors.
- If the source patient is not known to carry any of these infections, do they have any risk factors for them?
- The risk of being infected with HIV is increased in people from areas of high prevalence, particularly sub-Saharan Africa, men who have sex with men (MSM), intravenous drug users, people with HIV-infected mothers or with HIV-infected sexual partners.
- The risk of being infected with hepatitis C is increased by receipt of unscreened blood or untreated plasma products; sharing of injecting equipment while misusing drugs; sharps injury or mucous membrane splash exposure to blood from patients known to be infected, or at risk of infection with hepatitis C; involvement as a healthcare worker or a patient in invasive medical, surgical, dental or midwifery procedures in parts of the world where infection control precautions may have been inadequate; or with populations with a high prevalence of hepatitis C infection.
- The risk of being infected with hepatitis B is increased in intravenous drug users, men who have sex with men (MSM), and in people with hepatitis B- infected mothers or hepatitis B-infected sexual partners.
- If the source patient is known to be infected with HCV, is HCV RNA detectable on most recent test?
- If the source patient is known to be infected with HIV:
    - has there been a recent/current seroconversion illness?
    - are they terminally ill with HIV-related disease? If so viral load may be high.
    - what is the most recently recorded viral load?
    - are they taking anti-retroviral drugs?
    - is there any evidence of viral drug resistance?
- If the source patient is known to be infected with hepatitis B, are they:
    - HBsAg positive?

- HBeAg positive?

1.10.9.2 The exposed person

Hepatitis B immune status:

- unvaccinated?
- one, two, three or more doses of hepatitis B vaccine?
- date of last booster?
- most recent anti-HBs Antibody titer result and date?
- HBcAb positive (natural immunity)?

1.10.9.3 Response to a percutaneous exposure incident

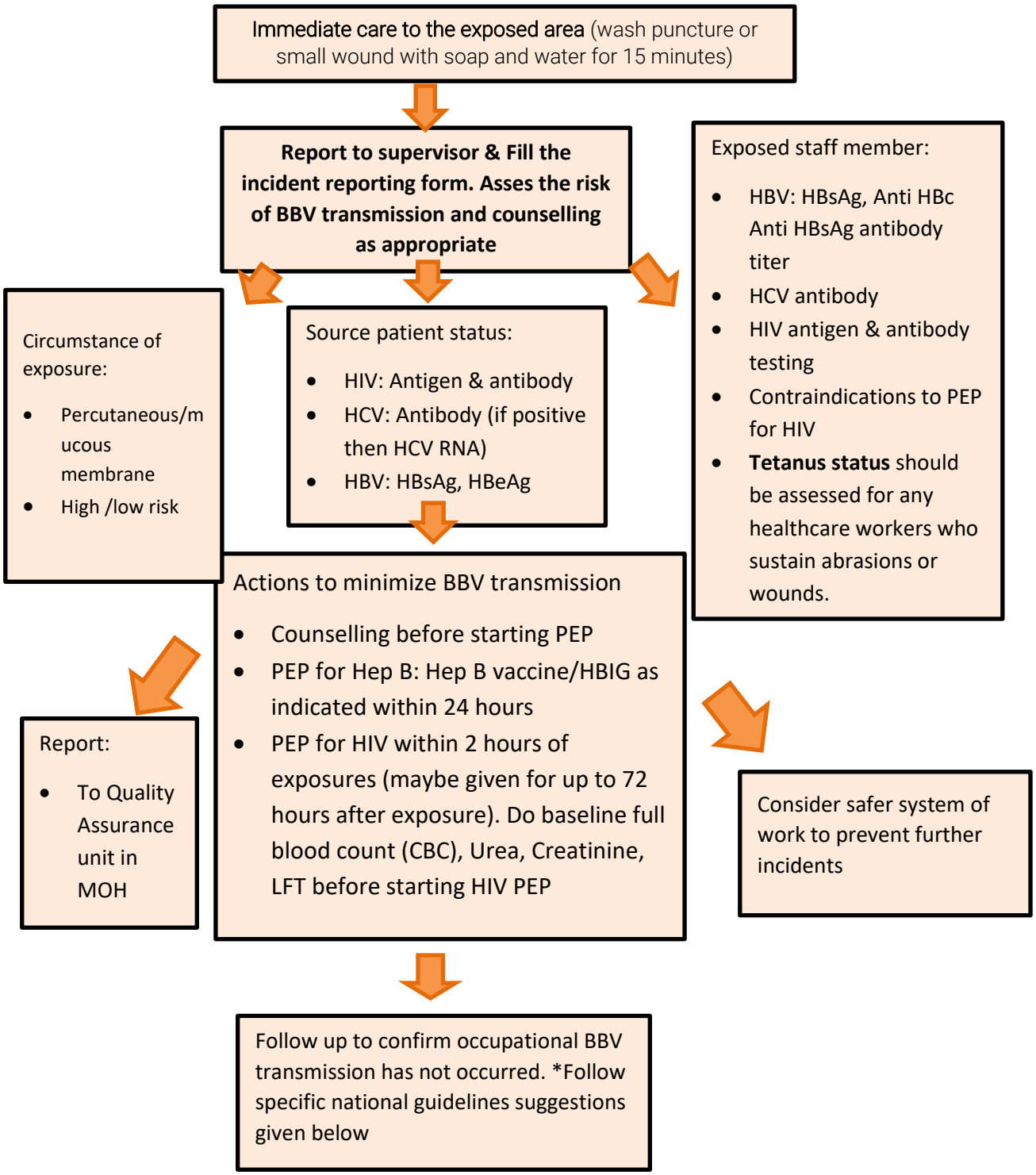


Table 35: Suggested follow-up testing after high risk exposure to BBV

Suggested follow up testing after percutaneous exposure to a positive/ high risk source (Check updated National guidelines)			
	Hepatitis B	**Hepatitis C**	**HIV**
4 weeks:	-	HCV RNA	HIV Ag/Ab (depending on available tests)
12 weeks	-	HCV RNA HCV Antibody	HIV Ag/Ab
6 months	Anti HBc antibody HBsAg	HCV antibody	
1-2 months after Post hepatitis B vaccination completion anti HBs titer			

1.10.9.4 Testing and PEP for specific BBV exposure

1.10.9.4.1 Hepatitis B post exposure prophylaxis (PEP) indication

Healthcare personnel status	Post exposure testing		Post exposure prophylaxis		Post vaccination serologic testing[2]
	Source patient (HBsAg)	HCP testing (anti-HBs)	HBIG[1]	Vaccination	
Documented responder[3] after complete series	No action needed				
Documented non-responder[4] after 2 complete series	Positive/ Unknown	_____[5]	HBIG x 2 separated by 1 month	_____	No (Do only anti HBc total)
	Negative	No action needed			

Response unknown after complete series	Positive/ Unknown	<10mIU/ml[5]	HBIG x1	Initiate revaccination (for HCW with documented ≥ 3 doses of Hep B vaccine refer to flow diagram below	Yes
	Negative	<10mIU/mL	None	6	Yes
	Any result	≥10mIU/mL	No action needed		
Unvaccinated/incompletely vaccinated or vaccine refusers	Positive/ Unknown	_____[5]	HBIG x1	Complete vaccination	Yes
	Negative	_____	None	Complete vaccination	Yes

HCP = healthcare personnel, HBsAg = hepatitis B surface antigen, anti-HBs = antibody to hepatitis B surface antigen, HBIG = hepatitis B immune globulin

1. HBIG should be administered intramuscularly as soon as possible (within 48 hours) after exposure when indicated. If unable to give HBIG within 48 hours it may have some effect up to 7 days post exposure. HBIG dosage is 0.06 mL/kg.
2. Anti-HBs should be performed 1–2 months after the last dose of the HepB vaccine series (and 6 months after administration of HBIG to avoid detection of passively administered anti-HBs) using a quantitative method that allows detection of the protective concentration of anti-HBs (≥10 mIU/mL).
3. A responder is defined as a person with anti-HBs ≥10 mIU/mL after 1 or more complete series of HepB vaccine
4. A non-responder is defined as a person with anti-HBs <10 mIU/mL after 2 complete series of HepB vaccine.
5. HCW who have anti-HBs <10mIU/mL, or who are unvaccinated or incompletely vaccinated, and sustain an exposure to a source patient who is HBsAg-positive or has unknown HBsAg status, should undergo baseline testing for HBV infection as soon as possible after exposure, and follow-up testing approximately 6 months later. Initial baseline tests consist of total anti-HBc; followed by testing at approximately 6 months post exposure of HBsAg and total anti-HBc.
6. For vaccinated HCW (who have written documentation of a complete HepB vaccine series) without previous anti-HBs testing, the HCW should be tested for anti-HBs and the source patient (if known) should be tested for HBsAg as soon as possible after the exposure. Anti-HBs testing should be performed using a method that allows detection of the protective concentration of anti-HBs (≥10 mIU/mL). Testing the source patient and the HCW should occur simultaneously; testing the source patient should not be delayed while waiting for the HCW anti-HBs test results, and likewise, testing

the HCW should not be delayed while waiting for the source patient's HBsAg results (Table 5).If the HCW has anti-HBs <10 mIU/mL and the source patient is HBsAg-negative, the HCW should receive an additional single HepB vaccine dose, followed by repeat anti-HBs testing 1–2 months later. HCW whose anti-HBs remains <10 mIU/mL should undergo revaccination with two more doses (likely 6 doses total when accounting for the original series). So the HCW's vaccine response

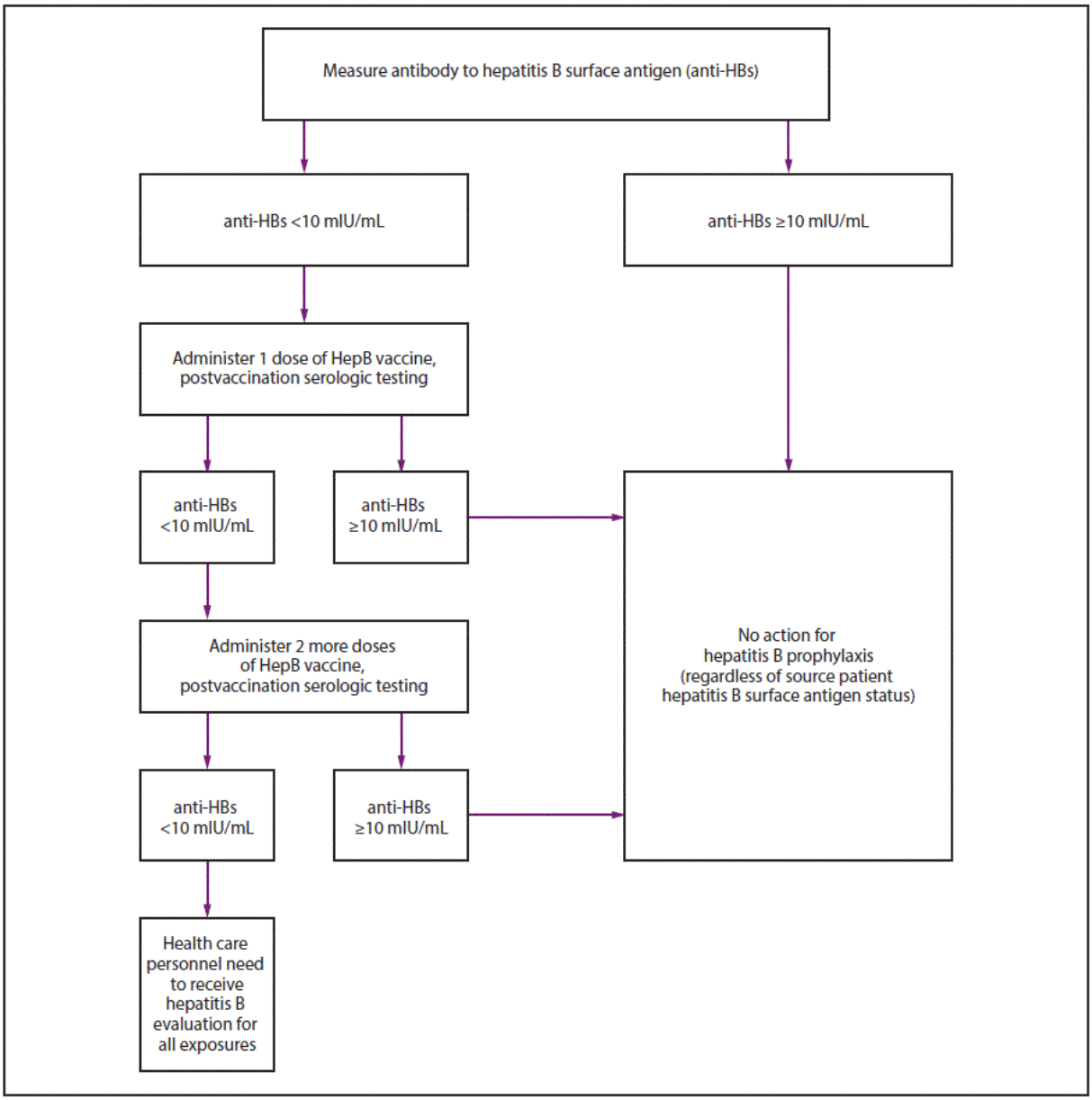


Figure 22: Pre-exposure evaluation for health care personnel previously vaccinated with complete, ≥3-dose HepB vaccine series who have not had postvaccination serologic testing*

1.10.9.4.2 HIV post exposure prophylaxis (HIV-PEP)

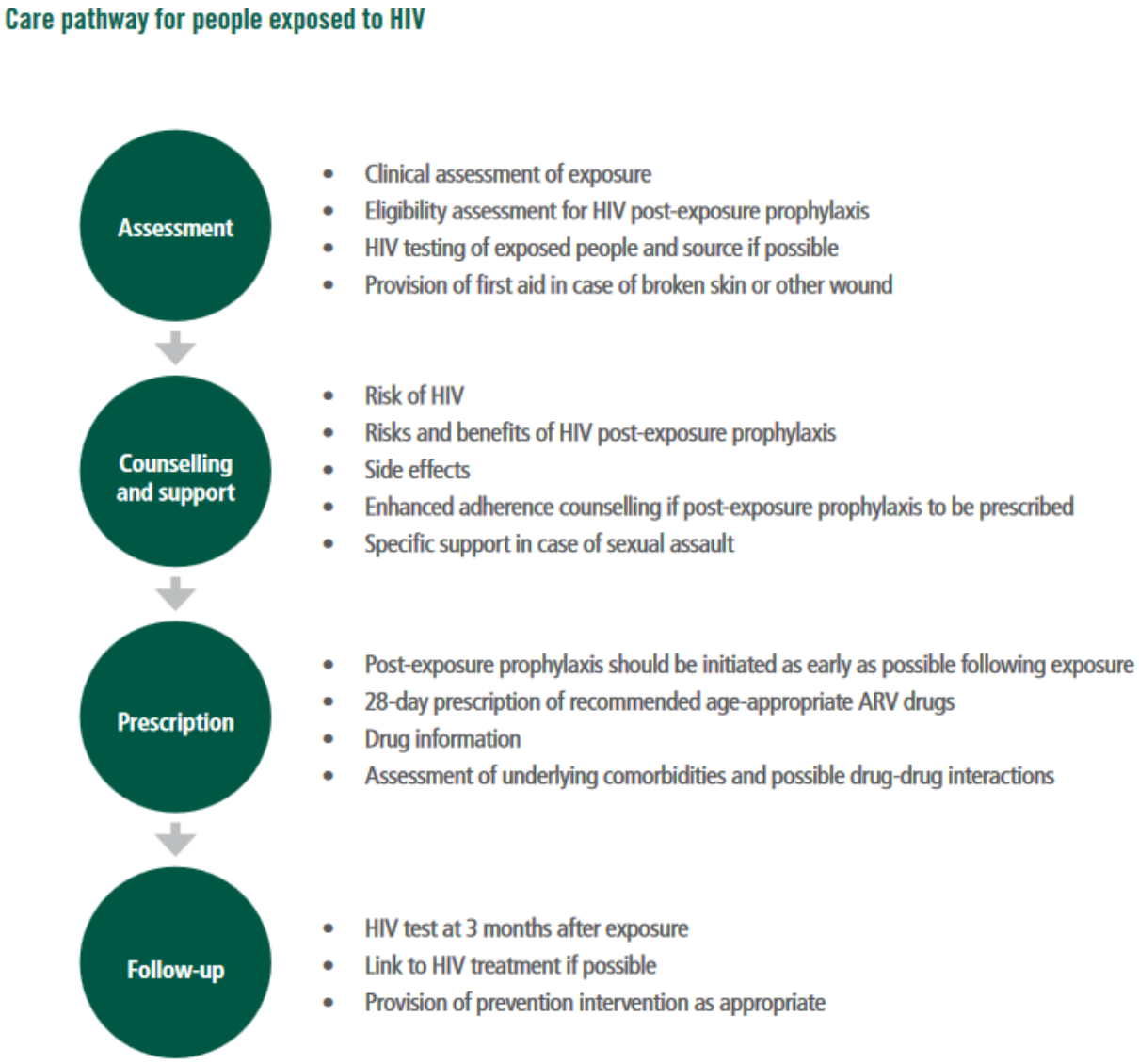


Figure 23: Care pathway for people exposed to HIV

Practical guidance

- Post-exposure prophylaxis should be offered, and initiated as early as possible, to all individuals with exposure that has the potential for HIV transmission, and ideally within 72 hours*. The sooner the better; every hour counts.
- Assessment for eligibility should be based on the HIV status of the source whenever possible and may include consideration of background prevalence and local epidemiological patterns**

- Exposures that may warrant post-exposure prophylaxis include:
- parenteral or mucous membrane exposure (splashes to the eye, nose or oral cavity); and
- the following bodily fluids may pose a risk of HIV infection: blood, blood-stained saliva, breast-milk, genital secretions and cerebrospinal, amniotic, rectal, peritoneal, synovial, pericardial or pleural fluids***.
- Exposures that does not require post-exposure prophylaxis include:
    - when the exposed individual is already HIV positive;
    - when the source is established to be HIV negative; and
    - exposure to bodily fluids that does not pose a significant risk: tears, non-blood-stained saliva, non blood stained urine, non blood stained feces and sweat.

*Post-exposure prophylaxis is ideally provided within 72 hours of exposure and, institutes should ensure that all HCW report risk exposure within this time frame.

**In some settings with high background HIV prevalence or where the source is known to be at high risk for HIV infection, all exposure may be considered for post-exposure prophylaxis without risk assessment.

***These fluids carry a high risk of HIV infection, but this list is not exhaustive and all cases should be assessed clinically and decisions made by the health-care workers as to whether exposure constitutes significant risk.

Assessment of exposed persons HIV status:

- Baseline HIV testing of the exposed worker should always be obtained after an occupational exposure, even if the exposed worker declines PEP.
- Regardless of whether the exposed worker accepts or declines PEP treatment, if the post-exposure evaluation determines that PEP is indicated, repeat HIV testing 12 weeks should be obtained. A negative HIV test result at 12 weeks post-exposure reasonably excludes HIV infection related to the occupational exposure.

HIV testing should be performed using rapid diagnostic tests that can provide definitive results in most cases within 2 hours and often within 20 minutes.

Follow up for health-care workers should respect confidentiality, and reporting and recordkeeping should be in accordance with national occupational health policies

Assessment of source HIV

HIV testing of the source person should be conducted to guide appropriate clinical action and inform the exposed individual and, where possible, the source of their HIV status. However, the initiation of post-exposure prophylaxis should not be delayed by the availability of the source HIV test results.

If the source is determined to be HIV positive, provision should be made to link them to appropriate treatment and care. If the source is established to be HIV negative, post-exposure prophylaxis should be discontinued.

Counselling

After the evaluation, health care workers should provide counselling on risk-reduction behaviour to the exposed person regardless of how the individual was exposed, and of whether or not antiretroviral (ARV) drugs will be recommended for PEP, as such, counselling can reduce the risk of future exposures.

It should be made clear during the counselling session that PEP is not mandatory. An informed consent form should be signed if the exposed person opts for PEP. In addition to the information outlined on the informed consent form, the exposed people should be counselled on:

- avoiding pregnancy and seeking safe alternatives to breastfeeding;
- avoiding blood, tissue or sperm donation;
- using condoms for sexual intercourse up to the sixthmonth test confirming that the exposed person remains seronegative;
- standard precaution measures for those at risk of workplace exposure; and
- the need for clinical and serological follow-up. As stated on the consent form, there is a strong need for adherence to PEP regimens.

Psychological support should be an integral part of counselling and include appropriate referrals as needed.

Note: Counselling on risk-reduction behaviour after non-occupational exposure should also focus, where indicated, on:

- safer injecting practices, with referral to harm-reduction programmes and drug-dependence treatment services;
- STI treatment, with referral to appropriate services; and

- contraception and condom use. Furthermore, counselling on sexual abuse should be provided, where needed, with appropriate referrals, such as legal services.

Table 36: HIV PEP

Post exposure prophylaxis HIV (Infectious Disease Consultant / Designated physician for HIV program to verify drugs used) as per the National HIV treatment guideline
Number of antiretroviral drugs
HIV post exposure regime contains 3 drugs • Tenofovir (TNF) + Emtricitabine (FTC) + Lopinavir/ritonavir (LPV/r) or (ATV/r) or DRV/r • If available may use: TNF + FTC + Raltagravir (RAL) or Dolutegravir (DTG) DTG to be avoided in exposed persons who are pregnant at less than 14 weeks of gestation, and exposed persons who desire pregnancy or are not using an effective method of contraception*
Prescribing frequency
Recommended to start within 36 hours up to 72 hours and preferably within 2 hours of known/high risk HIV exposure A 28 day prescription of antiretroviral drugs should be provided
Adherence support Enhanced adherence counseling is suggested
HIV antibody testing of source
If unknown, HIV testing of source patient should be done by rapid antibody testing to facilitate decision making (20min -2 hours) PEP to exposed HCW should not be delayed in cases at high risk of exposure to HIV and PEP regime can be discontinued if source patient is found to be HIV negative
HIV antibody testing on exposed
• Baseline • 12 weeks post-exposure (note: investigate for Hepatitis B and C exposure also other infections according to exposure and source)

Follow up baseline test -> 2 weeks to monitor for side effects/support -> 12 weeks final test (HIV antibody test)
• Individuals should be encouraged to seek assistance if they experience side effects that interfere with taking ARV drugs or adherence problems. • Any further contact with a person prescribed post-exposure prophylaxis should emphasize the importance of completing the full 28-day course, and reducing future risk of HIV infection. • If the source is established to be HIV negative during the course of post-exposure prophylaxis, ARV drugs can be discontinued. • Respect confidentiality of HCW in reporting and recordkeeping

Adult and Adolescent ARV drug dosages for use in PEP	
Generic name	Dose
Tenofovir (TDF)	300 mg once daily
Lamivudine (3TC) not recommended	150 mg twice daily or 300 mg once daily
Emtricitabine (FTC)	200 mg once daily
Lopinavir/ritonavir (LPV/r)	400 mg/100 mg twice daily or 800 mg/200 mg once daily
Atazanavir/ritonavir (ATV/r)	300 mg +100 mg once daily
Raltegravir (RAL)	400 mg twice daily
Dolutegravir (DTG)	50mg PO daily
Darunavir + ritonavir (DRV/r)	800 mg +100 mg once daily or 600 mg +100 mg twice daily
Efavirenze (EFV)	600 mg once daily

Brand name:

- Truvada (Tenofovir disoproxil 245mg/Emtricitabine 200mg) one tablet twice a day
- Kaletra (Lopinavir200mg/Ritonavir50mg) 2 tablets bd

Follow the latest National HIV PEP guidelines. It is recommended to obtain baseline Full blood count, liver function test and biochemistry before initiating PEP

It is suggested that the exposed person be followed initially by 48 hours if possible either by physical or by phone consultation, to check for tolerability of medication or any further queries.

A physical follow up after 2 weeks while taking PEP is recommended to monitor for:

- psychological support
- blood samples:
  - biochemistry (urea and electrolytes)
  - liver function tests (including gamma GT and amylase)
  - haematology (full blood count)
- monitoring of side effects.

HIV testing according to national guidelines and maybe done at 4 weeks. The final follow-up is at 12 weeks for HIV antibody. Proper documentation should be kept at all points of contact. Refer to the sample post exposure forms given at the end of this section.

The following should be considered when developing institutional protocols for providing PEP for HIV exposure:

- Who will perform the post-exposure evaluation.
- Who will provide counselling to the exposed worker regarding the exposure and indications for PEP (for off-hour exposures as well).
- How PEP will be made available within 2 hours of an exposure.
- How a 7-day supply of PEP will be made available for urgent use.
- Who will be given authority for releasing drugs for this purpose.
- How the exposed worker will obtain PEP medications to complete the 28-day regimen.
- Latest national PEP guideline and procedure for obtaining the PEP treatment drugs.

1.10.9.4.3 Hepatitis C virus post exposure testing

The most common modes of Hepatitis C viral infection are through unsafe injection practices; inadequate sterilization of medical equipment; and the transfusion of unscreened blood and blood products. HCV is not transmitted efficiently through occupational exposures to blood.

The risks of transmission of HCV after exposure to blood or body fluids infected with HCV areas follows:

- Mucous Membrane Exposure-<1.8%
- Venipuncture, Blood to Blood Exposure-approximately 1.8%

Laboratory testing:

For the source

- HCV RNA test is recommended
- The HCV RNA test is used to detect acute hepatitis C virus infection early before the appearance of HCV antibodies appear in the serum (i.e. <2 months from exposure), detection and confirmation of chronic HCV infection, and quantification of HCV RNA in serum (viral load) of persons with chronic HCV infection.
- If the status is unknown, the source must consent to having their blood drawn and tested related to this exposure

For the exposed HCW

For the person exposed to an HCV positive source or unknown source:

- Perform baseline testing for anti-HCV and ALT activity; and save a sample for further testing
- Perform follow-up testing at 3 and 6 months for anti-HCV antibodies and ALT activity
- HCV RNA (viral load) may be performed at 4 and 12 weeks (if available)

Table 26: HCV exposure follow up: timing and investigations

Time	HCV antibody	HCV RNA	Save serum
Baseline	✓		✓
4 weeks		✓	
12 weeks	✓	✓	
6 months	✓		

Special considerations

- All positive anti-HCV baseline test results on employees must be followed up with HCV RNA testing to rule out a false positive anti-HCV test
- Information on counseling, testing and medical follow-up should be given to individuals exposed to hepatitis C.
- In the absence of PEP for HCV, recommendations for post exposure management are intended to achieve early identification of chronic disease through monitoring for symptoms of viral illness and additional serology testing.
- All employees who convert to an acute positive hepatitis C infection following an occupational exposure should be evaluated by a provider with expertise in assessment of liver disease severity and HCV treatment.
- The decision of when to treat is usually made after the 6-month post-exposure period. At that time treatment decisions are based on current recommendations for those who are chronically infected with hepatitis C. Recent data has shown that up to 95% of people treated with HCV medications were able to rid their bodies of the hepatitis C virus.

Provide employee centered counseling:

- The employee exposed to HCV infected blood does not need to take any special precautions to prevent secondary transmission during the follow-up period; however, they should refrain from donating blood, plasma, organs, tissue, or semen.
- If the exposed woman is breastfeeding, she does not need to discontinue.
- Modification to the exposed employee's patient-care responsibilities are not necessary to prevent transmission to clients solely based on their exposure to HCV positive blood.

http://hcvadvocate.org/hepatitis/factsheets_pdf/occupational_exposure.pdf

1.10.9.5 Sample forms for incident reporting and consent

1.10.9.5.1 Proposed occupational exposure report (Confidential)

<table>
<tr><td colspan="5">Institution Name:</td></tr>
<tr><td>Name:</td><td>Record Card Number:</td><td>ID Card Number</td><td colspan="2">Address</td></tr>
<tr><td>Date of Birth
dd/mm/yyyy</td><td>Male □
Female □</td><td>Position</td><td>Years in Practice</td><td>Contact Number:
Mobile:
Work:</td></tr>
<tr><td>Date/time of exposure</td><td colspan="2">Location where exposure occurred</td><td colspan="2">Activity at the time of exposure</td></tr>
<tr><td colspan="5">Nature of injury (e.g. cut, splash, needle-stick, including bore of needle)</td></tr>
<tr><td colspan="5">Details of the procedure being performed, including where and how the exposure occurred</td></tr>
<tr><td colspan="5">Details of the exposure, including the type and the amount of the fluid or materials and the severity of the exposure</td></tr>
<tr><td colspan="2">Date and time of case reporting:</td><td colspan="3">Reporting personel:
Name:
Position:
Supervisor name:</td></tr>
<tr><td colspan="2">Details about exposure source
The source material contained
HBV:
HCV:
HIV:
Whether source if HIV infected: Y / N
Whether source is HBV infected: Y / N
Whether source is HCV infected: Y / N
Clinical disease stage

Viral load:

Is the source at risk of HBV, HCV, HIV?

History if antiretroviral treatment?
HBV/HCV treatment?
Antiretroviral Resistance:
Pre-test counselling provided:</td><td colspan="3">Details about the exposed person

Infected with:

HBV:
HCV:
HIV

Concomitant disease

Hepatitis B vaccination status:

Vaccination response status:
Anti HbS antibody titer:
Pre-test counselling provided</td></tr>
</table>

Test results HBV:HBsAg HBeAg HCV: HIV: Post test counselling provided: Referral:	Test results: HBV: antiHbC HBsAg HCV:HCV antibody HIV:HIV Ag/Ab Post test counselling provided: Referral:
	PEP commenced: Informed consent obtained: PEP regime administered: HBV: HepB Immunoglobulin/ date: Hep B vaccination/ date: HCV: HIV:

Post exposure management	CBC with differential	Serum Liver enzymes	Signs and symptom	Other tests
Phone call at 48 hours post PEP / if PEP not started may contact after 24 hours to re-counsel for PEP required				
Week 2 consultation				
Week 4 consultation				

Antibody or antigen test results 4 weeks: HIV antigen HIV antibody HCV RNA 12 weeks: HIV antigen HIV antibody HCV RNA HCV antibody 6 months: HBsAg Anti HBc HCV antibody Post vaccination: anti HBs antibody 1 to 2 months after 3rd dose	Hepatitis B vaccination if required: Dose: Date: Dose: Date: Dose: Date: Post vaccination Anti HBs antibody titer: Date
Consultant in charge Name:	Signature:

1.10.9.5.2 Informed consent form for source person

(Informed consent to perform an HIV test and authorization for release of HIV-related information for purposes of providing post-exposure care to a person accidentally exposed occupationally or non-occupationally*)

A person has been exposed to your blood or a body fluid in a manner that may pose a risk for the transmission of a bloodborne infection. Many individuals may not know whether they have a bloodborne infection because people can carry these viruses without having any symptoms. We are therefore asking for your consent to test for the presence of human immunodeficiency virus (HIV). You will also be tested for hepatitis B virus (HBV) and hepatitis C virus (HCV). HIV testing is voluntary and requires your consent in writing; consent can be withdrawn for the test at any time. Your blood will be tested by a rapid or enzyme immunoassay serological test. The test result will be used to help determine whether the exposed person is actually at risk for HIV and requires treatment for that exposure.

We will inform you of the test results, helping you understand their implications as well as assisting you in accessing any services you may need.

Meaning of HIV test results

You also are being asked to authorize the release of confidential HIV-related information related to this request to the health professional, named below, who is treating the exposed person. This release is necessary to provide appropriate care and to counsel the exposed person about his or her risk of becoming infected and possibly infecting others. Confidential HIV-related information can only be given to persons you allow to have it by signing a release. These individuals are prohibited by law from subsequently disclosing these test results or your identity.

_____

Name of exposed person's health care provider to whom HIV test result will be disclosed:

Prior to executing this consent, you will be counselled about the implications of HIV testing and your confidentiality protections under the law.

I understand the purpose for which I am being asked to submit a specimen for HIV testing. My questions about the HIV test were answered. I agree to be tested for HIV, and I authorize the release of this information to the health care provider for the exposed person. This release is effective for one year after the date listed below.

_____

Name of person to be tested Date

_____

Signature of the person to be tested, or of the person consenting if different from the person to be teste.

I provided pretest counselling. I answered the above individual's questions about the test and offered him/her an unsigned copy of this form.

Signature _____Title _____
Facility/provider
_____

* This form is recommended only for cases of accidental non-intentional exposure. In cases of intentional exposure (e.g. a needle-stick or non-consensual sex), the issue of consent to be tested for HIV and the release of information about an individual's HIV status is regulated by national laws.

1.10.9.5.3 Informed consent form for exposed Person

Name_____Record number_____

I understand that I have had an exposure which may be a risk for HIV transmission. I have been given the following information about post-exposure prophylaxis (PEP):

- the risk of HIV transmission with and without PEP for the specific exposure;
- the benefits of HIV testing (now, at 6 weeks, at 12 weeks and at 6 months);
- the benefits and risks of taking PEP;
- the use of PEP during pregnancy;
- that PEP is not guaranteed to prevent HIV transmission;
- the importance of receiving post test counselling;
- other recommended blood tests;
- the importance of using methods that will prevent HIV transmission (e.g. using condoms, not sharing needles and not breastfeeding) for the next six months;
- the prohibition against donating blood, semen or tissues for the next six months;
- the usual duration of PEP (four weeks) and my ability to stop at any time (though this will reduce its effectiveness);
- the importance of treatment adherence (taking the correct dose of medications at the right time);
- possible side-effects of and drug interactions with the PEP medications; and
- (for HCWs): the safe work practices that are necessary to observe for the next six months.

I have understood this information and have been given the opportunity to ask questions and have received satisfactory answers.

□ I voluntarily consent to post-exposure prophylaxis (PEP).

□ I decline post-exposure prophylaxis (PEP).

Name_____

Date_____
Signature_____

I confirm that I have explained information about PEP as above.

Name_____
Signature_____

Position_____
Date_____

Resources:

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep 2018;67(No. RR-1):1–31. DOI: http://dx.doi.org/10.15585/mmwr.rr6701a1

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National Health and Medical Research Council (2019). Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019

Public Health England, 2019. Guidance on management of potential exposure to blood-borne viruses in emergency workers: For occupational health service providers and frontline staff.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/835888/Guidance_on_management_of_potential_exposure_to_blood__2_.pdf

Indian Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

National Health and Medical Research Council (2019). Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019

1.11 STANDARD PRECAUTIONS: SUMMARY OF KEY ELEMENTS

1. Hand hygiene

Summary technique:
- Hand washing (40–60 sec): wet hands and apply soap; rub all surfaces; rinse hands and dry thoroughly with a single use towel; use towel to turn off faucet.
- Hand rubbing (20–30 sec): apply enough product to cover all areas of the hands; rub hands until dry.

Summary indications:
- Before and after any direct patient contact and between patients, whether or not gloves are worn.
- Immediately after gloves are removed.
- Before handling an invasive device.
- After touching blood, body fluids, secretions, excretions, non-intact skin, and contaminated items, even if gloves are worn.
- During patient care, when moving from a contaminated to a clean body site of the patient.
- After contact with inanimate objects in the immediate vicinity of the patient.

2. PPE

Gloves
- Wear when touching blood, body fluids, secretions, excretions, mucous membranes, non-intact skin.
- Change between tasks and procedures on the same patient after contact with potentially infectious material.
- Remove after use, before touching non-contaminated items and surfaces, and before going to another patient. Perform hand hygiene immediately after removal.

Facial protection (eye, nose and mouth)
- Wear (1) a surgical or procedure mask and eye protection (eye visor, goggles) or a face shield to protect mucous membranes of the eyes, nose, and mouth during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, and excretions

Gown

Wear to protect skin and prevent soiling of clothing during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions.
Remove soiled gown as soon as possible, and perform hand hygiene.

3. Respiratory Hygiene and cough etiquette

Persons with respiratory symptoms should apply source control measures:
- Cover their nose and mouth when coughing/sneezing with tissue or mask, dispose of used tissues and masks, and perform hand hygiene after contact with respiratory secretions.

Health-care facilities should:
- Place acute febrile respiratory symptomatic patients at least 1 metre (3 feet) away from others in common waiting areas, if possible.
- Post visual alerts at the entrance to health-care facilities instructing persons with respiratory symptoms to practise respiratory hygiene/cough etiquette.

Consider making hand hygiene resources, tissues and masks available in common areas and areas used for the patient placement

4. Appropriate patient placement

Prioritize for those patients who have conditions that facilitate transmission of infectious material to other patients and for those who are at increased risk of acquisition and adverse outcomes resulting from HAI
- Single room
- Cohorting of patient
- Cohorting of HCW

At ER triage screen for communicable diseases of public health importance
- Fever with Rash
- Fever with history of travel to outbreak region
- Fever with respiratory symptoms and with history of health care related exposure or part of cluster ≥2 persons with similar symptoms.

5. Reposition of patient care equipment and devices
- Handle equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of pathogens to other patients or the environment.
- Clean, disinfect, and reprocess reusable equipment appropriately before use with another patient.

6. Environmental cleaning
- Use adequate procedures for the routine cleaning and disinfection of environmental and other frequently touched surfaces.

7. Handling of waste and linen
- Treat waste contaminated with blood, body fluids, secretions and excretions as clinical waste, in accordance with national guideline.
- Human tissues and laboratory waste that is directly associated with specimen processing should also be treated as clinical waste.
- Discard single use items properly.

Management of linen
- Handle, transport and process linen in a manner which prevents skin and mucous membrane exposures and contamination of clothing.
- Avoids transfer of pathogens to other patients and or the environment.

8. Aseptic technique

Protects patients during invasive clinical procedures by employing infection control measures that minimise, as far as practicably possible, the presence of pathogenic microorganisms
- Standard ANTT
- Surgical ANTT

9. Handling and disposal of sharps
- Handling needles, scalpels, and other sharp instruments or devices.
- Cleaning used instruments.
- Disposing of used needles and other sharp instruments.

10. Occupational Health in infection control
- Health status screening and immunization
- Education on safe work practices
- Ensure safe work system and design
- Physical protection with PPE and PEP
- Reporting system to detect compliance and breach in infection control

Employers should take all reasonable steps to ensure that staff members are protected against vaccine-preventable diseases. Where healthcare workers may be at significant occupational risk of acquiring or transmitting a vaccine-preventable disease, a comprehensive occupational vaccination program should be implemented. Such a program should include:

- a vaccination policy
- maintenance of current staff vaccination records
- provision of information about the relevant vaccine-preventable diseases
- the management of vaccine refusal (which should, for example, include reducing the risk of a healthcare worker transmitting disease to a vulnerable patient).

Recommended vaccination for all health care worker or students directly involved in patient care or human tissue

- Hepatitis B vaccination (3 dose series)
- Annual Influenza vaccination
- MMR (preferred) /MR vaccination (2 doses)
- COVID-19 vaccination and boosters as relevant for the period

Further vaccines which maybe offered to HCW, especially those at risk of getting exposed or working with high risk patients such as neonates and immunocompromised patients.

- Varicella vaccination (if not immune need proof of 2 doses)
- Tdap if not received previously (and required during each pregnancy for female HCW)
- Td is required every 10 yearly

Healthcare workers with specific circumstances

Where a healthcare worker is known to be particularly susceptible to healthcare associated infections, work duties are assessed to ensure that the welfare of that person, patients and other healthcare workers is safeguarded. This may involve appropriate work placements, adjustments or restrictions, or deployment to a role involving less risk. Healthcare workers in this situation may require counseling on what tasks they can perform, what they should avoid and the possible impact of their work on their health.

Pregnant heath worker

Employers should provide information on the risks associated with pregnancy and should assist pregnant healthcare workers to avoid infectious circumstances that may present a risk to her or the baby. It is the responsibility of pregnant healthcare workers to advise their doctor and employer of their pregnancy; this information must remain confidential.

All pregnant healthcare workers should adhere to standard and transmission-based precautions and ensure that they are appropriately vaccinated. However, pregnant non-immune healthcare workers should be given the opportunity to avoid patients with specific infections such as given below;

- Rubella, measles, Chicken pox, Pertussis and Parvo B19 infection.

Immunocompromised healthcare workers

Healthcare workers with immune deficiencies are more at risk of acquiring infections. The type of employment they can undertake should include only duties that will minimise their exposure to infections. Predisposing conditions include neutropenia, disseminated malignancy and infections that produce immunodeficiency (e.g. HIV).

Healthcare worker with skin condition

Skin integrity is the ultimate barrier to transmission of infectious agents. When staff members have damaged skin or weeping skin conditions (e.g. allergic eczema, psoriasis, exfoliating dermatitis), they may be readily colonised by healthcare associated microorganisms and may become a vehicle for disseminating these organisms.

- Healthcare workers in this situation should be identified by personal history screening when they start employment and need to be informed of the risks they may pose to patients.
- Any damaged skin must be appropriately covered before healthcare workers carry out procedures.
- Consideration must be given to providing these staff members with appropriate, individual PPE such as specific types of gloves, or glove liners, hand hygiene product and moisturising lotion.

Exposure-prone procedures

Exposure prone procedures (EPPs) are invasive procedures where there is potential for direct contact between the skin, usually finger or thumb of the healthcare worker, and sharp surgical instruments, needles, or sharp body parts (e.g. fractured bones), spicules of bone or teeth in body cavities or in poorly visualised or confined body sites, including the mouth of the patient. During EPPs, there is an increased risk of transmitting bloodborne viruses between healthcare workers and patients.

Categories of exposure prone procedures:

Table 29: Catergories of exposure prone procedues

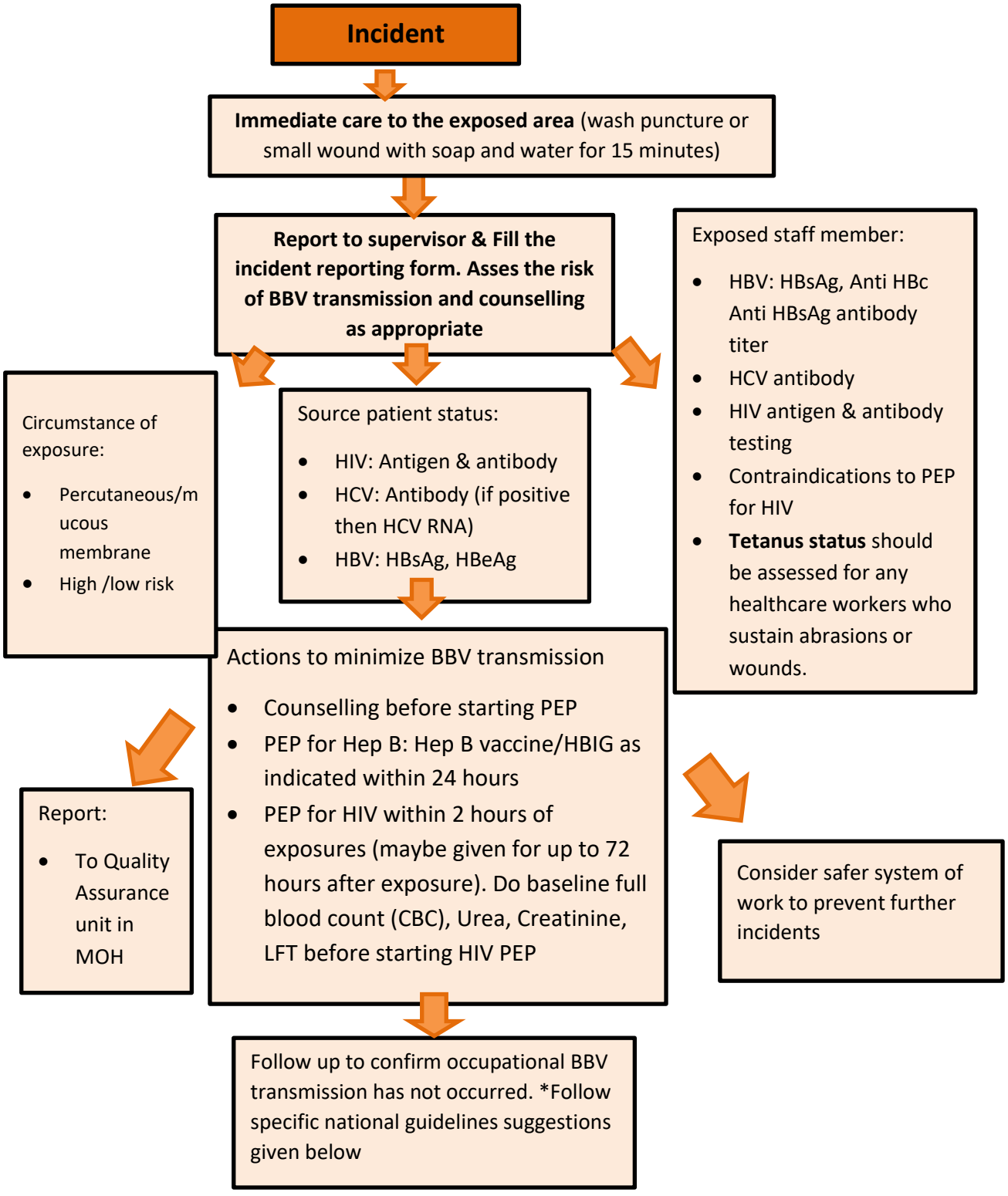
Category 1	A procedure where the hands and fingertips of the healthcare worker are usually visible and outside the body most of the time and the possibility of injury to the worker's gloved hands from sharp instruments and/or tissues is slight. This means that the risk of the healthcare worker bleeding into a patient's open tissues should be remote (e.g. insertion of a chest drain).
Category 2	A procedure where the fingertips may not be visible at all times but injury to the healthcare worker's gloved hands from sharp instruments and/or tissues is unlikely. If injury occurs it is likely to be noticed and acted upon quickly to avoid the healthcare worker's blood contaminating a patient's open tissues (e.g. appendectomy).
Category 3	A procedure where the fingertips are out of sight for a significant part of the procedure, or during certain critical stages, and in which there is a distinct risk of injury to the healthcare worker's gloved hands from sharp instruments and/or tissues. In such circumstances it is possible that exposure of the patient's open tissues to the healthcare worker's blood may go unnoticed or would not be noticed immediately (e.g. hysterectomy).

Infectious agents and Post exposure prophylaxis (PEP)

Percutaneous exposure

Please refer to the chapter safe injection practices in standard precautions, for further details

Response to a percutaneous exposure incident



Enter fig no: Response to percutaneous exposure

Table 30: Suggested follow-up testing after high risk exposure to BBV

Suggested follow up testing after percutaneous exposure to a positive/ high risk source (Check updated National guidelines)			
	Hepatitis B	Hepatitis C	HIV
4 weeks:	-	HCV RNA	HIV Ag/Ab (depending on available tests)
12 weeks	-	HCV RNA HCV Antibody	HIV Ag/Ab
6 months	Anti HBc antibody HBsAg	HCV antibody	
1-2 months after Post hepatitis B vaccination completion anti HBs titer			

Other exposures

Neisseria meningitides infection:

N. meningitides can be transmitted through respiratory secretions. Occupational infections are rare, but the severity of the disease warrants appropriate chemoprophylaxis for close contact between patients and health care workers.

Close contact is defined as direct mouth-to-mouth contact as in resuscitation attempts. Recommended prophylaxis includes one of the following: a single dose of ciprofloxacin (500 mg), or a single dose of ceftriaxone (250 mg) IM. Rifampicin is not recommended for chemoprophylaxis in view of high prevalence of tuberculosis in India.

Mycobacterium tuberculosis:

Transmission to hospital staff occurs through airborne droplet nuclei, usually from patients with pulmonary tuberculosis. The association of tuberculosis with HIV infection and multidrug-resistant tuberculosis are a current major concern. Refer to National TB PEP guideline.

Other infections (Varicella, Hepatitis A and E, Influenza, Pertussis and Diphtheria):

Transmission of these microorganisms may be uncommon, but policies to manage staff exposure should be developed.

Table 31: Post Exposure Prophylaxis (PEP) for infectious agents

Disease	Route of transmission	Incubation period	PEP indication	PEP Regime	Comment
Meningococcal	Droplet	1-10days (usually < 4 days)	High risk contact: Mouth to mouth resuscitation, unprotected contact during endotracheal intubation at any time 7 days before onset of illness	Ciprofloxacin 500mg PO one dose	Patient is infectious till 24 hours after initiation of appropriate antibiotics
Pertussis	Droplet	7-10 days (range 5-21)	Those who had unprotected exposure to pertussis and likely to be exposed to patient with risk of severe pertussis (hospitalized neonates and pregnant women)	Azithromycin PO 500mg single dose on day 1 followed by 250mg single dose from day 2 to 5	Patient is infectious till complete 5 days of appropriate antibiotics or till 21 days after onset of symptoms if no antibiotic given One dose of Tdap to HCW who previously have not received Tdap
Chicken Pox	Airborne	14-16 days (10-21days)	HCW with no evidence of varicella immunity: 2 doses of varicella vaccine Evidence of varicella infection	Varicella vaccine within 3 to 5 days after exposure	Infectious period 1-2 days before onset of rash till all lesions have crusted (minimum 5 days)
Hepatitis A	Feco-oral	15-50 days (average 28 days)	Exposed HCW without documented evidence of HAV vaccine	≤ 40 years HAV vaccine (2nd dose after 6 months) ≥41 years IVIG (within 2 weeks of	Standard and contact precaution for diapered and incontinent patient till 1 week after onset of symptoms

				exposure) or if not available HAV vaccine	
Measles	airborne	8-14 days (range 7-21 days)	Exposed HCW without evidence of 2 doses of measles containing vaccine	Measles vaccine within 72 hours exposure limit/ modify infection	Measles is contagious 4 days before to 4 days after rash and need airborne precaution in hospital

Exclusion periods for healthcare workers with acute infections

It is recommended that every healthcare facility to have comprehensive written policies regarding disease-specific work restriction and exclusion, which include a statement of authority defining who can implement such policies.

Any employee who has an infectious disease has a responsibility to:

- consult with an appropriate medical practitioner to determine that they are capable of performing their tasks without putting patients or other workers at risk
- undergo regular medical follow-up and comply with all aspects of informed clinical management regarding their condition.

These policies should encourage healthcare workers to seek appropriate preventive and curative care and report their illnesses, medical conditions, or treatments that can render them more susceptible to opportunistic infection or exposures. They should not penalise healthcare workers with loss of wages, benefits, or job status.

Table 32: Exclusion periods for healthcare workers with different infections

Acute infection	Exclusion period
Conjunctivitis	Must not provide patient care for the duration of symptoms (i.e. while eye discharge is present)
Gastroenteritis	Must not come to work while symptomatic (e.g. diarrhea and/or vomiting) and until 24 hours after symptoms have resolved *for norovirus 2 days after diarrhea cease
Glandular fever (Infectious mononucleosis)	NO need for exclusion, even if having direct patient contact, provided staff members are well enough to return to work and employ standard precautions
Herpes Simplex (cold sores)	Must not provide direct care to neonates, newborns, patients in delivery suites, severely immunocompromised patients, burns patients, patients with extensive eczema, or patients in operating room if there is an exposed herpetic lesion May provide direct patient care to other patients, do not need to wear a mask
Herpes Zoster (Shingles)	Must not provide ANY direct patient care if lesions cannot be covered (e.g. ophthalmic zoster) If active lesions can be covered, can provide care to all patients except for pregnant women, neonates, severely immunocompromised patients, burns patients and patients with extensive eczema.
Influenza	Employees should remain off work for 5–6 days or until they are symptom free
Norovirus	Must not come to work while symptomatic (e.g. diarrhea and/or vomiting) and until 48 hours after symptoms have resolved
Pertussis (Whooping Cough)	Remain away from work until at least 5 days after commencement of appropriate antibiotic therapy; or for 21 days after the onset of symptoms if not receiving antibiotic treatment (especially not to work with infants and pregnant patients).
Staphylococcal infection	Any staphylococcal lesions (e.g. boils, wound infections) must be covered with an occlusive dressing while at work. If lesions cannot be covered, must not perform patient care or prepare hospital food until they have received appropriate antibiotic therapy and the infection has resolved
Streptococcal infection	Any employee with streptococcal lesions (e.g. impetigo, tonsillitis) must ensure that lesions are covered with an occlusive dressing while at work. If lesions cannot be covered, employees must not provide direct patient care nor prepare hospital food until 24 hours after commencement of appropriate antibiotic therapy. Employees with pharyngitis/tonsillitis should avoid patient contact for at least 24 hours after starting appropriate antibiotic therapy.

Tuberculosis (TB)	If TB disease is suspected or is present, staff to be notified to TB specialists and treated. Any personnel with pulmonary TB is to be excluded from the workplace until cleared by specialist. Any active TB must be monitored.
Viral rashes	Measles (Rubeola)—If suspected, must remain off of work until appropriate test results are known. May return to work if they have serological evidence of immunity (i.e. are IgG seropositive and IgM sero-negative); but must be excluded until 4 days after the appearance of the rash if they develop measles. Mumps—If suspected, must remain off work until appropriate test results are known. May return to work if they have serological evidence of immunity (i.e. are IgG sero-positive and IgM sero-negative). Must be excluded from work for 9 days after the onset of parotid gland swelling if they develop mumps. Rubella (German Measles)—If suspected, must remain off work until appropriate test results are known. May return to work if they have serological evidence of immunity (i.e. are IgG seropositive and IgM sero-negative). Personnel must be excluded for 4 days after the appearance of the rash if they develop Rubella. Chickenpox (Varicella)—Before starting employment, personnel should be screened by completing a pre-employment health assessment; non immune staff should be offered vaccination unless contraindicated; personnel must be until all blisters have dried. Human Parvovirus B19 (Slapped Face)—does not require exclusion from work, non-infectious once rash develops.
Viral respiratory tract infections (e.g. common cold)	Staff should be excluded from contact with susceptible persons, until they are no longer symptomatic and recommended for Staff with viral respiratory tract infections to at home until they feel well.
SARS-CoV infection*follow latest National Guidelines	Mild infections 14 days from symptoms onset with At least 3 days (72 hours) without symptoms (without fever* and respiratory symptoms) (If symptomatic with fever, cough or shortness of breath at the end of 14 days, should seek medical care and continue to isolate for a duration of 21 days 14 days from onset of symptoms) Moderate to severe infections: 21 days from the date of obtaining the sample of the positive PCR test and At least 3 days (72 hours) without symptoms (without fever and respiratory symptoms)

Responsibilities of employer and healthcare worker

Employers

Employers must ensure that employees who perform EPPs have access to appropriate information, testing, training, counselling and vaccination programs. Serological testing may be provided by the healthcare facility or healthcare workers may choose to seek testing from outside sources.

Healthcare facilities should aim to achieve voluntary compliance and self-disclosure by providing an environment in which healthcare workers know their confidentiality will be maintained

Healthcare workers

Healthcare workers who undertake EPPs have a responsibility to know their infectious status with regard to bloodborne viruses such as hepatitis B virus, hepatitis C virus and HIV, and should be given relevant information about the tests available and encouraged to have voluntary testing Healthcare workers who carry a bloodborne virus have a clear responsibility to follow the treatment recommended by their doctor and modify their involvement in direct patient care.

They must not perform EPPs if they are:

- HIV antibody positive
- Hepatitis B e antigen (HBeAg) positive and/or hepatitis B DNA positive at high titres
- Hepatitis C RNA positive (by nucleic acid test).

Healthcare workers who carry a bloodborne virus and are not in these categories must not perform EPPs until specialist medical advice has been sought. Healthcare workers who are currently hepatitis B surface antigen (HBsAg) positive and hepatitis B DNA negative or hepatitis C antibody positive and hepatitis C RNA negative must obtain ongoing medical advice regarding their potential infectiousness and the appropriateness of their continued performance of EPPs.

Resources:

CDC, 2018. Type and Duration of Precautions Recommended for Selected Infections and Conditions

Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. Link: https://www.cdc.gov/infectioncontrol/guidelines/isolation/appendix/type-duration-precautions.html

Healthcare workers Education

Healthcare workers should be given Infection Prevention and Control orientation session at the time of joining and continued medical education at regular intervals

At a minimum, all staff (both clinical and non clinical) should be educated about:

- modes of transmission of infectious agents
- risk identification, assessment and management strategies including transmission-based precautions
- orientation to the physical work environment with a focus on its risks for infection
- safe work procedures
- correct use of standard precautions
- correct choice and use of PPE, including procedures for putting on and removing PPE and fit
- checking of respirators
- appropriate attire (shoes/hair/nails/jewelry)
- hand hygiene practices
- levels of cleaning required for clinical areas and equipment
- how to deal with spills
- safe handling and disposal of sharps
- reporting requirements of incidents such as sharps injuries and exposures
- waste management
- antibiotic policy and practice

Preventing occupational hazards

There should be proper Work Practice Controls in the healthcare setting for the safety of healthcare worker.

Elimination of sharp hazard

Complete removal of a hazard from the work are is the most effective way to control hazards; this approach should be used whenever possible.

Examples include:

- Removing sharps and needles when possible e.g. substituting jet injectors for needles and syringes or using needles less intravenous systems.
- eliminating all unnecessary injections
- eliminating unnecessary sharps such as towel clips

Engineering controls

These are used to isolate or remove a hazard from a workplace; examples include: adequate numbers of easily accessible sharps disposal containers use of sharps protection devices for all procedures (devices with needles that retract, sheathe or blunt immediately after use).

When considering safety engineered medical devices the following selection criteria should be applied:

The device must not compromise patient care the device must perform reliably the safety mechanism must be an integral part of the safety device, not a separate accessory the device must be easy to use and require little change of technique on the part of the health professional the activation of the safety mechanism must be convenient and allow the care giver to maintain appropriate control over the procedure the device must not create other safety hazards or sources of blood exposure a single-handed or automatic activation is preferable the activation of the safety mechanism must manifest itself by means of an audible, tactile or visual sign to the health professional the safety mechanisms should not be easily reversible once activated.

Administrative controls

These are policies such, which aim to limit exposure to the hazard. Examples include:

Health and safety responsibilities of all staff are clear, well coordinated and adequately resourced. Sharps injury prevention committee (may be part of health and safety

committee) a sharps policy which covers exposure prevention as well as treatment (e.g. access to care, especially after hours) and follow up reference to sharps injury prevention in infection control and procurement policies. Healthcare workers should be aware that they must report occupational exposures immediately.

Removal of all unsafe devices

Safe systems of work particularly in high risk areas such as theatres, obstetrics and emergency care

Environmental factors including good lighting and adequate space to carry out the procedure

Consistent information and training which include safe systems of work, correct use and disposal of sharps, the use of medical devices incorporating sharps protection mechanisms, measures to be taken in the event of a sharps injury, how to use any PPE provided.

Promotion of a no blame culture

Incident reporting procedures and investigations which include feedback to staff/staff groups involved

These controls to change the behaviour of workers to reduce exposure to occupational hazards. Examples of work controls to prevent blood born virus exposure (BBV) include:

- no needle recapping or resheathing
- safe construction of sharps containers
- placing sharps containers at eye level and within arms
- disposing of sharps immediately after use in designated sharps containers
- sealing and discarding sharps containers when they are three quarters full
- establishing means for the safe handling and disposal of sharps devices
- Personal Protective equipment: These provide barriers and filters between the worker and the hazard. They will prevent exposures to blood splashes but will not prevent needle stick injuries.
    - Gloves: Although a needle or sharp instrument can easily penetrate a glove, the risk of transmission of infection is significantly reduced. The glove material will remove up to 86 per cent of the blood on the outside of a needle. An inner glove will remove

most of blood not removed by the outer glove. Double gloving therefore substantially reduces the risk of blood-borne virus transmission from a sharps injury.

- Eye protection: This is important wherever blood or other body fluids could splash into the eye. Ordinary prescription spectacles offer some, but inadequate, protection, as they are not generally designed for this purpose. Eye protection should therefore be worn routinely not just in operating theatres, delivery suites and endoscopy suites, but also in accident and emergency departments and any other clinical areas where pressure may lead to spurting or splashing of body fluids, such as when unblocking or irrigating lines and tubes. Blood may become aerosolized due to surgical drilling techniques, such as those used in orthopedic surgery, and mucous membrane exposure may not always be recognized. There are many designs of safety spectacles now available, many of which will fit over prescription lenses and frames.

Resources:

National Health and Medical Research Council (2019). Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019

Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep 2018;67(No. RR-1):1–31. DOI: http://dx.doi.org/10.15585/mmwr.rr6701a1

National Occupational Research Agenda (NORA) CDC, 2019. What to do following a sharp injury. Link: https://www.cdc.gov/nora/councils/hcsa/stopsticks/whattodo.html

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WHO. Criteria for releasing COVID-19 patients from isolation Scientific brief 17 June 2020

Health-care facility recommendations for Standard Precautions: Summary of key elements

1. Hand hygiene

Summary technique:

- Hand washing (40–60 sec): wet hands and apply soap; rub all surfaces; rinse hands and dry thoroughly with a single use towel; use towel to turn off faucet.
- Hand rubbing (20–30 sec): apply enough product to cover all areas of the hands; rub hands until dry.

Summary indications:

- Before and after any direct patient contact and between patients, whether or not gloves are worn.
- Immediately after gloves are removed.
- Before handling an invasive device.
- After touching blood, body fluids, secretions, excretions, non-intact skin, and contaminated items, even if gloves are worn.
- During patient care, when moving from a contaminated to a clean body site of the patient.
- After contact with inanimate objects in the immediate vicinity of the patient.

2. PPE

Gloves

- Wear when touching blood, body fluids, secretions, excretions, mucous membranes, non-intact skin.
- Change between tasks and procedures on the same patient after contact with potentially infectious material.
- Remove after use, before touching non-contaminated items and surfaces, and before going to another patient. Perform hand hygiene immediately after removal.

Facial protection (eye, nose and mouth)

- Wear (1) a surgical or procedure mask and eye protection (eye visor, goggles) or a face shield to protect mucous membranes of the eyes, nose, and mouth during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, and excretions

Gown

Wear to protect skin and prevent soiling of clothing during activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions.

Remove soiled gown as soon as possible, and perform hand hygiene.

3. Respiratory Hygiene and cough etiquette

Persons with respiratory symptoms should apply source control measures:

- Cover their nose and mouth when coughing/sneezing with tissue or mask, dispose of used tissues and masks, and perform hand hygiene after contact with respiratory secretions.

Health-care facilities should:

- Place acute febrile respiratory symptomatic patients at least 1 metre (3 feet) away from others in common waiting areas, if possible.
- Post visual alerts at the entrance to health-care facilities instructing persons with respiratory symptoms to practise respiratory hygiene/cough etiquette.

Consider making hand hygiene resources, tissues and masks available in common areas and areas used for the patient placement

4. Patient placement

Prioritize for those patients who have conditions that facilitate transmission of infectious material to other patients and for those who are at increased risk of acquisition and adverse outcomes resulting from HAI

- Single room
- Cohorting of patient
- Cohorting of HCW

At ER triage screen for communicable diseases of public health importance

- Fever with Rash
- Fever with history of travel to outbreak region
- Fever with respiratory symptoms and with history of health care related exposure or part of cluster ≥2 persons with similar symptoms.

5. Reprocessing of patient care equipment

- Handle equipment soiled with blood, body fluids, secretions, and excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of pathogens to other patients or the environment.
- Clean, disinfect, and reprocess reusable equipment appropriately before use with another patient.

6. Environmental cleaning

- Use adequate procedures for the routine cleaning and disinfection of environmental and other frequently touched surfaces.

7. Handling and disposal of waste and linen

Waste management

- Treat waste contaminated with blood, body fluids, secretions and excretions as clinical waste, in accordance with national guideline.
- Human tissues and laboratory waste that is directly associated with specimen processing should also be treated as clinical waste.
- Discard single use items properly.

Handle, transport and process linen in a manner which

- Prevents skin and mucous membrane exposures and contamination of clothing.
- Avoids transfer of pathogens to other patients and or the environment.

8. Aseptic technique

Protects patients during invasive clinical procedures by employing infection control measures that minimise, as far as practicably possible, the presence of pathogenic microorganisms

- Standard ANTT
- Surgical ANTT

9. Handling and disposal of sharps

Use care when:

- Handling needles, scalpels, and other sharp instruments or devices.
- Cleaning used instruments.
- Disposing of used needles and other sharp instruments.

10. Occupational Health in infection control

- Health status screening and immunization
- Education on safe work practices
- Ensure safe work system and design
- Physical protection with PPE and PEP
- Reporting system to detect compliance and breach in infection control

2. TRANSMISSION BASED PRECAUTION

Transmission-based precautions are applied in addition to standard precautions to patients suspected or confirmed to be infected with agents transmitted by the contact, droplet or airborne routes. In the acute-care setting, this will involve a combination of the following measures:

- continued implementation of standard precautions
- appropriate use of PPE (including gloves, apron or gowns, surgical masks or P2 respirators,
- and protective eyewear)
- patient-dedicated equipment
- allocation of single rooms or cohorting of patients
- appropriate air handling requirements
- enhanced cleaning and disinfecting of the patient environment
- restricted transfer of patients within and between facilities.

For diseases that have multiple routes of transmission, more than one transmission-based precaution category is applied. Whether used singly or in combination, transmission-based precautions are always applied in addition to standard precautions. Transmission-based precautions remain in effect for limited periods of time until signs and symptoms of the infection have resolved or according to recommendations from infection control professionals specific to the infectious agent.

The mode of transmission of infectious agents is the same in primary care or office-based practice as it is in the acute-care setting. However, the risk of transmission may differ due to the population groups and the nature of care provided.

Considering the following will help to establish the risk of infection in primary care and office-based practice:

- patient population—this will influence the nature of care required and the type of potential infectious agents (i.e. some populations have a higher incidence of tuberculosis)
- the profile of care—this includes the level of training of staff, what forms of invasive procedures are performed, whether equipment is reprocessed or single use
- local infrastructure—this influences water quality, food availability, access to other health services (i.e. rural vs urban).

2.1 MODES OF TRANSMISSION

Indirect or direct contact transmission

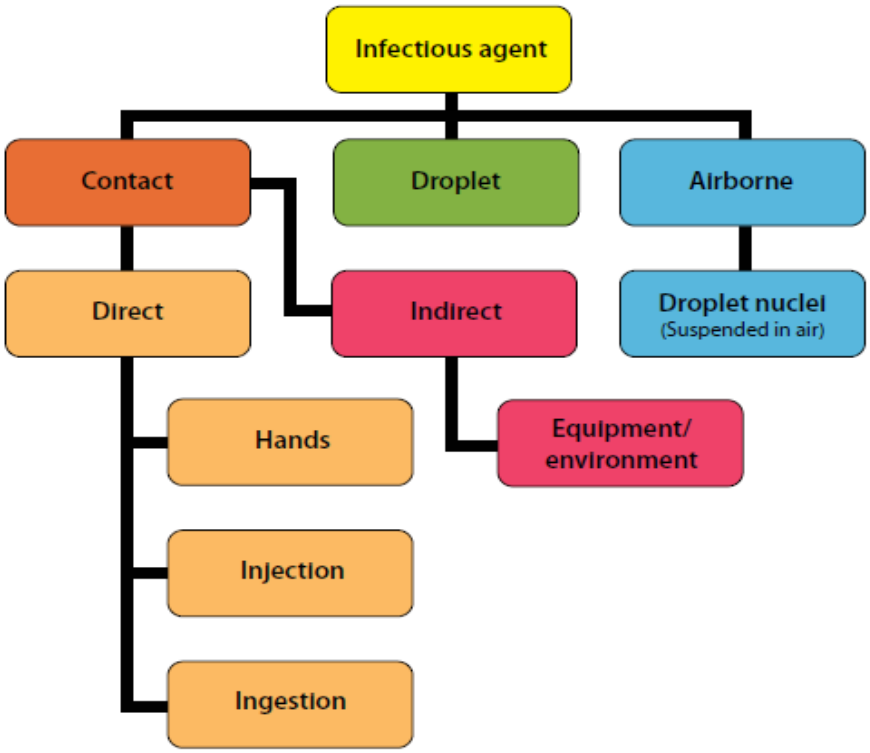
Occur when hen healthcare worker hands or clothing become contaminated, patient-care devices are shared between patients, infectious patients have contact with other patients, or environmental surfaces are not regularly decontaminated.

Droplet transmission:

Occur when infectious respiratory droplets are expelled by coughing, sneezing or talking, and comes into contact with another's mucosa (eyes, nose or mouth), either directly into or via contaminated hands.

Airborne transmission

When transmission occurs by small (i.e. <5microns) respiratory droplets which are carried through the air



Source: Courtesy of Northern Ireland region infection prevention manual, Department of Health, Social Services and Public Safety.

2.2 TYPES OF TRANSMISSION BASED PRECAUTIONS

Table 38: Types of transmission based precautions

	Contact precaution	Droplet precaution	Airborne precaution
	Presence of known or suspected infectious agents that are spread by direct or indirect contact with the patient or the patient's environment e.g. MRSA, *C. difficile*, highly contagious skin infection	A number of infectious agents are transmitted through respiratory droplets (i.e. large-particle droplets >5 microns in size) that are generated by a patient who is coughing, sneezing or talking or droplet generating procedure such as intubation	Dissemination of either airborne droplet nuclei or small particles in the respirable size range containing infectious agents that remain infective over time and distance (e.g., Mycobacterium tuberculosis, Measles, Chicken pox) (i.e. small-particle droplets <5 microns in size) that are generated by a patient who is coughing, sneezing or talking or droplet generating procedure such as intubation
Standard precaution with use of appropriate PPE	• Standard precautions • Hand hygiene; • Put on gloves and gown upon entry to the patient-care area; • Ensure that clothing and skin do not contact potentially contaminated environmental surfaces; and • Remove gown and gloves and perform hand hygiene before leaving the patient-care area	• Standard precautions • Hand hygiene • including respiratory hygiene and cough etiquette • When entering the patient-care environment, put on a surgical mask • Gloves and gown if contact with patient and bed area • Remove all personal protective equipment before leaving patient care area and perform hand hygiene	• Standard precautions, including respiratory hygiene and cough etiquette • Wear a correctly fitted N95 respirator when before entering the patient-care area when an airborne transmissible infectious agent is known or suspected to be present. • Respirators prevents healthcare workers from inhalation of small particles that may contain infectious agents transmitted via the airborne route • The use of negative pressure rooms may also reduce the transmission of infection • Wearing of correctly-fitted surgical masks by coughing patients prevents dispersal of respiratory secretions into the air • Gloves and gown (if worn) should be removed before leaving the patient care area. Perform hand hygiene • N95 mask must be removed and discarded outside the patient care area. Perform hand hygiene again
Patient placement	Single-patient room (if available) • keep patient notes outside the room	• Prioritise patients who have excessive cough and sputum production for single-patient room placement	• Patients on airborne precautions should be placed in a negative pressure room or in a room from which the

	• keep patient bedside charts outside the room • disinfect hands upon leaving room and after writing in the chart • keep doors closed • Make sure that contact isolation signs are visible • When single room not available: risk assessment regarding other options such as cohorting; avoid placing these patients with patients who are at increased risk of an adverse outcome from acquiring an infection (such as immunocompromised patients, fresh surgical patients, patients with burns or drains etc)	• Place together in the same room (cohort) patients who are infected with the same pathogen • If cohorting is not possible avoid placing these patients with patients who are at increased risk of an adverse outcome from infection and ensure >1m distance between patients	air does not circulate to other areas. • Exceptions to this should be justified by risk assessment. • Preventing the spread of pathogens that are transmitted by the airborne route requires the use of special air handling and ventilation systems (e.g., AIIRs) to contain and then safely remove the infectious agent. • Infectious agents to which this applies include Mycobacterium tuberculosis, rubeola virus (measles), and varicella-zoster virus (chickenpox)
Minimizing patient transfer or transport	• Limit transfer of patient • If transfer within or between facilities is necessary, it is important to ensure that infected or colonised areas of the patient's body are contained and covered. • The receiving unit or hospital is informed of the patient's infectious status (so that the correct precations are taken)	• Limit transfer of patient • If transfer within or between facilities is necessary, it is important to ensure that the patient to wear a mask while they are being transferred and to follow respiratory hygiene and cough etiquette. • Children should wear a correctly fitting mask when they are outside an isolation room. The child's oxygen saturation should be monitored. • The receiving unit or hospital is informed of the patient's infectious status (so that the correct precations are taken)	• Ask the patient to wear correctly fitted surgical mask while they are being transferred and to follow respiratory hygiene and cough etiquette, as well as covering any skin lesions associated with the condition (e.g. chickenpox [varicella]) will reduce the risk of cross-transmission. • Children should wear a correctly fitting mask when they are outside an isolation room. The child's oxygen saturation should be monitored. • The receiving unit or hospital is informed of the patient's infectious status (so that the correct precations are taken)

2.2.1 Infectious agents and the types of transmission based precaution

Table 34: Recommended transmission based precautions depending on the infectious agents

Type of precaution	Examples of infectious agents	Single room or cohort	Gloves	Gown	Mask	Eye protection	Handling of equipment	Visitors
Standard	Standard precautions apply for all work practices to prevent the likelihood of transmission of infection							Hand hygiene Respiratory hygiene and cough etiquette
Contact	MDROs, C.difficile, intestinal tract pathogens (e.g. norovirus), highly contagious skin infections-enterovirus (HFMD)	✓	✓	✓	Required if infectious agent isolated in sputum	*As required	Single use or reprocess before reuse on next patient	Same precautions as staff
Droplet	Influenza, RSV, norovirus, pertussis (whooping cough), meningococcus	✓	*As required	*As required	✓ Surgical mask	*As required	Single use or reprocess before reuse on next patient	Restrict visitor numbers and precautions as for staff
Airborne	Pulmonary TB, chickenpox (varicella)#, measles (rubeola)#, SARS	✓ Single room with negative pressure	*As required	*As required	✓ P2/N95 respirator	*As required	Single use or reprocess before reuse on next patient	Restrict visitor numbers and precautions as for staff

Chicken pox (Varicella) which is highly infectious requires Airborne and Contact isolation with standard precautions. This is transmitted via contact route due to the fluid in the

vesicles that can contamination the patient care environment – therefore touch patient and patient environment requires gown and gloves. The best protection for staff in immunitzation –the N95 mask alone will not prevent transmission because of the contact transmission risk. Non-immune staff must not care for chicken pox patients.

Resources:

Centers for Disease Control and Prevention (CDC), 2016. Transmission based precautions. Link: https://www.cdc.gov/infectioncontrol/basics/transmission-based-precautions.html

National Health and Medical Research Council (2019). Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019

Indian Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

3. OUTBREAK RESPONSE IN HEALTH CARE SETTING

Health care associated infection (HAI) outbreaks are defined as an increase in the number of hospital-acquired or healthcare facility-acquired cases of disease among patients or staff over and above the expected number of cases*.

* The expected number of cases can be determined through ongoing disease surveillance. This involves systematic collection of numerator and denominator data using standardized case definitions and surveillance methods.

3.1 COMMONLY DETECTED OUTBREAKS INCLUDE:

- Multi-resistant Enterbacteriacae or Pseudomonas
- Diarrhoeal pathogens (e.g. Campylobacter, norovirus)
- Respiratory pathogens (e.g. influenza, RSV, COVID-19 infection)
- Measles (rubeola), chickenpox (varicella)

3.2 OBJECTIVES OF HAI OUTBREAK INVESTIGATION:

- Prompt investigation of an Outbreak of hospital acquired infection.
- To prevent morbidity, cost and institutional image due to nosocomial infection.
- To sustained improvement in patient care practices.

3.3 DEFINITIONS OF COMMON HEALTHCARE ASSOCIATED INFECTION (HAI) OUTBREAKS

3.3.1 An influenza or influenza-like illness (ILI) outbreak

- Three or more cases of influenza-like illness in a defined setting within a 3-day period, OR
- One or more laboratory-confirmed cases of influenza within a 3-day period in a longterm care facility OR

- An increased absenteeism in association with ILI and/or laboratory confirmed influenza in healthcare workers.

3.3.2 A Norovirus outbreak

- Onset of two or more epidemiologically linked cases within a three day period, where a case is defined as someone with 2 or more episodes of vomiting or three or more episodes of diarrhea within 24 hours.

3.3.3 A Clostridium difficile infection (CDI) outbreak

- Three or more epidemiologically linked CDI cases within a period of < seven days.

3.3.4 A Multi-drug Resistant Organism (MDRO) outbreak

- Increase in the number of facility-acquired MDRO cases above and beyond the endemic (baseline) level in a certain facility/unit during a specific time period, and may include an increase in cases of methicillin-resistant Staphylococcus aureus (MRSA), vancomycin-resistant enterococcus (VRE), carbapenem-resistant Klebsiella pneumonia (CRKP) or other carbapenem-resistant Enterobacteriaceae (CRE), multi-drug resistant Acinetobacter or Pseudomonas, or any other multi-drug resistant organisms.

- Two or more infections with the same organism in patients receiving the same procedure within a short period of time (e.g. invasive staphylococcal infection inpatients undergoing epidural or intraarticular injection, postoperative infection such as bacterial or fungal endophthalmitis in patients undergoing extracapsular cataract extraction and intraocular lens implantation, etc.)

- A single case may constitute an outbreak, for example:
    - Vancomycin-intermediate Staphylococcus aureus (VISA) or vancomycin-resistant Staphylococcus aureus (VRSA)
    - Any unusual multidrug-resistant organism (MDRO) or MDRO with an unusual resistance pattern conferring resistance to critical antibiotic(s)
    - Legionellosis if the patient has been in the healthcare facility for the entire incubation period (10 days)
    - Acute hepatitis B or C in a patient who had an invasive procedure during the incubation period and no other risk factors for hepatitis.

- Botulism in a patient who recently received botox injections.
- Exotic infection in a transplant or transfusions recipient with no additional risk factors for the disease (e.g. rabies, West Nile virus, etc.)
- Post-procedure infection with an unusual organism (e.g. invasive fungal infection after an epidural procedure in an immune competent patient.)

3.3.5 Other outbreak definitions:

- A chickenpox outbreak is defined as 3 or more cases in a long-term care facility within 1 incubation period.
- A pertussis outbreak is defined as two or more cases clustered in time (e.g., cases occurring within 42 days of each other) and space (e.g., in one building) where transmission is suspected to have occurred in that setting (e.g., nosocomial transmission in a hospital) with at least one case culture or PCR-confirmed.
- A foodborne disease outbreak is defined as two or more persons who experience a similar illness after ingestion of a common food. Please note two exceptions: one case of botulism or chemical poisoning constitutes an outbreak.
- A waterborne disease outbreak is defined as two or more persons who experience a similar illness after consumption or use of a common water source.

3.4 STEPS IN INVESTIGATING AN OUTBREAK

Step 1: Identify potential investigation team members (or committee to investigate the outbreak) and resources /prepare for fieldwork.

Step 2: Establish the existence of an outbreak

- Establish background rate of disease.
- Consider if observed number of cases is in excess of the usual number and cases are typical.
- Examine surveillance data.

Step 3: Verify the diagnosis

Review clinical findings, laboratory results, and medical records if necessary. Compare the results with established case definitions

Step 4: Construct a working case definition

A case definition should be developed. Establish a set of standard criteria to decide whether or not a person has the disease of concern. It must include a unit of time and place and specific biological and/or clinical criteria.

Clinical Microbiologist & senior physician should be responsible for finalizing the case definition. A gradient of definition (as lab confirmed, probable or suspected case) is often helpful. Identification of the index case should be stressed.

Step 5: Find cases systematically and develop a line listing

As appropriate, identify additional cases through:

- Enhanced passive surveillance: send / fax a letter or memo to laboratories and/or providers asking them to report patients that meet the case definition OR
- Active surveillance: review laboratory results and/or facility records for patients that meet the case definition.

Collect the following information, as appropriate, on every case:

- Identifying information (name of patient, name of healthcare facility, unit information, and room number)
- Demographic information (date of birth, gender)
- Clinical information (signs, symptoms, diagnostic tests)
- Risk factor information
- Names of and details for other people with a similar illness
- Reporter information

Organize the information in a line listing

Step 6: Perform descriptive epidemiology

- Time: Construct an epidemic curve, using a unit of time one-eighth to one-third as long as the incubation period
- Place: Map the cases within the healthcare facility
- Person: Calculate the proportion of affected individuals. A nursing home outbreak might be characterized by nursing unit, room number, those attending specific functions, or

resident versus staff. Consider other factors, such as exposure to shared equipment, invasive procedures, medication, etc. when looking at proportion of affected individuals.

Step 7: Develop hypotheses.

- Review the data collected thus far. What are the implications of your findings?
- Talk to facility staff about risk factors and the proportion exposed to suspected risk factors who may not have become ill.
- Summarize hypotheses.

Step 8: Evaluate hypotheses.

- If the source of infection is obvious, e.g., in a situation where there is clear person-to-person transmission, no formal hypothesis testing is necessary.
- If the source of infection is not obvious, a cohort or case-control study may be necessary to test hypotheses.

Perform epidemiological study for testing the formulated hypothesis with the help of epidemiologist form the RRT.

A case-control study is the most common approach to hypothesis testing. This compares the frequency of a risk factor in a group of cases (i.e. individuals with the nosocomial infection) and in a group of controls (i.e. individuals without the infection). Controls must be carefully selected to limit bias. Two or more controls for each case may be necessary to provide sufficient statistical power. The strength of association between exposure and disease is quantified by the odds ratio in case control studies with a 95% confidence interval. The role of chance, confounding, and bias should be considered in interpreting results. The appropriate statistical methods can be applied as per the requirement.

Carry out further studies if necessary to support the hypothesis or if analytic studies do not confirm the hypothesis; Further study to refine case definition, may involve testing of environmental samples, food samples or environmental screening.

Step 9: As necessary, reconsider and refine hypotheses and conduct additional studies.

In some cases, analytical studies may reveal a source for the illness. In other cases, analytical studies may reveal only part of the answer or no answer at all. A second set of epidemiological, environmental or laboratory studies may be necessary to identify the source of illness.

Step 10: Implement and strengthen infection control and prevention measures

The aims are:

- To control the current outbreak by interrupting the chain of transmission.
- To prevent future occurrence of similar outbreaks.

Step 10: Review the measures initiated for immediate control for its adequacy to reduce the risk of transmission. Implement appropriate ongoing control measures and strategies to prevent further illness:

- Restrict spread from the case (ward closure etc)
- Interrupt chain of infection (contact tracing)
- Interrupt transmission or reduce exposure
- Reduce susceptibility to infection
- Assessment of policy, regulations, standards
- Communicate and coordinate with all stakeholders: Reinforcement of infection control precautions to staff, patients and visitors.

Make plans to evaluate their effectiveness

- Document type and time of implementation of infection control measures.
- Monitor factors contributing or affected by outbreak and any associated changes.
- This is also an opportunity to initiate or improve a surveillance system to facilitate evaluation of the efficacy of the control procedures instituted.
- Continuous surveillance may be implemented in high-risk units as per HAI surveillance chapter.

Step 11: Communicate your findings

During the investigation of an outbreak, timely, up to- date information must be communicated to the hospital administration, public health and other concerned authorities

A final report on the outbreak investigation should be prepared. It should describe the outbreak, interventions, and effectiveness, and summarize the contribution of each team member participating in the investigation. It should also make recommendations to prevent future occurrence.

3.5 MANAGEMENT OF MULTIDRUG RESISTANT ORGANISM OUTBREAK SITUATION

Successful control of multi drug resistance organism (MRO) is based on a combination of interventions. These include;

- continued rigorous adherence to hand hygiene,
- appropriate use of PPE
- implementation of specific transmission-based precautions (isolation of infected or colonised patients from exposed patient, etc)
- increased environmental cleaning and patient-dedicated equipment) until patients are culture-negative for a target MRO or have been discharged from the facility.

3.5.1 Isolation

Placing colonised or infected patients in single rooms, cohort rooms or cohort areas as a component of a multifaceted infection control policy can reduce acquisition rate and infection with MROs in acute-care settings. Cohorting patients with the same strain of MRO has been used extensively for managing outbreaks of specific MROs, including MRSA, VRE, extended spectrum beta-lactamase (ESBL)-producing bacteria, and Pseudomonas aeruginosa. However, it is not always appropriate to cohort patients with the same MRO species if they have a different resistance mechanism or phenotype.

3.5.2 Environmental cleaning

In acute-care areas where the risk of patient vulnerability and risk of cross infection due to the presence of an MRO is high, contact precautions should be followed. This will require all patient surrounds and frequently touched objects (e.g. bedrails, trolleys, bedside commodes, doorknobs, light switches or tap handles, ensuite facilities) to be cleaned with a suitable detergent and disinfected with a TGA-registered hospital grade disinfectant.

- a 2-step clean, which involves a physical clean using detergent solution followed by use of a chemical disinfectant
- a 2-in-1 clean in which a combined detergent/disinfectant wipe or solution is used and mechanical/manual cleaning action is involved. Sole reliance on a disinfectant without mechanical/manual cleaning is not recommended.

3.5.3 Patient equipment

Standard precautions concerning patient-care equipment are very important in the care of patients with MROs. Patient-care devices (e.g. electronic thermometers) may transmit infectious agents if devices are shared between patients. To reduce the risk of transmission, disposable or patient dedicated equipment is preferred.

3.5.4 Screening of patients at high risk of acquisition of MROs

Screening for colonization of high risk patients with MROs maybe undertaken depending on the available resources.

Table 40: Screening of patients at high risk of acquisition of MROs

Organism	Suggested targeted screening dependent on local acquisition rates and risk factors	Frequency of screening	Sample collection
MRGN ESBLs, Plasmid AmpC, MR-Pa, MR-Ab, Transferable carbapenemase producing organisms	• **High risk units** –– Intensive care unit –– Specialty centres (e.g. burns, neurosurgery) • Patients epidemiologically linked to single-strain outbreak in health care facility • **Patients at high risk of carriage** o Those with recent broad spectrum antibiotic therapy (carbapenem, quinolones, and 3rd and 4th generation cephalosporins) o Long duration of stay and severity of illness o Chronic disease and impaired functional status o Presence of invasive medical devices		Multiple sites including rectal or perianal swabs, • Reasonable sites to include groin, wounds and respiratory secretions or tracheal aspirates depending on the infectious agent
VRE	• **High risk units** –– Intensive care unit –– Nephrology –– Haematology • Patients epidemiologically linked to single-strain outbreak in health care facility • **Patients at high risk of carriage** o Dialysis patients o Recent hospitalisation in any health care facility o Critical illness in intensive care units o Long duration of stay and severity of illness o Chronic disease and impaired functional status o Patients with urinary catheters o Prolonged or broad-spectrum antibiotic use, particularly vancomycin	• For endemic VRE screen on admission to intensive care unit, discharge and once weekly • For VRE in ambulatory haemodialysis unit, or an haemotology/ oncology facility screen periodically every 3-6 months	• Multiple sites including rectal or perianal swabs, • Reasonable sites include groin, wounds and respiratory secretions or tracheal aspirates depending on the infectious agent
Management • Staff screening and decolonisation is not recommended for VRE and MRGN • Apply stringent hand hygiene, contact precautions (gloves and gown) and core strategies for isolating including cohorting, increased environmental cleaning and dedicated patient equipment • Patients positive for VRE or MRGN should have an electronic or other alert placed on their case record for easy identification on readmission.			

Table 41: Screening for MRSA

Organism	Screen who	Screen when	Sample collection
MRSA	• Patients at high risk of carriage: –– those who are known to have been previously infected or colonised with MRSA –– frequent re-admissions to any healthcare facility –– transfers from other acute care facility –– residence in long term care facilities –– patients with chronic wounds –– recent inpatients at hospitals known or likely to have a high prevalence of MRSA –– locales or populations where community-acquired strains of MRSA are prevalent	• Screened routinely at the time of admission unless they are being admitted directly to isolation facilities and it is not planned to attempt to clear them of MRSA carriage	• Multiple sites including one from the nose and a mucosal surface • Reasonable sites to swab include nares, skin lesions and wounds, sites of catheters, catheter urine, groin/perineum, tracheostomy and other skin break in all patients, and sputum from patients with a productive cough • Where maximum sensitivity is required, consideration should be given to adding a throat swab. The umbilicus should be sampled in all neonates
	• Healthcare workers epidemiologically linked to single-strain outbreak in health care facility	• After confirmation of epidemiological evidence • 2 weeks after decolonisation therapy	
	• Patients in high-risk units –– ICU/high dependency unit (admission and discharge) –– Spinal unit –– Burns unit –– Pre-operative clinics –– Patients with planned prosthetic surgery (joint replacement, cardiothoracic surgery)	• All patients on admission, discharge and once weekly	

Management

- Apply stringent hand hygiene, contact precautions (gloves and gown) and core strategies including; isolating and cohorting patients, increased environmental cleaning and dedicated patient equipment.
- Patients positive for MRSA have an electronic alert placed on their case record for easy identification on readmission.
- Consider topical plus/minus systemic decolonisation for:
  - Healthcare workers epidemiologically linked to transmission
  - Patients having prolonged hospitalisation
  - Patients with chronic conditions likely to be readmitted (e.g. haemodialysis).
  - Patients before undergoing high-risk elective surgery such as cardiac and implant surgery

Resources:

Garnacho Montero, J., Lerma, F.Á., Galleymore, P.R. et al. Combatting resistance in intensive care: the multimodal approach of the Spanish ICU “Zero Resistance” program. Crit Care 19, 114 (2015). https://doi.org/10.1186/s13054-015-0800-5

West Viginia, Department of health, Human Health Resources, Division of Infectious Disease Epidemiology, 2014. Healthcare Associated Infections (HAI) Outbreak Investigation / Notification Protocol. Link: https://oeps.wv.gov/hai/documents/lhd/hai-protocol.pdf

Ministry of Health and Family Welfare India, Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

3.6 MANAGEMENT OF CHICKENPOX EXPOSURE IN HEALTH CARE SETTING

Identification of a single case of varicella should trigger intervention measures because this case could lead to an outbreak

3.6.1 Important Terms

Significant Exposure of varicella:

- Varicella: In same 2- to 4 bed room or adjacent beds in large ward, face-to-face contact with an infectious patient, by a by a susceptible person visitor or staff member not wearing appropriate N95 mask. Experts differ in their opinion about the duration of contact; some suggest 5 minutes and others more than 1 hour.
- Zoster: Intimate contact (eg, touching or hugging) with a person deemed contagious. Direct contact with vesicle fluid without wearing gloves.
- Newborn infant: onset of varicella in mother 5 days or less before delivery or within 48 hours after delivery. If mother has zoster Varicella Zoster Immunoglobulin or IVIG is not indicated.

The average incubation period: is 14–16 days (range, 10–21 days). If received Varicella Zoster Immunoglobulin (IVIG) or immunocompromised incubation period maybe extended up to 28 days.

Infectious Period: 1 to 2 days before the rash appears and until all lesions are crusted over (average range, 4–7 days after rash onset).

3.6.2 Modes of Transmission

- Most important mode of transmission is airborne transmission.
    - Dissemination of airborne VZV-containing droplet nuclei (<5mm) that remain infective over time and distance. VZV carried in this manner may be dispersed by air currents and may be inhaled by susceptible persons who have not had face-to-face contact with or been in the same room with an infectious person.
- Direct contact transmission.
    - Transfer of VZV from one infected person to another person from a contaminated intermediate object or person. This is transmitted via contact route due to the fluid in the vesicles that can contamination the patient care environment

3.6.3 Transmission based protection:

- In addition to standard precaution, airborne and contact precautions are recommended for patients with varicella for minimum of 5 days after onset of rash and until all lesions are crusted (in immunocompromised patients infectious period maybe a week or longer).
    - Transmission via contact route due to the fluid in the vesicles that can contamination the patient care environment – therefore touch patient and patient environment requires gown and gloves. The best protection for staff in immunitzation –the N95 mask alone will not prevent transmission because of the contact transmission risk.
- For exposed patient: Airborne and contact precaution from 8 to 21 days after exposure (up to 28 days if received Varicella Zoster Immunoglobulin or IVIG).
- Neonates born to mothers with varicella, if hospitalized, need to be on airborne and contact precaution till 21 days or 28 days of age if they received Varicella Zoster Immunoglobulin or IVIG. Infants with varicella embryopathy do not require isolation if they do not have active lesions.
- Immunocompromised patients who have zoster (localized or disseminated) and immunocompetent patients with disseminated zoster require airborne and contact precautions for duration of illness. For immunocompetent patients with localized zoster, contact precautions are indicated until all lesions are crusted.

3.6.4 Individuals who have high risk of complications include:

Infants, adolescents, adults and immunocompromised patient. Persons with underlying immunocompromising medical conditions (e.g., cancer, HIV/AIDS) are especially likely to have more severe disease and a longer time to crusting of lesions; and, they may shed virus from skin lesions for a prolonged period. Severe complications also may occur in healthy children receiving intermittent steroids for asthma (>2mg/kg/day or >20mg/day), especially if it was given during the incubation period.

3.6.5 Recommended control measures in event of exposure:

Identify Heath care workers, patients, and visitors who had been exposed and who lack evidence of immunity:

- Evidence of immunity:
- Evidence of vaccination:

- 1 dose of varicella vaccine in preschool age children (≥ 12 months of age) or 2 doses in school age adolescents and adults

- Laboratory evidence of immunity
  - Immunoglobulin G test- this titer may not detect vaccine induced antibody)
- Lab confirmed disease
  - Demonstration of VZV antigen by polymerase chain reaction (PCR) tests, by direct fluorescent antibody (DFA), or by isolation of VZV through viral culture from a clinical specimen.
  - Four-fold or greater rise in serum varicella immunoglobulin G (IgG) antibody level between acute and convalescent serum by a quantitative serologic assay (A four-fold rise in IgG antibodies might not occur in vaccinated persons).
  - Varicella diagnosed by a physician or verification of history of varicella disease.
  - History of herpes zoster diagnosed by a physician.
- Offer varicella immunization for all aged ≥ 12 months of age who do not have evidence of immunity, provided there is no contraindication to vaccination. Vaccinate as soon as possible within to 3 days up to 5 days after exposure may prevent or modify disease.
- Varicella –Zoster Immune globulin (VariZIG 125units/10kg upto maximum of 625units /5 vials) if available / Intravenous Immunoglobulin (IVIG at dose 400mg/kg) should be administered to those who have high risk of severe varicella infection and who cannot be vaccinated. Should be given as soon as possible up to 10 days after exposure. In exposed immunocompromised patients without evidence of immunity, if VZV IgG/IVIG is not available some experts recommend oral acyclovir as post exposure prophylaxis (PEP) starting 7-10 days after exposure and given for 7 days. PEP dose of acyclovir is 20mg/kg/dose given 3 times a day with maximum daily dose of 3200mg. (Note: In immunocompromised patient with varicella or zoster and all severe varicella infections treat with intravenous acyclovir).
  - High risk patients include;
    - Immunocompromised patients without evidence of immunity
    - Pregnant women without evidence of immunity (if varicella-zoster immunoglobulin is not available clinicians may choose to administer IVIG or closely monitor for signs and symptoms of varicella and treat with acyclovir if disease develops).
    - Newborn infant whose mother had onset of chicken pox within 5 days before delivery or 48 hours of delivery.

- Hospitalized preterm infants (≥ 28 weeks of gestation) whose mothers lack evidence of immunity against varicella
- Hospitalized preterm infants (< 28 weeks of gestation or birth weight ≤1000g) regardless of maternal immunity

- All exposed patients without evidence of immunity should be discharged as soon as possible.
- All exposed patients without evidence of immunity who cannot be discharged should be placed in isolation from day 8 to day 21 after exposure to the index patient. For people who receive Varicella –Zoster Immune Globulin/ IVIG, isolation should be continued for day 28.
- Health care professionals who have received 2 doses of vaccine should be monitored daily during 10-21 days after exposure and placed on sick leave if develop disease as even after vaccination break through disease may develop.

Contraindications to varicella vaccination (Kim, Park et al. 2018)

- Severe allergic reaction (such as anaphylaxis) after a previous dose of varicella vaccine or to any component of varicella vaccine
- Pregnancy or possibility of pregnancy within 1 month
- Severe immunosuppression
- Solid tumors and hematologic malignancies
- Current receipt of anti-cancer chemotherapy
- Primary or acquired immunodeficiency
- Immunosuppressive agents administered to patients who have undergone solid organ or hematopoietic stem cell transplant
- Biologic agents for autoimmune conditions
- Human Immunodeficiency virus (HIV) infection with CD4 cell count < 200 cells/mm3
- Long-term high dose systemic corticosteroids (prednisone ≥ 20 mg/day or ≥ 2 mg/kg/day or its equivalent for 14 days or more). If long term steroid has been given varicella vaccine can be give 1 month after stopping the steroid treatment.
- Active, untreated tuberculosis
- As to all vaccine in moderate to severe illness vaccination is deferred till illness resolves

Note: Live viral vaccine such as varicella vaccine are usually withheld for an interval of minimum 3 months (interval to immune reconstruction varies and depend on individual case) after immunosuppressive cancer chemotherapy has been discontinued.

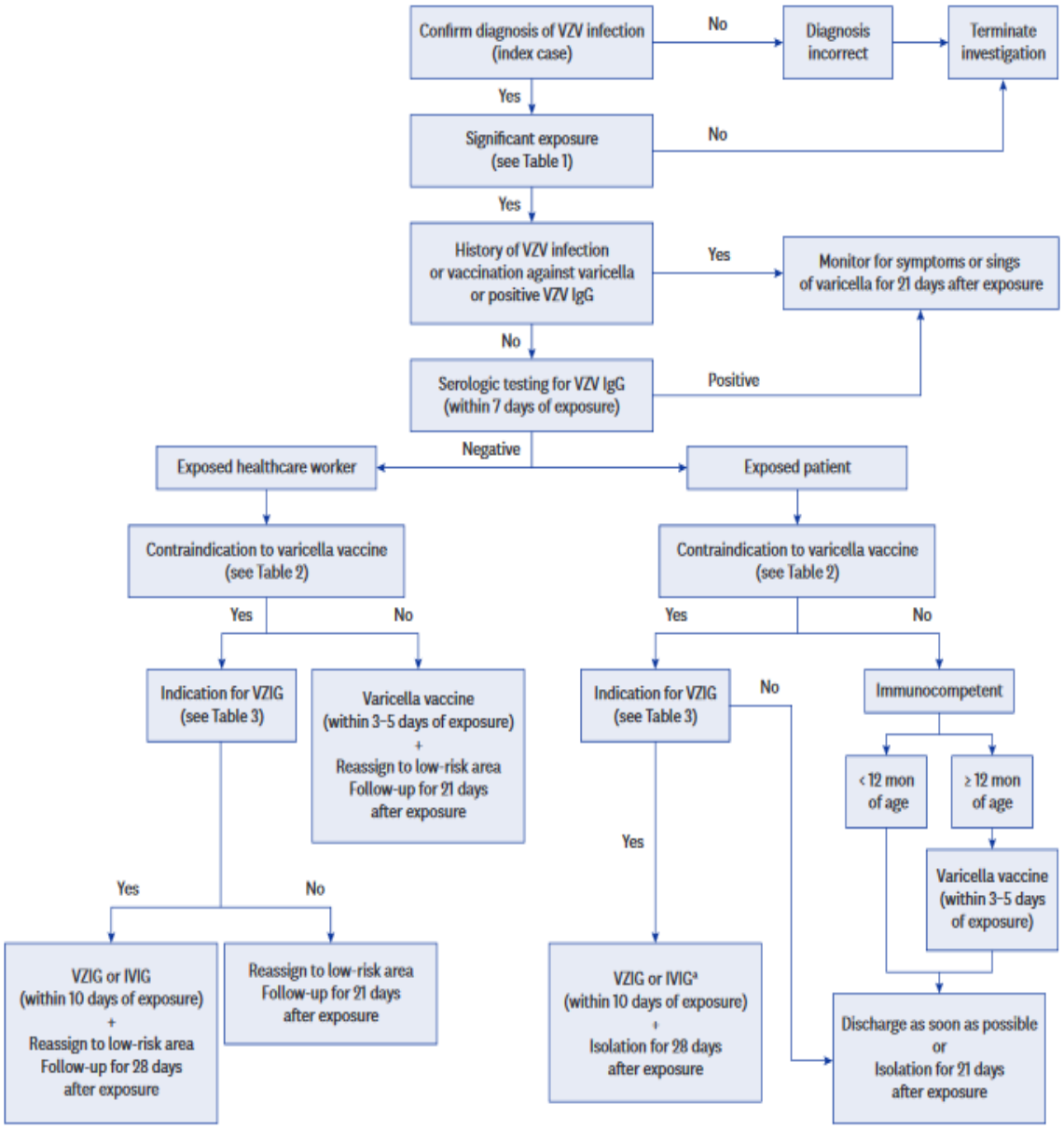


Fig. 1. Suggested algorithm for the evaluation and management after exposure to VZV in healthcare settings.
VZV = varicella-zoster virus, IVIG = intravenous immune globulin, VZIG = varicella-zoster immune globulin.
*For immunocompromised patients, a 7-day course of acyclovir or valacyclovir may be considered if both VZIG and IVIG are not available.

Figure 25: Response to Chicken pox exposure

Ref (Kim, Park et al. 2018)

Table 42: Form to be used during outbreak response in Chicken pox exposure in health care setting

Bed number /ward	ID	Age/sex	Underlying disease	Varicella immunity	Contraindication to vaccination	Require VZV IgG/IVIG

Sample table for filling information on those exposed to varicella in health care setting

Resource:

Kim, S. H., et al. (2018). "Implementation of Hospital Policy for Healthcare Workers and Patients Exposed to Varicella-Zoster Virus." J Korean Med Sci 33(36): e252. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6115693/

Lopez, A. S., & Marin, M. (2008). Strategies for the control and investigation of Varicella Outbreaks manual; 2008. National Center for Immunization and Respiratory Diseases Center for Disease Control and Prevention, Atlanta, GA. Link: https://www.cdc.gov/chickenpox/outbreaks/manual.html

3.7 MANAGEMENT OF ACUTE GASTROENTERITIS DUE TO SMALL ROUND STRUCTURED VIRUS (SRSV)

Norovirus are a frequent cause of diarrhoea and vomiting in the community and the commonest cause of outbreaks of gastroenteritis in hospital.

3.7.1 Transmission occurs by;

- Feco-oral rout:
  - Consumption of contaminated food and water
  - Person-to-person contact
- Droplet rout via vomitus Via aerosols of vomitus. Vomitus spread is most commonly recognized in semiclosed communities, such as nursing homes, hospitals, and cruise ships.

3.7.2 Criteria for suspecting an outbreak due to SRSV:

- Short incubation (15 – 48 hours)
- Illness duration (12 – 60 hours)
- Vomiting in >50% symptomatic patients
- Patients and Staff both affected.

3.7.3 Infectivity:

During acute disease and up to 48 hours after stools become formed.

3.7.4 Control of Norovirus outbreaks

- Cohort or isolate symptomatic individuals until 48 hours after resolution of symptoms
  - Consider longer periods of isolation or cohorting precautions for complex medical patients (e.g., those with cardiovascular, autoimmune, immunosuppressive, or renal disorders) as they can experience protracted episodes of diarrhea and prolonged viral shedding. Patients with these or other comorbidities have the potential to relapse, and facilities may choose longer periods of isolation based on clinical judgment.
  - Consider extending the duration of isolation or cohorting precautions for outbreaks among infants and young children (e.g., under 2 years), even after resolution of symptoms, as there is a potential for prolonged viral shedding and environmental contamination. Among infants, there is evidence to consider extending contact precautions for up to 5 days after the resolution of symptoms.

- Emphasize the importance of handwashing with soap and water
- Wash and dry hands before and after patient/environmental contacts.
- Wear gloves and aprons for contact with infected patients/environment.
- Avoid transfer to unaffected wards or departments (unless medically urgent and after consultation with Infection Control Staff). The priority is to stop spread of the virus to other areas.
- Minimise movements of staff between affected and unaffected wards.
- Exclude affected staff until symptom free for 48 hours.
- Caution visitors that they may be exposed to infection.
- Wherever possible, exclude children from visiting affected wards.
- Advise relatives not to visit if they are feeling unwell or have D&V.
- Use Presept 1200ppm, hypochlorite (1tab : 1 litre water) to disinfect contaminated environmental surfaces.
    - For Neonates: After cleaning incubators and toys disinfect with Presept (100 PPM) left for 30 minutes and then rinsed off with detergent and water.
- May use Chlorine bleach solution with a concentration of 1000 to 5000 ppm (5 to 25 tablespoons of household bleach [5% to 8%] per gallon of water) or other disinfectant registered as effective against norovirus by the Environmental Protection Agency (EPA), according to the recommended concentration.

Guidelines on cleaning up vomit and faeces:

- The following precautions should be used by individuals who clean up vomit or faeces in order to minimize the risk of infection to them.
- Wear disposable gloves and apron.
- Use proper towels to soak up excess liquid. Transfer these and any solid matter directly into a clinical waste bag.
- Clean the soiled area with detergent and hot water, using a disposable cloth. Disinfect the contaminated area with freshly made Presept 1200ppm, hypochlorite (1 tab: 1litre water) solution. Note that the hypochlorite is corrosive and may bleach furnishings and fabric.
- Dispose of gloves, apron and clothes into the clinical waste bag.
- Wash hands thoroughly with disinfectant (Hibiscrub) and dry hands well.

Treatment of specific materials:

- Contaminated linen and bed curtains should be placed carefully into laundry bags appropriate to guidelines for infected linen (soluble alginate bags with a red outside bag) without generating further aerosols. Contaminated pillows should also be laundered as infected linen unless they are covered with an impermeable cover in which case they should be disinfected with Presept 1200ppm, hypochlorite (1tab:1litre water) solution.

- Contaminated hard surfaces should be washed with detergent and hot water, using a disposable cloth, then disinfected with Presept 1200ppm, hypochlorite (1tab:1litre water) solution (disposable cloth).
- Clean floors with detergent and hot water and disinfect with Presept 1200ppm, hypochlorite (1tab:1litre water) solution. Mops should be disposed of.
- Fixtures and fittings in toilet area should be cleaned with detergent and hot water using a disposable cloth, then disinfected with Presept 1200ppm, hypochlorite (1tab:1litre water) solution.

Resources:

Reacher, M. H., et al. (2004). "Clinical Manifestation of Norovirus Gastroenteritis in Health Care Settings." Clinical Infectious Diseases 39(3): 318-324.

Health and Safety Executive (HSE), South Cork & Kerry Guidelines. Section 10.2 Norovirus (Winter Vomiting Disease). Link: https://www.hse.ie/eng/about/who/healthwellbeing/infectcont/sth/gl/section-10-2.html

MacCannell, T., Umscheid, C. A., Agarwal, R. K., Lee, I., Kuntz, G., Stevenson, K. B., & Healthcare Infection Control Practices Advisory Committee. (2011). Guideline for the prevention and control of norovirus gastroenteritis outbreaks in healthcare settings. Infection Control & Hospital Epidemiology, 32(10), 939-969. https://www.cambridge.org/core/journals/infection-control-and-hospital-epidemiology/article/abs/guideline-for-the-prevention-and-control-of-norovirus-gastroenteritis-outbreaks-in-healthcare-settings/93513EE99AB8EF31CBB0E675DB35BA50

3.8 RESPIRATORY INFECTION OUTBREAK

Various agents may cause respiratory diseases and including but are not limited to

Influenza viruses, Mycoplasma pneumoniae, adenovirus, respiratory syncytial virus, rhinovirus, parainfluenza viruses, Legionellaspp., group A streptococcus, human metapneumovirus, and coronavirus.

General symptoms include fever, upper or lower respiratory congestion, cough, sore throat, shortness of breath, chills, head-ache, myalgia, malaise, and sometimes gastrointestinal (GI) symptoms.

Differential Diagnosis: Acute respiratory illnesses are often attributable to infectious etiologies. Non-infectious etiologies that can present as ARI include asthma, malignancies (e.g., lymphoma), and rheumatologic conditions. However, infectious etiologies must always be considered and evaluated.

Diagnosis: Clinical syndrome associated with outbreaks, confirmed by viral culture, PCR, rapid antigen test, DFA/IFA test, or other test.

Incubation: Varies with agent. Bacterial infections generally have longer incubation times than viral infections.

Reservoir: Varies with agent; mostly human.

Source: Nasal or pharyngeal secretions.

Transmission: Mostly through droplets or contaminated fomites.

Communicability: Varies with agent. On average, up to 2 days prior to and through 1 day after resolution of fever; may be longer in children or in patients with compromised immune systems.

Specific Treatment:

Supportive care (e.g., rest, antipyretics, fluids, etc.). Bacterial infections require antibiotic treatment. With influenza, antiviral medications may reduce the severity and duration of influenza illness if administered within 48 hours of onset. Serious infections with RSV may be prevented with the antiviral Synagis®(palivizumab).

Immunity: Varies by agent.

Prior to laboratory confirmation of infection by a particular organism, the following case definition should be used to identify cases of respiratory infection (RI):

- New or worsening cough and
- Fever (≥100°F/37.8°C), or a temperature that is abnormal for that individual and
- At least one of the following symptoms: myalgia/arthralgia, prostration,nasal discharge, sore throat, headache

Note: There may be groups within the population that would not meet this definition, yet are infected with an organism that can cause respiratory outbreaks. For example, young children, the elderly, the immuno-compromised, or those taking medications such as steroids, NSAIDS, or ASA, may not develop a fever or may have a lowered temperature as a result of the infection. A temperature<35.6ºC or > 37.4ºC in the elderly may be an indication of infection

Case denition maybe further refined:

ILI: Influenza like illness for suspected influenza outbreaks

COVID-19 infection case definitions for SARS- CoV infections.

3.8.1 Identifying an Outbreak

3.8.1.1 Outbreak definition:

One case of laboratory-confirmed influenza and at least two residents with onset of influenza-like-illness (ILI)* within 72 hours of each other.

While unusual, influenza out breakscan occur outside of the normal influenza season; therefore, influenza testing should be added to testing for other respiratory pathogens during non-influenza season periods when any resident has signs and symptoms that could be due to influenza, and especially when two residents or more develop respiratory illness within 72 hours of each other.

*ILI is defined as fever (≥100°F/37.8°C) plus cough and/or sore throat, in the absence of a known cause other than influenza. Patients with influenza often have fever or feverishness with cough, chills, headache, myalgias, sore throat, or runny nose. The elderly, children with neuromuscular disorders, and young infants, may have atypical clinical presentations.

3.8.1.2 Non-influenza respiratory outbreak of known etiology definition:

At least one case of laboratory-confirmed respiratory pathogen, other than influenza, in the setting of a cluster (≥2 cases) of ARI within a 72-hour period. OR

Respiratory outbreak of unknown etiology definition: A sudden increase of ARI cases over the normal background rate in the absence of a known etiology

Suspected respiratory outbreaks should be initially reported as respiratory outbreaks (unknown) until laboratory testing confirms the etiology.

3.8.2 Outbreak response:

Create line list that could include:

- names of cases
- dates of onset
- symptoms
- age
- hospitalization status
- results of laboratory tests
- prior immunization history
- epi links to other cases (ward or rooms)
- avian or swine exposure, if relevant
- Maintain surveillance for new cases until rate of AFRI is down to “normal” or no new cases for 1 week.
- Create an epi-curve, by date of onset. Only put those that meet the case definition on the epi-curve. (Optional)

Control of case, contacts & carriers case:

Varies by agent.

Precautions:

Advise symptomatic individuals to stay away from work or school for at least 24 hours after resolution of fever.

Limit exposure to others, especially those at high risk for complications.

CONTACTS: No restrictions.

CARRIERS: Not applicable.

General control recommendations for outbreaks

- Reinforce good hand hygiene among all (including residents/patients, visitors, staff, and residents/students).
- Emphasize respiratory etiquette (cover cough and sneezes, dispose of tissues properly).
- Reinforce staying home when sick.
- Provide posters and health education about hand hygiene and respiratory etiquette
- Discourage sharing water bottles.
- Emphasize importance of early detection of cases and removing them from contact with others.
- Encourage regular environmental cleaning with EPA registered disinfectant appropriate for respiratory pathogens.
- Suspend group activities until 1 week after last case.

- Provide educational materials to facility- including posters, handouts, etc.
- Close facility or affected areas within a facility to new admissions. The duration of closure or limiting admissions is typically 1 week after onset of illness for the last case. However, the exact duration of closures or limiting admissions should be assessed on a case-by-case basis.
- If possible, separate staff that cares for sick from staff that cares for well patients.
- Institute droplet precautions for symptomatic individuals.
- Place patient in a separate area away from crowded waiting areas.
- Maintain a distance of at least two metres from other patients.

Diagnostic Procedures

Clinical and epidemiologic histories are required to aid in laboratory test selection

NP swabs are preferred because the specimens can be tested for influenza and a variety of other respiratory pathogens using PCR based technology.

Other methods nasal swab and nasal wash or aspirate (these specimens can only be tested for influenza).

Dacron or Nylon flocked swabs are recommended, do NOT use wooden swabs.

Samples should be collected within the first 4 days of illness. Collect specimens from at least 2 separate symptomatic individuals and up to 5 symptomatic individuals for any community-based outbreak and select those individuals with the most recent onset for specimen collection.

Container:

Viral Culturette with M4 viral transport medium if available.

Laboratory Form: Completed with clinical details

Investigation:

Influenza PCR and/or Respiratory Pathogen PCR Panel.

Nasopharyngeal swab preferred; nasal swab can be used if necessary.

Deliver Laboratory as soon as possible.

Storage: Keep refrigerated and upright.

Influenza Testing

During influenza season, most respiratory outbreaks are likely to be caused by influenza.

Molecular assays, including rapid molecular assays, reverse transcription polymerase chain reaction (RT-PCR) and other nucleic acid detection tests, have high sensitivity and high specificity and are strongly recommended for influenza testing of hospitalized patients, fatal cases, and to confirmoutbreaks.

Immunofluorescence assays are antigen detection assays that generally require use of a fluorescent microscope to produce results in ~2-4 hours with moderate sensitivity and high specificity.

Rapid influenza diagnostic tests(RIDTs) are antigen detection assays that can detect influenza virus antigens in 10-15 minutes with ~50-70% sensitivity and 90-95%specificity.

Because the sensitivity of RIDTs vary widely, RIDT results should not be relied upon for the diagnosis of hospitalized patients, fatal cases, or to confirm an outbreak. Rather, confirmation of positive or negative RIDTs in these cases should be made using a molecular assay.

3.8.3 Common agents causing Respiratory Infections, PEP and treatment

Table 38: Common agents causing respiratiory infections, recommended PPE and treatment

Viral Organism	Epidemiology	Incubation period	Symptoms and symptom duration	Period of communicability	Prophylaxis and treatment
Influenza A	Typically first half of the year need more surveillance data (major peak in May-June in 2018) Causes mild to severe symptoms Causes infection in all age groups with highest incidence in children; highest mortality in elderly and those with comorbidity	1-4 days	Fever*, cough (often severe and may last longer than other symptoms), headache, muscle/joint pain, sore throat, prostration and exhaustion.	Probably 3-5 days from clinical onset in adults; up to 7 days in young children (till symptoms persist infectious) and	Yearly vaccine (for A&B)Antivirals for prophylaxis and treatment: Neuraminidase inhibitors are prefered(for A&B): i.e. Oseltamivir

	Can infect animals and humans Causes most outbreaks		Gastro-intestinal symptoms may occur in children Duration: 2-7 days	Asymptomatic people may be infectious	
Influenza B	Smaller peak latter half of the year (need more surveillance data). Causes milder infection Mostly affects children Can cause outbreaks				
Parainfluenza virus	Entire year (little seasonal pattern)Predominantly causes infection & outbreaks in young children and the elderly	2-6 years	Fever, cough, wheezing Croup	From shortly prior to clinical onset and for duration of active disease	Symptomatic treatment only
Respiratory syncytial virus	Data not available on timing. Predominantly causes infection & outbreaks in young children and the elderly	Usually 4-6 days, range 2-8 days	Fever, cough, wheezing Bronchiolitis in children Pneumonia in adults	From a day or so before clinical onset and usually for 3-8 days. However, viral	Symptomatic treatment only. For severe pediatric cases consult a Pediatrician or an Infectious Disease physician
Adenovirus	Data not available on timing. Causes infection in all ages	Usually 4-5 days, range 2-14 days for respiratory disease	Conjunctivitis, sore throat, fever, and other respiratory symptoms	-From up to a week prior to clinical onset and for duration of active disease-Viral shedding may persist for a long period of time	Symptomatic treatment only
Common respiratory viruses such as: -Rhinovirus-CoronavirusMetapneumo-virus-Echovirus-Coxsackie-virus-other entero-viruses.	Throughout the year with peaks in the spring and fall	Usually 2-3 days, but may be longer	'Common cold' type illness: Sneezing, runny nose, cough, sore throat, sinus	-Viral shedding usually most abundant during the first 2-3 days of clinical illness. Shedding	Symptomatic treatment only

(Currently included in multiplex pannels)			congestion malaise, headache, myalgia and/or low grade fever	usually ceases by 7-10 days, but may continue for up to 3 weeks in young children	

Bacterial organism	Epidemiology	Incubation period	Symptoms and signs	Period of communicability	Prophylaxis and treatment
Chlamydia pneumoniae	Throughout year, no seasonality	21 days	Fever, sore throat, prolonged cough, headache, malaise	Not defined	Antibiotics based on clinical picture
Bordetella pertussis	Neither infection nor immunization provide life long immunity (whole cell Pertussis vaccine offers better and longer duration of protection than acellular pertussis vaccine)	7-10 days (range 5-21 days)	Mild URI with minimal of no fever, progresses to cough and then paroxysms of cough with inspiratory whoop and commonly followed by vomiting. Duration 6-10 weeks	From onset of early mild symptoms and first 2 weeks of cough	Immunization, chemoprophylaxis for all household and close contacts regardless of age and immunization status*. Antibiotic therapy for treatment
Legionella sp.	Acquired through inhalation of aerosolized contaminated water NOT from person to person	2-10 days	Fever, cough, progressive respiratory distress. Occurs most commonly in those who are elderly, immunocompromized or haveother underlying lung disease.	Person to person transmission not documented	Antibiotic therapy for treatment
Mycoplasma pneumoniae	Worldwide non seasonal more common in school age and young adults	2-3-weeks (range 1-4 weeks)	Fever, acute bronchial cough non-productive initially	Duration of symptoms	Mild illness may resolve on own, inherently resistant to beta-lactam agents.

*Chemoprophylaxis:

Influenza:

Those who are at high risk of influenza related complications maybe given PEP

B. pertussis:

May consider PEP in Infants and women in their third trimester of pregnancy — severe and sometimes fatal pertussis-related complications occur in infants aged <12 months, especially among infants aged <4 months. Women in their third trimester of pregnancy may be a source of pertussis to their newborn infant. All people with pre-existing health conditions that may be exacerbated by a pertussis infection (for example, but not limited to, immunocompromised people and those with moderate to severe medically treated asthma). People who themselves have close contact with either infants under 12 months, pregnant women or individuals with pre-existing health conditions at risk of severe illness or complications. All people in high risk settings that include infants aged <12 months or women in the third trimester of pregnancy. These include, but are not limited to neonatal intensive care units, childcare settings, and maternity wards (refer to the national guidelines)

Measles: MMR or MR vaccination within 72 hours of exposure to those without documented evidence of 2 doses of Measles containing vaccination provided they do not have any contraindications to vaccination

Chicken pox: Chicken pox vaccination should be offered within 120 hours (5 days) of exposure to those without documented evidence of 2 doses of Chicken pox vaccine provided that they do not have any contraindications to vaccination.

Immunocompromised people who are exposed to measles or Chicken pox maybe provided with IVIG or if available Varicella immunoglobulin (for further options refer to section on chicken pox exposure)

Resources:

Provincial Infection Control Network (PICNet) of British Columbia, 2018. Respiratory Infection Outbreak Guidelines for Healthcare Facilities Reference Document for use by Health Care Organizations for Internal Policy/Protocol Development. Link: https://www.picnet.ca/wp-content/uploads/Respiratory-Infection-Outbreak-Guidelines-for-Healthcare-Facilities-March-20.pdf

California Department of Public Health, Immunization Branch, 2021. Influenza and Other Non-COVID-19 Respiratory Illness Outbreak Quick sheet. Link: https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/Immunization/FluAndRespiratoryIllnessOutbreakQuicksheet.pdf

Public Health, County of Los Angeles. 2019. Acute Communicable Disease Control Manual (B-73), Respiratory Disease Outbreaks. Link: http://publichealth.lacounty.gov/acd/procs/b73/DiseaseChapters/B73RespDisOB.pdf

WHO guidance for surveillance during an influenza pandemic: 2017 update. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO. Link: https://www.who.int/influenza/preparedness/pandemic/WHO_Guidance_for_surveillance_during_an_influenza_pandemic_082017.pdf

Health Protection Agency Maldives, 2021. Quick Reference SOP COVID-19 version-11. Link: https://covid19.health.gov.mv/wp-content/uploads/2021/06/COVID-19-QR-SOP_-Version-11_13.06.2021.pdf

3.9 INFECTION PREVENTION AND CONTROL FOR PATIENTS ON DIALYSIS

Infection is the first cause of hospitalization and the second most common cause of mortality among HD patients. Infection control in dialysis units remains the most important measure to maintain a healthy environment and to prevent and avoid dissemination of infection among immunocompromised patients.

HD patients are exposed to different types of infections including bloodstream infections and localized infections of vascular access; blood-borne infections with hepatitis B virus, hepatitis C virus, and/or human immunodeficiency virus; and airborne infections. Sources of infections include contaminated water, equipment, environmental surfaces, and infected patients. Contaminated healthcare worker hands are among the most common modes of transmission of healthcare-associated infections (Karkar 2018). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5875570/

Hemodialysis (HD) patients, as well as dialysis staff, are vulnerable to healthcare-associated infections due to frequent and prolonged exposures to many possible contaminants in the HD environment. The increased risk is mainly due to

- Immune-compromised status of dialysis patients,
- Frequent and prolonged blood exposure during HD treatments through vascular access (mainly catheters) and extracorporeal circuit (with many ports and connections),
- Close proximity to other patients during treatment in the HD facility
- Frequent contact with healthcare workers, who frequently move between patients and between machines,
- Frequent hospitalization and surgery
- Non-adherence or breaks in implementation of recommended practices

3.9.1 Strategies to prevent infection in hemo-dialysis patients

Infection is the first cause of hospitalization and the second most common cause of mortality among hemo-dialysis (HD) patients. Infection control in dialysis units remains the most important measure to maintain a healthy environment and to prevent and avoid dissemination of infection among immunocompromised patients.

HD patients are exposed to different types of infections including bloodstream infections and localized infections of vascular access; blood-borne infections with hepatitis B virus, hepatitis C virus, and/or human immunodeficiency virus; and airborne infections. Sources of infections include contaminated water, equipment, environmental surfaces, and infected patients. Contaminated healthcare worker hands are among the most common modes of transmission of healthcare-associated infections (Karkar 2018). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5875570/

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- Close proximity to other patients during treatment in the HD facility
- Frequent contact with healthcare workers, who frequently move between patients and between machines,
- Frequent hospitalization and surgery
- Non-adherence or breaks in implementation of recommended practices

3.9.2 Strategies to prevent infection in hemo-dialysis patients

3.9.2.1 Infection control procedures

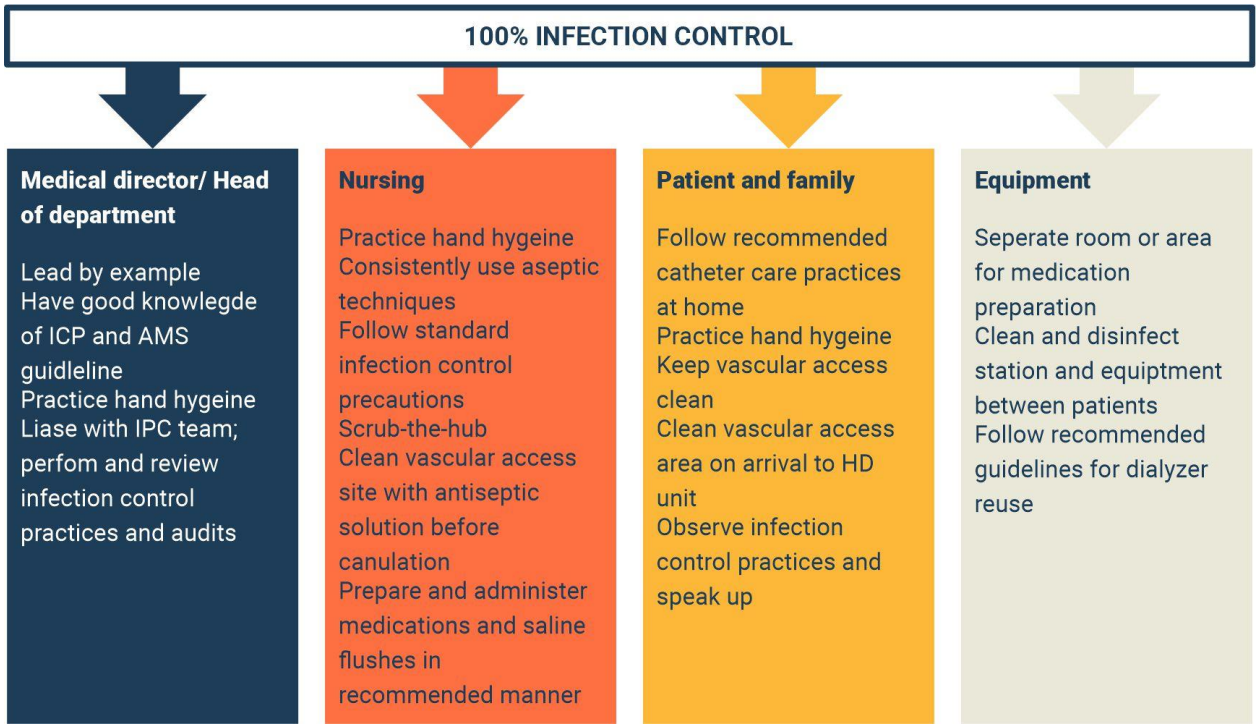


Figure 26: Adapted from: Infection prevention requires a collaborative effort between the medical director, dialysis staff, and the patient and family. CDC, Centers for Disease Control and Prevention; QAPI, Quality Assurance and Performance Improvement.

100% infection control (Vijayan and Boyce 2018)

5 moments of Hand hygiene

1. before touching a patient
2. before aseptic procedures
3. after body fluid exposure risk
4. after touching a patient
5. after touching patient surroundings

Careful use of single-dose and multidose medication vials is also essential in prevention of infection transmission. Single use should only be accessed once, and whenever possible, multidose vials should be dedicated to one patient.

Medications and saline syringes should be prepared in a dedicated, clean, separate area in the dialysis unit and taken to individual stations by hand. A medication cart should not be used to take medications from station to station, because this has been associated with transmission of infections, especially HCV.

Reuse of dialyzers has been associated with outbreaks of gram-negative bloodstream infections, and reuse facilities must ensure strict adherence to sterilization protocol to mitigate the risk of infection transmission.

3.9.2.2 Immunization

https://www.cdc.gov/dialysis/PDFs/Vaccinating_Dialysis_Patients_and_Patients_dec2012.pdf

Table 44: Recommended immunization for CKD patients and all adults

Vaccine	Recommended for Dialysis or CKD patients	Recommended for all adults
Hepatitis B vaccine	✓	
Inactivated Influenza vaccine (Live attenuated Influenza vaccine is contraindicated*)	✓	✓
Pneumococcal vaccines	✓	
Tdap/Td	✓	✓
MMR (live vaccine contraindicated in immunocompromised state)	Unless no contraindication	✓
Varicella (live vaccine, (live vaccine contraindicated in immunocompromised state)	Unless no contraindication	✓
COVID-19 vaccination	✓	✓

All patients on dialysis should be immunized against

1. COVID-19 vaccination: according to the most recent recommendation by HPA
2. Hepatitis B virus

Those undergoing hemodialysis or other immunosuppressed patients, a higher vaccine dose or an increased number of doses is recommended.

- Recombinant vaccine is recommended
- Available vaccines:
  - Recombivax HB, 40 µg/mL, Merck & Co., Inc (for age ≥20 years) contains an increased dosage and is administered in a 3 dose schedule at 0,1 and 6 months.
  - The other available formulation of hepatitis B vaccine is administered at a double standard dosage (age ≥20 years) in a 4 dose schedule (0,1,2 and 6 months) to patients (two Engerix-B, 20ug [1.0 mL doses] administered in 1 (2ml) or 2 (1ml) injections, GlaxoSmithKline Biologicals, Rixensart, Belgium).

- Vaccine should be given intramuscular in deltoid region
- If an adult patient begins the vaccine series with a standard dose before beginning hemodialysis treatment, then moves to hemodialysis treatment before completing the series, complete the series using the higher dose recommended for hemodialysis patients.
- No specific recommendations have been made for higher doses for pediatric hemodialysis patients. If a lower than recommended vaccine dose is administered to either adults or children, the dose should be repeated

- Assess antibody titer to Hep B surface antigen (anti-HBs) at 1-2 months after the primary course is completed and annually thereafter
- Revaccination with full doses (three or four) is recommended for persons who do not develop protective antibody titer after primary course.
- Booster dose should be given if anti-HBs titer falls below 10 mU/ml

Note:

- "Persons who do not have a protective concentration of anti-HBs after revaccination should be tested for HBsAg. If the HBsAg test result is positive, the person should receive appropriate management, and any household, sex, or needle-sharing contacts should be identified and vaccinated.
- Persons who test negative for HBsAg should be considered susceptible to HBV infection and should be counseled about precautions to prevent HBV infection and the need to obtain HBIG postexposure prophylaxis for any known or likely parenteral exposure to HBsAg positive blood.

3. Influenza vaccination:

An annual inactivated influenza vaccine is recommended for patients on dialysis, given preferably according to the influenza activity in the country. Live attenuated influenza vaccine is contraindicated.

4. Pneumococcal vaccine recommended

Those with chronic kidney disease (CKD)

19 to 64 years

- For those with no history of prior PCV13
  - give one dose of PCV 13 to those a at high risk of infection (CKD)

- PPSV23 after 8 weeks of PCV 13 followed by a second dose of PPSV23 after 5 years of first dose

- If a PPSV 23 was given initially a PCV 13 may be taken after ≥ 1 year of the last PPSV23
- Children require 3 doses of PCV 13 in infancy with a booster dose at 12-15 months
- Children 2 years and older should receive PPSV23 as soon as possible after diagnosis is made. Doses of PCV 13 should be completed before PPSV 23 is given with a minimum gap of 8 weeks after the last dose of PCV 13. Another PPSV 23 is recommended 5 years after the first dose.

Age 65 years and above

- Those who received PPSV23 before age 65 years for any indication should receive another dose of the vaccine at age 65 years or later if at least 5 years have elapsed since their previous PPSV23 dose.

5. Td every 10 yearly with one dose of Tdap (if available and never received Tdap)
6. MMR vaccination (unless no other contraindication is present)
7. Varicella vaccination (unless no other contraindication is present)

Immunization of staff at dialysis center

COVID-19 vaccination

Hepatitis B vaccine

Annual influenza vaccine

MMR/MR vaccine two doses at minimum interval of 4 weeks

Varicella vaccine (recommended) 2 doses 4 weeks apart

Td every 10 yearly with one dose of Tdap (if available and never received Tdap)

3.9.3 Factors needed to be kept in mind to prevent HAI related to dialysis

1. Understaffing with poor nurse-to-patient ratio
2. Frequent turn-over of nursing staff
3. Lack or inadequate training and lower level of competency among HD staff,
4. Inadequate or lack of patient/family education,
5. Inadequate provision of necessary supplies/ equipment,
6. Poor design of HD unit layout (congested and inadequate segregation/isolation)
7. Urgency associated with dialysis complications (sometimes life-threatening situation) may sacrifice adherence to standard precautions

3.9.3.1 Approach to BSI Prevention in Dialysis Facilities (i.e., the Core Interventions for Dialysis Bloodstream Infection (BSI) Prevention)

1. Surveillance and feedback for HAI monthly surveillance for BSIs and other dialysis events using. Calculate facility rates and compare to rates in other facilities. Actively share results with front-line clinical staff.
2. Hand hygiene observations Perform observations of hand hygiene opportunities monthly and share results with clinical staff.
3. Catheter/vascular access care observations Perform observations of vascular access care and catheter accessing quarterly. Assess staff adherence to aseptic technique when connecting and disconnecting catheters and during dressing changes. Share results with clinical staff.
4. Staff education and competency Train staff on infection control topics, including access care and aseptic technique. Perform competency evaluation for skills such as catheter care and accessing every 6-12 months and upon hire.
5. Patient education/engagement Provide standardized education to all patients on infection prevention topics including vascular access care, hand hygiene, risks related to catheter use, recognizing signs of infection, and instructions for access management when away from the dialysis unit.

6. Catheter reduction Incorporate efforts (e.g., through patient education, vascular access coordinator) to reduce catheters by identifying and addressing barriers to permanent vascular access placement and catheter removal.
7. Chlorhexidine for skin antisepsis Use an alcohol-based chlorhexidine (>0.5%) solution as the first line skin antiseptic agent for central line insertion and during dressing changes.*
8. Catheter hub disinfection Scrub catheter hubs with an appropriate antiseptic after cap is removed and before accessing. Perform every time catheter is accessed or disconnected.**
9. Antimicrobial ointment Apply antibiotic ointment or povidone-iodine ointment to catheter exit sites during dressing change.***

* Povidone-iodine (preferably with alcohol) or 70% alcohol are alternatives for patients with chlorhexidine intolerance.

** If closed needleless connector device is used, disinfect device per manufacturer's instructions. *** See information on selecting an antimicrobial ointment for hemodialysis catheter exit sites on CDC's Dialysis Safety website (http://www.cdc.gov/dialysis/prevention-tools/core-interventions.html#sites). Use of chlorhexidine-impregnated sponge dressing might be an alternative.

3.9.3.2 Key areas for patient education

Table 45: Key areas for patient education for prevention of infection in patients undergoing dialysis

Patients with catheters		Patients with permanent arteriovenous access	
1	Hand hygiene	1	Hand hygiene
2	General access care at home (e.g., bathing with a catheter)	2	Washing the access site prior to treatment
3	Signs and symptoms of infection	3	General access care at home (e.g., do not scratch or pick at the site)
4	How to respond if problems with the catheter develop outside of the dialysis center	4	Signs and symptoms of infection
5	Risks associated with catheters / importance of permanent access	5	How to respond if problems with access develop outside of the dialysis center
6	Basic infection control practices during catheter access process (as a mean to engage patients)	6	Basic infection control practices during cannulation process (as a mean to engage patients)

Resources:

Karkar, A. (2018). "Infection control guidelines in hemodialysis facilities." Kidney research and clinical practice 37(1): 1-3.

Centers for Disease Control and Prevention, Division of Healthcare Quality Promotion (DHQP), 2016. Dialysis safety, Infection Prevention Tools. Link: https://www.cdc.gov/dialysis/prevention-tools/core-interventions.html

CDC. Core Interventions for Dialysis Bloodstream Infection (BSI) Prevention, please visit http://www.cdc.gov/dialysis

Vijayan, A. and J. M. Boyce (2018). "100% Use of Infection Control Procedures in Hemodialysis Facilities." Clinical Journal of the American Society of Nephrology 13(4): 671.

GSK Highlights of Prescribing Information Engerix-B. Link https://www.gsksource.com/pharma/content/dam/GlaxoSmithKline/US/en/Prescribing_Information/Engerix-B/pdf/ENGERIX-B.PDF

4. IMPACT OF ENVIRONMENT ON HEALTHCARE-ASSOCIATED INFECTIONS

Many studies indicate that infection rates are lower when there is very good air and water quality, greater physical separation of patients and greater space per patient (with isolation where appropriate).

4.1 AIR AND VENTILATION

Ventilation is the intentional introduction of clean air into a space while the stale air is removed. Ventilation moves outdoor air into a building or a room and distributes it within the building or room.

Ventilation can reduce the risk of infection through dilution and removal of infectious particles through air exchange.

Building ventilation has three basic elements:

- ventilation rate (m^3/hr, l/s or ACH) – the volume of outdoor air that is provided into the space;
- airflow direction – the overall airflow direction in a building and spaces, which should be from clean zones to dirty zones; and
- air distribution or airflow pattern – the external air should be delivered to each part of the space in an effective and efficient manner and the airborne pollutants generated in each part of the space should also be removed in an effective and efficient manner.

There are three methods that may be used to ventilate a building: natural, mechanical and hybrid (mixed mode) ventilation

Improved ventilation in healthcare facilities is essential in preventing transmission of TB and other airborne infections. Ventilation systems Table 27, gives a summary of the advantages and disadvantages of different types of ventilation systems for healthcare settings.

4.1.1 Natural ventilation

- Refers to fresh air that enters and leaves a room or other area through openings such as windows or doors.

- Natural ventilation is "controlled" when openings are fixed and unrestricted to maintain air flow at all times.
- Unrestricted openings (i.e. those that cannot be closed) on opposite sides of a room provide the most effective natural ventilation.
- In existing HCFs that have natural ventilation, when possible, effective ventilation should be achieved by proper operation and maintenance of openings, and by regular checks to see that openings remain free of obstruction at all times.

Table 46: Advantages and disadvantages of different types of ventilation

	Mechanical ventilation	Natural ventilation	Hybrid (mixed mode) ventilation
Advantages	Suitable for all climates and weather	Suitable for warm and temperature climate	
	More controlled and comfortable environment	Lower capital, operational, maintenance costs for simple implementation	
	Occupants have limited control to affect ventilation	Capable of achieving very high ventilation rates	
Disadvantages	Expensive to install and maintain	Easily affected by outdoor climate and occupant's behaviour	May be more costly or difficult to design
	Can fail to deliver required ventilation rates through faulty design, maintenance or operation	Reduced comfort level of occupants in extreme weather	
	May be difficult to plan, design, and predict performance	Cannot achieve directional control of airflow, if required	

Simple natural ventilation can be optimized by

- maximizing the size of the windows, opening up fixed window panes and locating windows on opposite walls.
- Ventilation can also be optimized by the use of "mixing fans". Types of mixing fans include ceiling fans, stand/ desk mounted fans, or window/ exhaust fans located in open windows. Mixing of air can disperse pockets of high concentration of infectious particles, such as in the vicinity of patients. The total number of infectious particles in the room will not change with mixing. Unless adequate ventilation is present, mixing fans will not be useful in dispersing infectious particles and reducing the risk of transmission.
    - A common problem with reliance on natural ventilation is that patients or staff close windows during cold weather or at night. Further, there is likely to be

variability of airflow patterns due to varying weather. In colder climates where rooms are closed to keep the temperature adequately high even in winter, natural ventilation can be implemented by airing via windows at frequent intervals. If natural ventilation is inadequate, additional mechanical ventilation or other measures may be needed, especially in areas where the risk of transmission of TB is high.

4.1.2 Mechanical ventilation

Mechanical ventilation uses fans to drive the airflow through a building.

- Mechanical ventilation can be fully controlled and combined with airconditioning and filtration systems as is normally done in some office buildings.
- Mechanical ventilation includes “mixed mode ventilation”, in which exhaust and/ or supply fans are used in combination with natural ventilation to obtain adequate dilution when a sufficient ventilation rate cannot be achieved by natural ventilation alone.
- Mechanical ventilation with or without climate control may be appropriate where natural ventilation cannot be implemented effectively, or where such systems are inadequate given local conditions (e.g. building structure, climate, regulations, culture, cost and outdoor air quality).

Exhaust fans

The simplest form of mechanical ventilation is the use of exhaust fans, placed for instance in windows, to move air from inside a room to the outdoors.

- Exhaust fans may also be more acceptable to staff and patients than keeping windows consistently open.
- If exhaust fans are used, it is important to ensure that airflow is adequate, that air flows across the room (not in and out the same window or vent), and that exhaust fans and air intake (windows or vents) are not located so that shortcircuiting may occur.

Challenges of achieving adequate ventilation and climate control x Effective ventilation is often at odds with efforts to make indoor climate more comfortable. In practice, air cooling or heating with re-circulation of air is more energy efficient. x The implication of installing a split air-conditioning and closing the doors and windows is, however, complete lack of air exchange. x It is possible for rooms with air conditioning or heaters to have adequate ventilation. Careful attention must be given to ensuring adequate ventilation when installing climate control.

Minimum air-changes per hour HCFs should maintain a minimum amount of ventilation during all climatic conditions. These recommendations are based on the minimum ventilation rate estimated to reduce the probability of infection in an enclosed room to less than 5% with an hour of exposure to an infectious source case.

Table 28 gives the minimum air-changes per hour (ACH) required for various healthcare settings. Standards for natural ventilation Where it is not possible to measure ACH, as is usually the case in rooms with natural ventilation, the following standards for ventilation ensure that air exchange is safely >12 ACH under all climactic conditions:

- Natural ventilation should be "controlled", with fixed, unrestricted openings that are insensitive to climactic conditions.
- Openings should constitute >20% of floor area.
- Openings should be on two sides, preferably opposite sides, for example, a 100 sq. feet room should have >10 sq. feet fixed, unrestricted openings on two sites, for a total of 20 sq. feet.

Table 47: Recommended air exchanges and ventilation rates for different healthcare setting

Type of healthcare setting	Minimum air changes per hour	Minimum hourly averaged ventilation rates (litres/ second/ patient)
Registration	>6 ACH	> 40 litres/ second/ patient
Outpatient departments and waiting areas	>6 ACH	> 40 litres/ second/ patient
Inpatient department	>6 ACH	> 40 litres/ second/ patient
High-risk settings and their waiting areas, ART centres, TB/chest departments (outpatient and inpatient bronchoscopy procedure room MDR-TB wards and clinics,) Airborne precaution rooms	>12 ACH	80-160 litres/ second/ patient

Considerations for hot climates Climatic extremes may require some adjustments to ensure that minimum ventilation standards are achieved. In the case of hot climatic conditions, the following design considerations should be kept in mind.

- Air conditioners must be avoided, or used very cautiously in patient care areas. If air conditioners are used, it must be acknowledged that the need to maintain adequate ventilation for airborne infection control may to some degree necessarily compromise the comfort of the occupants and the efficiency of the air conditioner.
- Solar heat gain must be minimized through proper use of sunshades or external shading.
- Outdoor shaded waiting areas must be used to the greatest extent possible.
- Where augmentation of ventilation is required, the use of air supply fans may help improve thermal comfort, compared to exhaust fans.
- The use of evaporative coolers ("desert coolers") may be an effective solution to achieve both comfort and adequate ventilation, as these tend to have powerful fans. Proper maintenance, however, is essential. An online tool for estimating the total fan rating for a given room can be found at http://www.csgnetwork.com/airexchangecalc.html. This reference is provided for convenience, and is not an endorsement of the site.
- The installation of "whirlybirds" (also known as whirligigs or wind turbines) that do not use electricity and provide a roof exhaust system can greatly increase both ventilation and comfort.

4.1.3 Filtration

An effective way to prevent infections is to control the source of pathogens. Heating, ventilation and air-conditioning systems control the concentration of airborne particulates in high risk areas, to minimise the risk of infection by means of air pressure, flow control and air filtration (the physical removal of particulates from air). The level of control should be proportional to the risk.

In acute healthcare settings, a commonly used approach to filtration is the HEPA filter. There is evidence that there is a lower incidence of infection when immunocompromised and other high-acuity patients are housed in HEPA-filtered isolation rooms. HEPA filters must comply with the national and the international standards (AS 1324 and AS 4260).

4.1.3.1 Ventilation systems and airflow control

Optimal ventilation rates, airflow patterns and humidity can help to minimisethe spread of infection. The ventilation rate is a measure used to control indoor air quality, and in healthcare facilities is usually expressed as room air changes per hour (ACH). The peak efficiency for particle removal in the air space often occurs between 12 ACH and 15

ACH—Isolation rooms should have a minimum of 12 ACH or 145L/sec whichever is greater.

4.1.4 Airflow direction:

Directional control of air flow x Directional control of air flow is recommended in specific high-risk settings where infectious patients with drug-resistant TB or other acute respiratory diseases of potential concern are likely to be managed – i.e. airborne precaution rooms, MDR-TB wards and clinics, and bronchoscopy suites.

- There should be a system in place for minimizing the chance of airflow from the room to other parts of the facility. In a room relying on natural ventilation that is situated away from other patient care areas, no additional changes would be required. However, it would be important to keep the doors to the corridor or other rooms closed, to prevent the escape of infectious aerosols to other parts of the facility.
- Assessment of the direction of air movement can be done easily using smoke tubes, strips of ribbon, or by observing the directionality of dense smoke from “dhoop” or incense stick.
- Directional control of airflow can be achieved in mixed mode ventilation by paying proper attention to adequate exhaust and supply ventilation. Optimal arrangement of patients and staff in relation to the direction of air flow
- Healthcare staff should be mindful of the direction of airflow to ensure that they are closest to the clean air source, and that patients are closest to the exhaust. This involves arranging patients and staff so that contaminated air is not likely to cross directly into staff/ patient spaces.
- The natural direction of air flow should be between patients and staff, and not across patients and staff. This is especially important for settings such as DOT centres, OPD examination rooms, and smear microscopy laboratories. Seating arrangement in a naturally ventilated room is given in Fig. 20. The healthcare worker is marked with a red cross. Seating “B” is better than seating “A” as the potentially infected air from the patient with airborne disease does not cross the healthcare worker.

  MINIMUM STANDARDS FOR HCW MANAGEMENT AT HEALTH FACILITIES 2008

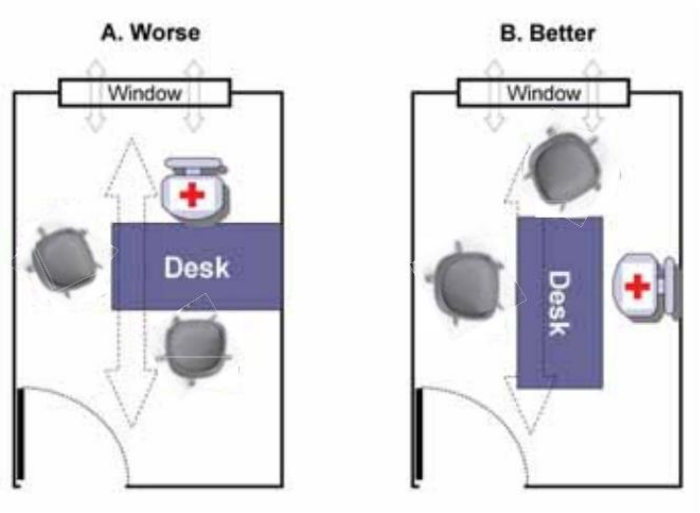


Figure 28: Seating arrangement in a naturally ventilated room

A diagrammatical representation of a mechanically ventilated room with optimum direction airflow control is shown in figure 20. In “A” the supply of air is on one side and near exhaust on the other; wheres in “B”, the supply is from the top and exhaust neat patients’ head and foot end.

- Negative airflow pressure is preferred for rooms housing infectious patients to prevent the dispersion of pathogen-laden aerosols (e.g. measles [rubeola], TB, chickenpox [varicella]), dust and skin scales from the location of the infected patient to other spaces.

- Positive airflow pressure is desirable to safeguard them from aerial pathogens entering from adjacent spaces in the care of immunocompromised patients (e.g. surgical patients, patients with underlying chronic lung disease, or dialysis patients) or immunosuppressed patients (e.g. transplant patients or cancer patients).

Laminar air flow (LAF) is HEPA-filtered air blown into a room at a rate of 27 ± 3 m/min in a unidirectional pattern with 100–400 ACH.. LAF can reduce air contamination to the lowest possible level and is therefore recommended for operating rooms and areas with ultraclean room requirements (e.g. immunocompromised patients)

4.1.5 Maintenance systems

Ventilation and airflow control systems need to be maintained regularly by suitably qualified staff according to an agreed maintenance plan, and accurate documented in a maintenance record.

4.1.6 Approaches to reduce airborne transmission

Introduction

Infections transmitted by airborne route include Tuberculosis,measles and chicken pox. COVID-19, SARS and other serious respiratory viral infections can be transmitted through the air during aerosol generating procedures such as intubation and bronchoscopy. Varicella (including disseminated zoster) and highly pathogenic influenza may also be transmitted through the air route. These particles remain suspended in the air through various lengths of time and can travel over distances greater than 1 metre and at times even from room to room.

Approaches to reducing airborne transmission include:

- Specifying appropriate ventilation systems and air change rates (eg negative airflow pressure)
- Installation of effective air filtration
- employing monitoring and control measures during construction or renovation
- using single-bed instead of multi-bed rooms.

4.1.6.1 The benefits of single-bed rooms for patient isolation

The three routes of transmission often overlap, and environmental approaches may influence more than one transmission route. For example, single rooms play a key role in preventing a patient with a contagious or aerial spread infection from infecting others, also protect immunocompromised patients in nearby patient-care areas from airborne pathogens.

- Studies of cross-infection for contagious airborne diseases (such as TB, measles [rubeola], and chickenpox [varicella]) indicate that placing patients in single rooms, single-bed cubicles with partitions, isolation rooms, or rooms with fewer beds and more space between patients, is safer than housing them in multi-bed spaces with more patients.
- Surfaces near infected patients quickly become contaminated, creating numerous reservoirs that can transfer pathogens to patients and staff.
- Screening for multi drug resistant organisms or specific pathogens is effective, but results may not be available on admission; placing MRO colonised/infected patients

with non-colonised /infected patients in multi-bed rooms increases the spread of MROs.

- Single-bed rooms can facilitate greater frequency of cleaning and decontamination, as there is limited impact on neighbouring patients.
- Hand-hygiene compliance is likely to be improved through greater prominence of sinks or hand hygiene dispensers
- Ensuite bathrooms are a key factor in preventing the spread of C. difficile and other infectious agents that spread via enteric and contact mechanisms.

4.1.6.2 Anterooms

Anterooms enable visitors and healthcare workers to change into and dispose of appropriate PPE when caring for an infectious patient. Anterooms increase the effectiveness of isolation rooms by reducing the potential escape of airborne infectious particles into the corridor.

Ideally the pressure in the anteroom is lower than that of ambient pressure in the adjacent corridor.

4.1.7 Maintaining air quality during construction or renovation

Infection prevention and control precautions during construction and renovation should be integrated into the design and documentation of the facility from the beginning of the design stage. It is important that the dust control and infection prevention and control principles developed during the pre-design stage are integrated from the initial stages of design development until the completion of the activity.

Identification of the ‘at risk’ population, knowledge of the transmission route of a likely pathogen and location of the ‘at risk’ population all need to be taken into account in the planning stages.

4.1.7.1 Infection Control Risk Assessment (ICRA) Matrix

The ICRA matrix is a published assessment method that is widely accepted by engineers and architects, and is one effective method for completing an ICRA. Although the ICRA does not have to be done as a matrix, it does help non-clinical staff understand management of patient groups without requiring specific diagnoses.

Each facility should categorize patients per group within a specific patient population. The development of the “patient risk groups” is quite relative–and the criteria are dependent on the facility’s mix of patients. Nursing homes and ambulatory care delivery sites have very different populations, and risk is relative.

The key principle used for categorizing patients considers:

- Inherent susceptibility to infection – immunosuppression due to chemotherapy, radiation, such as bone marrow allograft patients, who as a group remain at greatest risk.
- Invasiveness – a healthy patient undergoing surgery is at greatest risk when sterile issues are exposed to the OR environment.
- The key principle for classifying projects is determining the degree of dust created.
- The patient groups are matched with project categories to select the level of required precautions.
- Consideration of pre-construction, demolition, intra-construction, post construction and cleanup activities as well as educational and monitoring needs, before, during and after construction/renovation.
- The construction matrix tool includes a sample permit which follows the format of the matrix, assessing patient risk categories and environmental risk groups to determine appropriate class or level of precautions.
- The construction matrix tool includes a sample permit which follows the format of the matrix, assessing patient risk categories and environmental risk groups to determine appropriate class or level of precautions.

Infection Control Risk Assessment Matrix of Precautions for Construction & Renovation

Step One: Using the following table, identify the Type of Construction Project Activity (Type A-D)

Table 43: Construction Project Activity Type

Type A	Inspection and Non-Invasive Activities. Includes, but is not limited to: • Removal of ceiling tile for visual inspection-limited to 1 tile per 50 square feet with limited exposure time. • Limited building system maintenance (e.g., pneumatic tube station, HVAC system, fire suppression system, electrical and carpentry work to include painting without sanding) that does not create dust or debris. • Clean plumbing activity limited in nature.
Type B	Small scale, short duration activities which create minimal dust. Includes, but is not limited to: • Work conducted above the ceiling (e.g., prolonged inspection or repair of firewalls and barriers, installation of conduit and/or cabling, and access to mechanical and/or electrical chase spaces). • Fan shutdown/startup. • Installation of electrical devices or new flooring that produces minimal dust and debris. • The removal of drywall where minimal dust and debris is created. • Controlled sanding activities (e.g., wet or dry sanding) that produce minimal dust and debris.

Type C	**Large-scale, longer duration activities that create a moderate amount of dust and debris.** Includes, but is not limited to: • Removal of preexisting floor covering, walls, casework or other building components. • New drywall placement. • Renovation work in a single room. • Non existing cable pathway or invasive electrical work above ceilings. • The removal of drywall where a moderate amount of dust and debris is created. • Dry sanding where a moderate amount of dust and debris is created. • Work creating significant vibration and/or noise. • Any activity that cannot be completed in a single work shift.
Type D	**Major demolition and construction activities** Includes, but is not limited to: • Removal or replacement of building system component(s). • Removal/installation of drywall partitions. • Invasive large-scale new building construction. • Renovation work in two or more rooms

Step 1: Construction Activity Type:

_____

_____

Step Two: Using the following table, identify the Patient Risk Groups that will be affected. If more than one risk group will be affected, select the higher risk group:

Table 44: Patient Risk Groups

Low risk Non-patient care areas such as:	Medium risk Patient care support areas such as	High risk Patient care support areas such as	Highest risk Patient care support areas such as
• Public hallways and gathering areas not on clinical units. • Office areas not on clinical units. • Breakrooms not on clinical units. • Bathrooms or locker rooms not on clinical units. • Mechanical rooms not on clinical units. • Environmental services (EVS) closets not on clinical units.	• Waiting areas. • Clinical engineering. • Materials management. • Sterile processing department - dirty side. • Kitchen, cafeteria, gift shop, coffee shop, and food kiosks.	• Patient care rooms and areas • acute care units • Emergency department • Employee health • Pharmacy - general work zone • Medication rooms and clean utility rooms • Imaging suites: diagnostic imaging • Laboratory	• All transplant and intensive care units. • All oncology units. • OR theaters and restricted areas. • Procedural suites. • Pharmacy compounding. • Sterile processing department - clean side. • Transfusion services. • Dedicated isolation wards/units. • Imaging suites: invasive imaging.

Step 2_____

Step Three: Match the Patient Risk Group (Low, Medium, High, Highest) with the planned … Construction Project Type (A, B, C, D) on the following matrix, to find the … Class of Precautions (I, II, III, IV or V) or level of infection control activities required. Class I-V or Color-Coded Precautions are delineated on the following page.

IC Matrix - Class of Precautions: Construction Project by Patient Risk

	Construction Project Type			
Patient Risk Group	Type A	Type B	Type C	Type D
Low Risk	I	II	II	III*
Medium Risk	I	II	III*	IV
High Risk	I	III	IV	V
Highest Risk	III	IV	V	V

Infection control permit and approval will be required when Class of Precautions III (Type C) and all Class of Precautions IV or V are necessary.

Environmental conditions that could affect human health, such as sewage, mold, asbestos, gray water and black water will require Class of Precautions IV for LOW and MEDIUM Risk Groups and Class of Precautions V for HIGH and HIGHEST Risk Groups.

*Type C [Medium Risk groups] and Type D [Low Risk Groups] work areas [Class III precautions] that cannot be sealed and completely isolated from occupied patient care spaces should be elevated to include negative air exhaust requirements as listed in Class IV Precautions.

Step 3: Class of precaution required: _____
_____

Step Four: Assess potential risk to areas surrounding the project.

Using the table below, identify the surrounding areas that will be affected and the type of impact that will occur. If more than one risk group will be affected, select the higher risk group from Patient Risk Group table.

Table 45: Surrounding Area Assessment

<table>
<tr><td>Unit Below</td><td>Unit Above</td><td>Unit Lateral</td><td>Unit Behind</td><td>Unit Front</td></tr>
<tr><td>Risk Group</td><td>Risk Group</td><td>Risk Group</td><td>Risk Group</td><td>Risk Group</td></tr>
<tr><td>Contact</td><td>Contact</td><td>Contact</td><td>Contact</td><td>Contact</td></tr>
<tr><td>Phone</td><td>Phone</td><td>Phone</td><td>Phone</td><td>Phone</td></tr>
<tr>
<td>Additional Controls:
□ Noise
□ Vibration
□ Dust control
□ Ventilation
□ Pressurization
□ Impact to other systems, such as:
□ Data
□ Mechanical
□ Med Gases
□ Water Systems</td>
<td>Additional Controls:
□ Noise
□ Vibration
□ Dust control
□ Ventilation
□ Pressurization
□ Impact to other systems, such as:
□ Data
□ Mechanical
□ Med Gases
Water Systems</td>
<td>Additional Controls:
□ Noise
□ Vibration
□ Dust control
□ Ventilation
□ Pressurization
□ Impact to other systems, such as:
□ Data
□ Mechanical
□ Med Gases
Water Systems</td>
<td>Additional Controls:
□ Noise
□ Vibration
□ Dust control
□ Ventilation
□ Pressurization
□ Impact to other systems, such as:
□ Data
□ Mechanical
□ Med Gases
Water Systems</td>
<td>Additional Controls:
□ Noise
□ Vibration
□ Dust control
□ Ventilation
□ Pressurization
□ Impact to other systems, such as:
□ Data
□ Mechanical
□ Med Gases
Water Systems</td>
</tr>
<tr><td colspan="5">Noise & Vibration Mitigation Strategies</td></tr>
<tr><td colspan="5">□ Use diamond drills instead of powder-actuated fasteners.
□ Schedule noise-making periods with adjacent spaces.
□ Use beam clamps instead of shot.
□ Prefab where possible.
□ Use tin snips to cut metal studs instead of using a chop saw.
□ Install metal decking with vent tabs, then use cellular floor deck hangers.
□ Consider pro-press instead of soldering, brazing or welding.
□ Wet core drill instead of dry core or percussion.
□ Instead of jackhammering concrete, use wet diamond saws.
□ Use HEPA vacuums instead of standard wet/dry vacuums.
□ Use mechanical joining system sprinkler fittings instead of threaded.
□ Where fumes are tolerated, use chemical adhesive remover (flooring glue) instead of mechanical.
□ To remove flooring, shot blast instead of using a floor scraper.
□ Use electric sheers instead of reciprocating saw for ductwork cutting.
□ Install exterior man/material lifts</td></tr>
<tr><td colspan="5">Ventilation & Pressurization Mitigation Strategies</td></tr>
<tr><td colspan="5">□ HEPA–99.97% to exterior.
□ Install temporary ductwork.
□ Utilize temporary HVAC equipment.
□ Vacate the area.
□ Install temporary partitions.
□ Use carbon filtration to filter odors.</td></tr>
<tr><td colspan="5">Impact to Other Systems Mitigation Strategies</td></tr>
<tr><td colspan="5">□ Schedule outages.
□ Provide temporary systems
□ Back-feed electricity or medical gases.
□ Flushing and testing of building water systems</td></tr>
</table>

Table 46: Minimum Required Infection Control Precaution by Class (before and after work activity)

Class of Precaution	Mitigation Activities (Performed Before and During Work Activity)
Class I	1. Perform noninvasive work activity as to not block or interrupt patient care. 2. Perform noninvasive work activities in areas that are not directly occupied with patients. 3. Perform noninvasive work activity in a manner that does not create dust. 4. Immediately replace any displaced ceiling tile before leaving the area and/or at end of noninvasive work activity.
Class II	1. Perform only limited dust work and/or activities designed for basic facilities and engineering work. 2. Perform limited dust and invasive work following standing precautions procedures approved by the organization. 3. This Class of Precautions must never be used for construction or renovation activities.
Class III	1. Provide active means to prevent airborne dust dispersion into the occupied areas. 2. Means for controlling minimal dust dispersion may include hand-held HEPA vacuum devices, polyethylene plastic containment, or isolation of work area by closing room door. 3. Remove or isolate return air diffusers to avoid dust from entering the HVAC system. 4. Remove or isolate the supply air diffusers to avoid positive pressurization of the space, 5. If work area is contained, then it must be neutrally to negatively pressurized at all times. *If negative pressure is required, refer to 8-11 guidance listed under Class IV precautions. 6. Seal all doors with tape that will not leave residue 7. Contain all trash and debris in the work area. 8. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area. 9. Install a sticky (dust collection) mat at entrance of contained work area based on facility policy. Sticky mats must be changed routinely and when visibly soiled. 10. Maintain clean surroundings when area is not contained by damp mopping or HEPA vacuuming surfaces.

Class IV	1. Construct and complete critical barriers (meeting NFPA 241 requirements). Barriers must extend to the ceiling or if ceiling tile is removed, to the deck above. 2. All (plastic or hard) barrier construction activities must be completed in a manner that prevents dust release. Plastic barriers must be effectively affixed to ground and ceiling and secure from movement or damage. Apply tape that will not leave a residue to seal gaps between barriers, ceiling or floor. 3. Seal all penetrations in containment barriers, including floors and ceiling, using approved materials (UL schedule firestop if applicable for barrier type). 4. Containment units or environmental containment units (ECUs) approved for Class IV precautions in small areas totally contained by the unit and that has HEPA-filtered exhaust air. 5. Remove or isolate return air diffusers to avoid dust entering the HVAC system. 6. Remove or isolate the supply air diffusers to avoid positive pressurization of the space. 7. Negative airflow pattern must be maintained from the entry point to the anteroom and into the construction area. The airflow must cascade from outside to inside the construction area. The entire construction area must remain negatively pressurized. 8. Maintain negative pressurization of the entire workspace by use of HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows does not require HEPA-filtered air. 9. If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas. 10. Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (e.g., bathroom exhaust) is not acceptable. 11. Install device (e.g., magnehelic, manometer, or digital monitoring) on exterior of work containment to continually monitor negative pressurization. The “ball in the wall” or similar apparatus are not acceptable. 12. Contain all trash and debris in the work area. 13. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area. 14. Worker clothing must be clean and free of visible dust before leaving the work area. HEPA vacuuming of clothing or use of cover suites is acceptable. 15. Workers must wear shoe covers prior to entry into the work area. Shoe covers must be changed prior to exiting the anteroom to the occupied space (non-work area). Damaged shoe covers must be immediately changed. 16. Install a sticky (dust collection) mat at entrance of contained work area based on facility policy. Sticky mats must be changed routinely and when visibly soiled. 17. Consider collection of particulate data during work to monitor and ensure that contaminates do not enter the occupied spaces. Routine collection of particulate samples may be used to verify HEPA filtration efficiencies.

Class V	1. Construct and complete critical barriers (meeting NFPA 241 requirements). Barriers must extend to the ceiling or if ceiling tile is removed, to the deck above. 2. All (plastic or hard) barrier construction activities must be completed in a manner that prevents dust release. Plastic barriers must be effectively affixed to ground and ceiling and secure from movement or damage. Apply tape that will not leave a residue to seal gaps between barriers, ceiling or floor. 3. Seal all penetrations in containment barriers, anteroom barriers, including floors and ceiling using approved materials (UL schedule firestop if applicable for barrier type). 4. Construct anteroom large enough for equipment staging, cart cleaning, workers. The anteroom must be constructed adjacent to entrance of construction work area. 5. Personnel will be required to wear coveralls at all times during Class V work activities. Coveralls must be removed before leaving the anteroom. 6. Remove or isolate return air diffusers to avoid dust entering the HVAC system. 7. Remove or isolate the supply air diffusers to avoid positive pressurization of the space. 8. Negative airflow pattern must be maintained from the entry point to the anteroom and into the construction area. The airflow must cascade from outside to inside the construction area. The entire construction area must remain negatively pressurized. 9. Maintain negative pressurization of the entire workspace using HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows does not require HEPA-filtered air. 10. If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas. 11. Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (bathroom exhaust) is not acceptable. 12. Install device (e.g., magnehelic, manometer, or digital monitoring) on exterior of work containment to continually monitor negative pressurization. The “ball in the wall” or similar apparatus are not acceptable. 13. Contain all trash and debris in the work area. 14. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area. 15. Worker clothing must be clean and free of visible dust before leaving the work area anteroom. 16. Workers must wear shoe covers prior to entry into the work area. Shoe covers must be changed prior to exiting the anteroom to the occupied space (non-work area). Damaged shoe covers must be immediately changed. 17. Install a sticky (dust collection) mat at entrance of contained work area based on facility policy. Sticky mats must be changed routinely and when visibly soiled. 18. Consider collection of particulate data during work to monitor and ensure that contaminates do not enter the occupied spaces. Routine collection of particulate samples may be used to verify HEPA filtration efficiencies.

Table 47: Minimum Required Infection Control Precaution (upon completion of Work Activity)

Class of Precaution	Mitigation Activities (Performed upon Completion of Work Activity)
Classes I, II and III	Cleaning: 1. Clean work areas including all environmental surfaces, high horizontal surfaces and flooring materials. 2. Check all supply and return air registers for dust accumulation on upper surfaces as well as air diffuser surfaces. HVAC Systems: 1. Remove isolation of HVAC system in areas where work is being performed. Verify that HVAC systems are clean and operational. 2. Verify the HVAC systems meet original airflow and air exchange design specifications
Classes III, IV and V	Class III (Type C Activities only), IV, and V precautions require inspection and documentation for downgraded ICRA precautions. Construction areas must be inspected by an infection preventionist or designee and engineering representative for discontinuation or downgrading of ICRA precautions. Work Area Cleaning: 1. Clean work areas including all environmental surfaces, high horizontal surfaces and flooring materials. 2. Check all supply and return air registers for dust accumulation on upper surfaces as well as air diffuser surfaces. Removal of Critical Barriers: 1. Critical barriers must remain in place during all work involving drywall removal, creation of dust and activities beyond simple touch-up work. The barrier may NOT be removed until a work area cleaning has been performed. 2. All (plastic or hard) barrier removal activities must be completed in a manner that prevents dust release. Use the following precautions when removing hard barriers: a. Carefully remove screws and painter tape. b. If dust will be generated during screw removal, use hand-held HEPA vacuum. c. Drywall cutting is prohibited during removal process. d. Clean all stud tracks with HEPA vacuum before removing outer hard barrier. e. Use a plastic barrier to enclose area if dust could be generated. Negative Air Requirements: 1. The use of negative air must be designed to remove contaminates from the work area. 2. Negative air devices must remain operational at all times and in place for a period after completion of dust creating activities to remove contaminants from the work area and before removal of critical barriers. HVAC systems:

	1. Upon removal of critical barriers, remove isolation of HVAC system in areas where work is being performed. 2. Verify that HVAC systems are clean and operational. 3. Verify the HVAC systems meets original airflow and air exchange design specifications.

Table 48: ICRA permit

ICRA 2.0 Infection Control Risk Assessment and Permit	Project Name:			
	ICRA Number:		Requested by	
Location of Work Activity			Project Start Date	
Estimated Duration			Completion Date	
Foreman/Supervisor			Phone	
Contractor Performing Work			Phone	
Approving Authority			Phone	

Please note that the above signature is approval of the work activity as described and assessed documented here.
Should the scope of work change or the discovery of additional toxic or biological substances.
STOP WORK and seek additional approval and guidance before proceeding.

1. Type of Activity	Explain this reasoning for this assessment
○ Type A: Non-invasive	
○ Type B: Small-scale, short duration	
○ Type C: Large-scale, longer duration	
○ Type D: Major demolition, construction	

2. Patient Risk Area	Describe key patient risks
○ Low: Non-patient care areas	
○ Medium: Patient care support areas	
○ High: Patient care areas	
○ Highest: Invasive, sterile or highly compromised care	

3. Class of Precautions				
	Type A	TYPE B	TYPE C	TYPE D
Low	○ I	○ II	○ II	○ III
Medium	○ I	○ II	○ III	○ IV
High	○ I	○ III	○ IV	○ V
Highest	○ III	○ IV	○ V	○ V

4. Surrounding Area					
	Below:	Above:	Lateral:	Behind:	In Front:
Unit					
Risk group					
Contact					
Phone					
Controls	☐ Noise ☐ Vibration ☐ Dust ☐ Ventilation ☐ Pressurization	☐ Noise ☐ Vibration ☐ Dust ☐ Ventilation ☐ Pressurization	☐ Noise ☐ Vibration ☐ Dust ☐ Ventilation ☐ Pressurization	☐ Noise ☐ Vibration ☐ Dust ☐ Ventilation ☐ Pressurization	☐ Noise ☐ Vibration ☐ Dust ☐ Ventilation ☐ Pressurization
Systems impacted:	☐ Data ☐ Mechanical ☐ Med Gas ☐ Water Systems ☐ Other	☐ Data ☐ Mechanical ☐ Med Gas ☐ Water Systems ☐ Other	☐ Data ☐ Mechanical ☐ Med Gas ☐ Water Systems ☐ Other	☐ Data ☐ Mechanical ☐ Med Gas ☐ Water Systems ☐ Other	☐ Data ☐ Mechanical ☐ Med Gas ☐ Water Systems ☐ Other

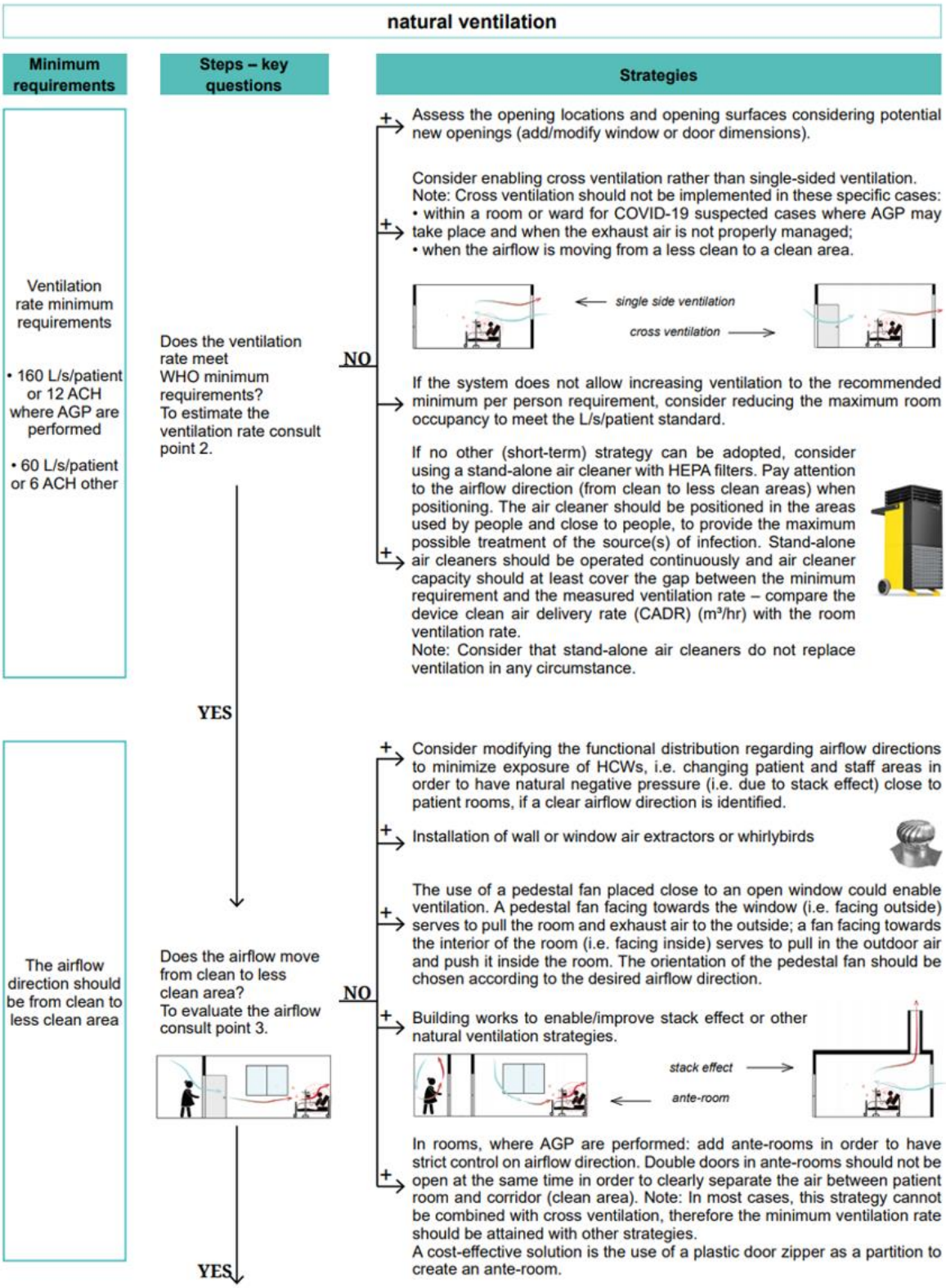
Were there discoveries in surrounding areas that would serve as cause to increase the class of precautions and necessitate additional controls? If so, please summarize.

5. Detailed Plan of ICRA Controls for this Work	Class I				
Final Class of Precautions being applied	I	II	III	IV	V
Controls required for this project	Specifications/ Materials			Verification method and frequency	

Exceptions/Additions to this permit
Date and Initials are noted by attached memoranda

Initials		Date	
Permit Request By		Date	
Permit Authorized By		Date	
Approval Signature			

4.1.8 Added Information on Different Types of ventilation and recommended IPC strategies



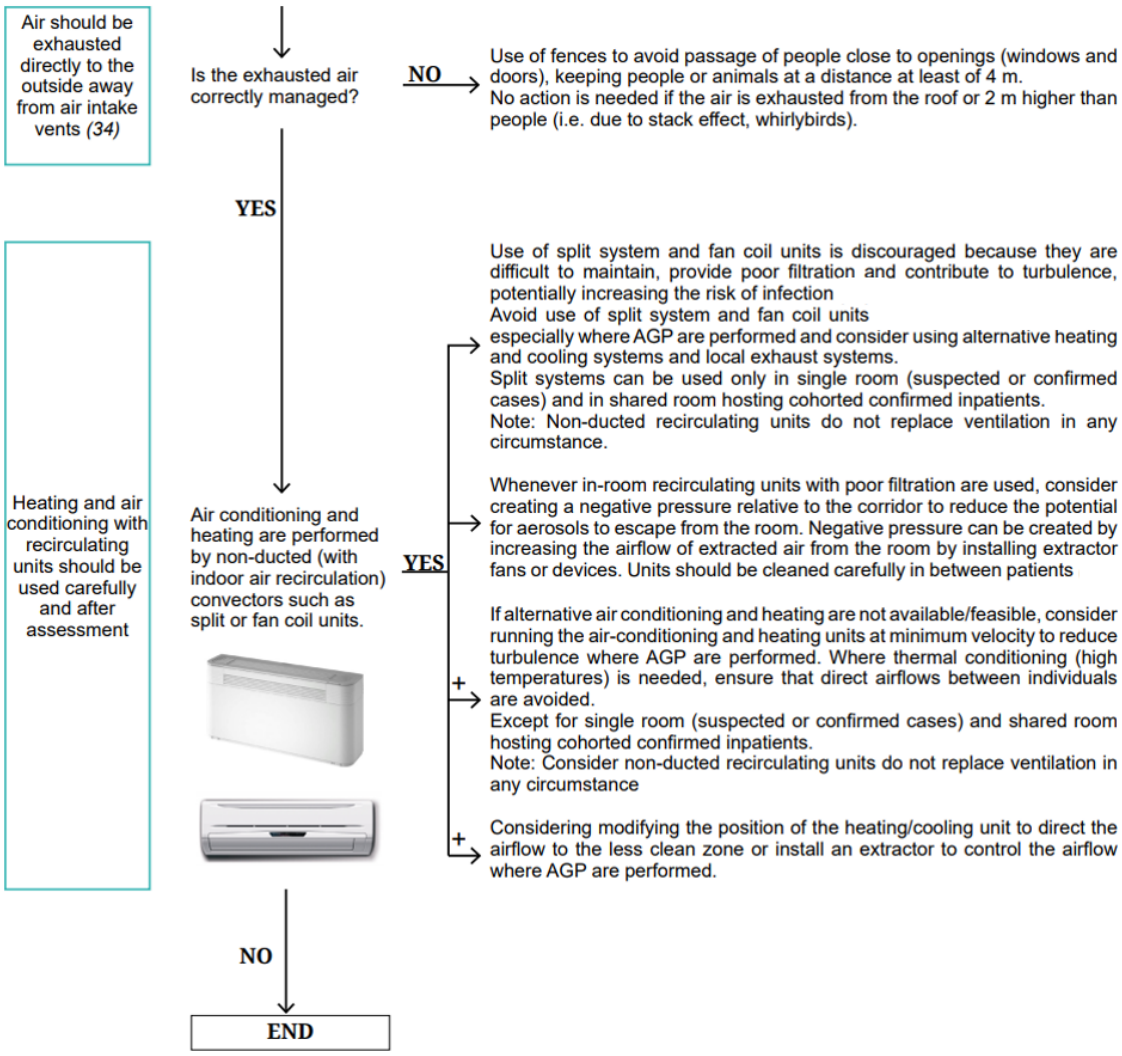
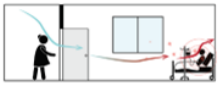
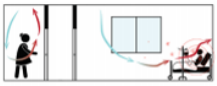
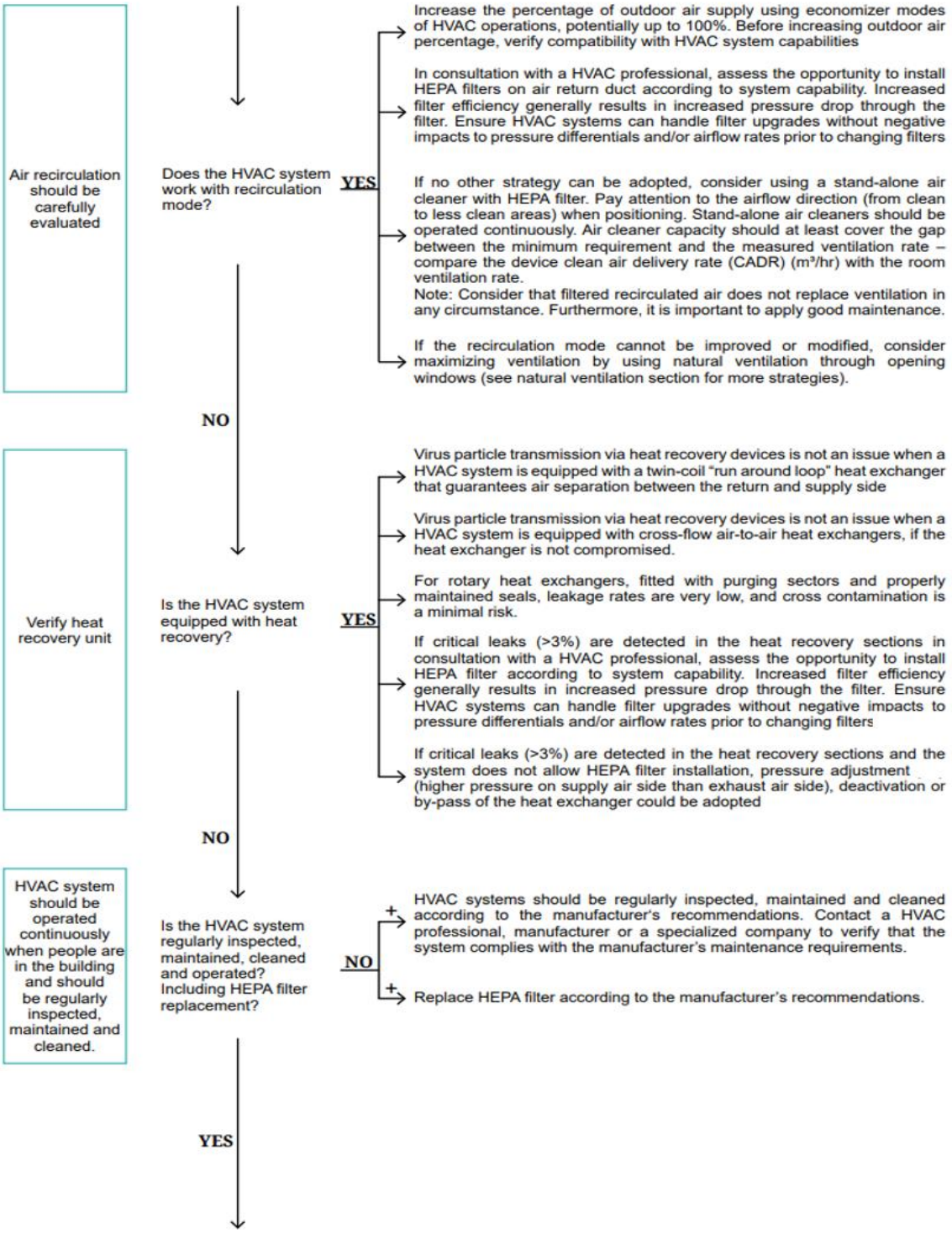


Figure 29: Added Information on Different Types of ventilation and recommended IPC strategies

mechanical ventilation

Minimum requirements	Steps – key questions		Strategies
Ventilation rate minimum requirements • 160 L/s/patient or 12 ACH where AGP are performed • 60 L/s/patient or 6 ACH other	Does the ventilation rate meet WHO minimum requirements? To assess the ventilation rate consult point 1.	NO	In consultation with a HVAC professional assess the opportunity to increase the ventilation rate according to system capabilities. Disable demand-control ventilation controls that reduce air supply based on temperature or occupancy (CO_2 concentration). If the ventilation rate cannot be increased mechanically, consider maximizing ventilation by using natural ventilation through opening windows *(37)* (see natural ventilation section for more strategies). If the system does not allow increasing the ventilation to the recommended minimum per person requirement, consider reducing the maximum room occupancy to meet the L/s/patient standard. If no other (short-term) strategy can be adopted, consider using a stand-alone air cleaner with HEPA filter. Pay attention to the airflow direction (from clean to less clean areas) when positioning. The air cleaner should be positioned in the areas used by people and close to people, to provide the maximum possible treatment of the source(s) of infection. Stand-alone air cleaners should be operated continuously. Air cleaner capacity should at least cover the gap between the minimum requirement and the measured ventilation rate – compare the device clean air delivery rate (CADR) (m^3/hr) with the room ventilation rate. Note: Consider that filtered recirculated air does not replace ventilation in any circumstance.
	YES		
The airflow direction should be from clean to less clean area	Does the airflow move from clean to less clean area? To evaluate the airflow consult point 3. 	NO	Consider modifying the functional distribution regarding airflow directions to minimize exposure of HCWs, i.e. swapping patient and health care staff areas, if a clear airflow direction is identified. In consultation with a HVAC professional, assess the opportunity to modify airflow direction, i.e. modifying the location of supply and exhaust (return) air devices. + In rooms where AGP are performed: add ante-rooms in order to have more strict control of airflow direction. Doors in ante-rooms should not be open at the same time in order to clearly separate the air between the patient room and the corridor (cleaner area). A cost-effective solution is the use of a plastic door zipper as a partition to create an ante-room. 
	YES		
Air should be exhausted directly to the outside and away from air-intake vents, people and animals	Is the exhausted air correctly managed?	NO	Consider fencing the area near the exhaust outlet keeping people or animals at a distance at least of 4 m. The air intake should be at least 2 m if the air outlet is above and 4 m if air outlet is below (EN 16798-4) from the exhaust. If fencing the area is not feasible, in consultation with a HVAC professional, assess the opportunity to install HEPA filters according to system capability.
	YES		


Air recirculation should be carefully evaluated
Does the HVAC system work with recirculation mode?
YES
Increase the percentage of outdoor air supply using economizer modes of HVAC operations, potentially up to 100%. Before increasing outdoor air percentage, verify compatibility with HVAC system capabilities
In consultation with a HVAC professional, assess the opportunity to install HEPA filters on air return duct according to system capability. Increased filter efficiency generally results in increased pressure drop through the filter. Ensure HVAC systems can handle filter upgrades without negative impacts to pressure differentials and/or airflow rates prior to changing filters
If no other strategy can be adopted, consider using a stand-alone air cleaner with HEPA filter. Pay attention to the airflow direction (from clean to less clean areas) when positioning. Stand-alone air cleaners should be operated continuously. Air cleaner capacity should at least cover the gap between the minimum requirement and the measured ventilation rate – compare the device clean air delivery rate (CADR) (m³/hr) with the room ventilation rate.
Note: Consider that filtered recirculated air does not replace ventilation in any circumstance. Furthermore, it is important to apply good maintenance.
If the recirculation mode cannot be improved or modified, consider maximizing ventilation by using natural ventilation through opening windows (see natural ventilation section for more strategies).
NO
Verify heat recovery unit
Is the HVAC system equipped with heat recovery?
YES
Virus particle transmission via heat recovery devices is not an issue when a HVAC system is equipped with a twin-coil "run around loop" heat exchanger that guarantees air separation between the return and supply side
Virus particle transmission via heat recovery devices is not an issue when a HVAC system is equipped with cross-flow air-to-air heat exchangers, if the heat exchanger is not compromised.
For rotary heat exchangers, fitted with purging sectors and properly maintained seals, leakage rates are very low, and cross contamination is a minimal risk.
If critical leaks (>3%) are detected in the heat recovery sections in consultation with a HVAC professional, assess the opportunity to install HEPA filter according to system capability. Increased filter efficiency generally results in increased pressure drop through the filter. Ensure HVAC systems can handle filter upgrades without negative impacts to pressure differentials and/or airflow rates prior to changing filters
If critical leaks (>3%) are detected in the heat recovery sections and the system does not allow HEPA filter installation, pressure adjustment (higher pressure on supply air side than exhaust air side), deactivation or by-pass of the heat exchanger could be adopted
NO
HVAC system should be operated continuously when people are in the building and should be regularly inspected, maintained and cleaned.
Is the HVAC system regularly inspected, maintained, cleaned and operated? Including HEPA filter replacement?
NO
HVAC systems should be regularly inspected, maintained and cleaned according to the manufacturer's recommendations. Contact a HVAC professional, manufacturer or a specialized company to verify that the system complies with the manufacturer's maintenance requirements.
Replace HEPA filter according to the manufacturer's recommendations.
YES

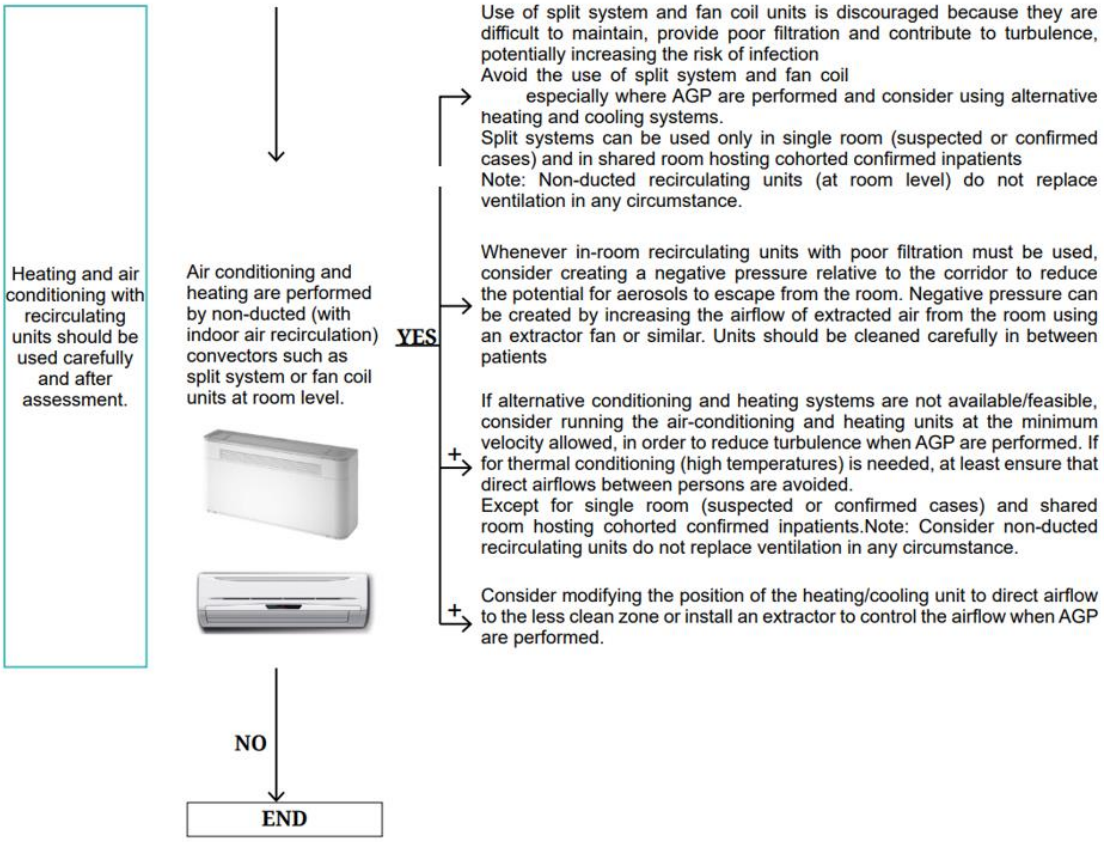


Figure 30: Mechanical ventilation

Evaluating ventilation

Ventilation rate and airflow direction are key elements to be assessed and evaluated before undertaking any action on the ventilation system. This first evaluation will provide the baseline and allow the user to better understand the gap between the ventilation system functionality and the proposed requirements. A second evaluation should be carried out once improvement strategies have been implemented. Comparing the second evaluation with the initial baseline will provide an overview of the effectiveness of the implemented improvement strategies and a clear understanding of the new ventilation rate and flow. Mechanical and natural ventilation systems require different methods to evaluate the ventilation airflow rate.

Point 1

Minimum ventilation rate – mechanical ventilation system. How to assess it? Each mechanical ventilation system is designed for specific airflow rates. Consult the technical manual to verify the system capacity.

Point 2

Minimum ventilation rate – natural ventilation system. How to estimate it? As a rule of thumb, wind-driven natural ventilation rate through a room can be calculated as follows (20): Ventilation rate [L/s] = k x wind speed [m/s] x smallest opening area [m2] x 1000 [L/m3] k = 0.05 in the case of single-sided ventilation k = 0.65 in the case of cross ventilation in the case of mosquito net presence = ventilation rate x 0.5 wind speed: the wind speed refers to the value at the building height at a site sufficiently away from the building without any obstructions (e.g. at an airport)

Point 3

Airflow direction. How to evaluate it? The airflow direction is usually assessed through a gas tracer. However, other cost-effective solutions can be used, such as incense sticks or other smoke generators – a smoke test can be used to highlight the direction of the airflow.

Resources:

National Health and Medical Research Council (2019). Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019

World Health Organization, 2021. Roadmap to improve and ensure good indoor ventilation in the context of COVID-19. Link: https://apps.who.int/iris/bitstream/handle/10665/339857/9789240021280eng.pdf?sequence=1

4.2 REDUCING INFECTIONS SPREAD THROUGH THE PHYSICAL ENVIRONMENT

The prevention of contact-spread infections is of paramount importance in healthcare settings. Contact contamination is generally recognized as the principal transmission route of healthcare acquired infections, including pathogens such as MRSA, C. difficile and VRE, which survive well on environmental surfaces and other reservoirs.

Environmental routes of contact-spread infections include direct person-to-person contact and indirect transmission via environmental surfaces. Reducing surface contamination through hand-hygiene compliance

Healthcare workers' hands play a key role in both direct and indirect transmission. Given the importance of maximising hand-hygiene compliance, it is absolutely essential that all areas of the facility are designed to facilitate compliance with hand-hygiene requirements.

4.2.1 Accessibility

Conveniently located alcohol-based product dispensers, sinks and basins can facilitate healthcare worker compliance with hand-hygiene requirements. Hand-hygiene compliance can be increased by providing a greater number of alcohol-based product dispensers, particularly if they are placed in appropriate locations (where clinical care is provided [e.g. bedside] or where indirect care tasks are performed). Other aspects of design that may increase compliance include automated dispensers of hand-hygiene products, electronic monitoring and computerised voice prompts. Alcohol-based handrub dispensers need to be suitably located out of the reach of children, or in supervised locations. Placement of dispensers must be carefully considered in mental health facilities and alcohol withdrawal units.

Consideration needs to be given to ensuring availability of basins for healthcare workers that are separate from patient bathrooms. As well as being installed in all patient-care areas, hand-hygiene facilities should be placed in all areas where careful attention to hygiene is essential, such as kitchens, laundries, pharmacies, laboratories and staff amenities areas (e.g. bathrooms, toilets and change rooms).

4.2.2 Personal protective equipment

It is also essential that all areas of the facility are designed to facilitate appropriate use of PPE. All rooms should have dedicated and accessible areas for storage of gowns, aprons, gloves, masks and protective eyewear.

4.2.3 Control of surface contamination through material selection

Ease of cleaning should be a key consideration in selecting appropriate floor and furniture coverings. Several design-related factors should be considered to minimise the risk of infection stemming from contaminated surfaces:

- the nature and type of contamination that is likely to occur
- if a suitable cleaning method for that surface can be performed.

Areas that may be in direct contact with blood and body substances (e.g. surfaces such as floors and bench tops) need to be made of impervious material that is smooth and easy to clean.

4.2.3.1 Healthcare flooring

A wide range of floor covering materials is used in healthcare settings. These include but are not limited to: ceramic tiling, linoleum, rubber, textile floor covering, vinyl, sheet terrazzo, cork, timber laminates, mats and matting, cementinous toppings, seamless coatings and outdoor flooring.

Floor coverings have not been generally related to healthcare associated infection.

Some studies have identified carpeting as susceptible to contamination by fungi and bacteria.

When selecting floor covering for a health care setting consideration needs to be given to the following:

- Who is at risk of acquiring infection?
- What is the risk of exposure to the infectious agents?
- What is the nature of the possible infectious agents?
- How can the agent be transmitted? (eg airborne; through cleaning techniques; through contact especially in environments in which there are young children)

In terms of infection prevention and control, the advantages of hard floor coverings include:

- being easier to clean
- being easier to disinfect where required

- allowing use of the most appropriate disinfectant, rather than a product that is suitable
- for use on carpet
- costing less, as disinfectant is less expensive than steam cleaning, and steam cleaning
- may not be readily available
- there is less surface area so hard floor coverings are less likely to act a as reservoir
- of infectious agents than carpet
- when additional cleaning is required, hard floor surfaces are easier to clean than carpet.

Care and maintenance of floor covering need to consider manufacturer's recommendations.

Carpeting should be avoided in areas where

- spills are likely to occur (e.g. around sinks or in isolation or soiled utility/holding areas)
- patients may have direct contact with contaminated carpets (e.g. children/babies crawling on the floor)
- patients are at greater risk of airborne infections.

4.2.3.2 Furnishings

fabric-covered furniture has been identified as a source of VRE infection in hospitals and suggested the use of easily cleanable, nonporous material. It is recommend to minimising the use of upholstered furniture in areas housing immunocompromised patients.

Blinds and curtains should be easy to clean and discourage the accumulation of dust.

4.3 REDUCING WATER-BORNE TRANSMISSION

Many bacterial and some protozoal microorganisms can proliferate or remain viable in moist environments or aqueous solutions in healthcare settings. Contaminated water systems in healthcare settings (such as inadequately treated wastewater) may lead to the pollution of municipal water systems, enter surface or ground water, and affect people in the community.

Sources of water contamination

4.3.1 Environmental routes or sources of waterborne transmission:

- direct contact, such as hydrotherapy
- ingestion of water, such as drinking water
- inhalation of aerosols dispersed from contaminated water sources, such as improperly cleaned or maintained cooling towers, showers, respiratory therapy equipment
- and room air humidifiers
- aspiration of contaminated water.

4.3.2 Approaches to reducing waterborne transmission

4.3.2.1 Water supply system

The water supply system should be designed and maintained with proper temperature and adequate pressure; stagnation and back flow should be minimised and dead-end pipes should be avoided.

To prevent the growth of Legionella and other bacteria, it is recommended that healthcare facilities maintain cold water at a temperature below 20°C, store hot water above 60°C, and circulate hot water with a minimum return temperature of 51°C.

When the recommended standards cannot be achieved because of inadequate facilities that are unable to be renovated, other measures such as chlorine treatment, copper-silver ionisation, or ultraviolet lights are recommended to ensure water quality and prevent infection.

4.3.2.2 Point-of-use fixtures

Water fixtures such as sinks, faucets, aerators, showers, and toilets have been identified as potential reservoirs for pathogenic microorganisms. Such fixtures produce aerosols that can disperse microbes and they have wet surfaces on which moulds and other

microorganisms can proliferate. However, empirical evidence linking these fixtures to HAIs is still limited; no consensus has been reached regarding the disinfection or removal of these devices for general use.

Regular cleaning, disinfection and preventative maintenance programs should be provided, especially in areas housing immunocompromised patients.

4.3.2.3 Ice machines

Ice storage receptacles and ice-making machines should be properly maintained and regularly cleaned. Ice and ice-making machines may be contaminated through improper handling of ice by patients and/or staff. Ice for human consumption should be differentiated from ice for first aid or storage of clinical specimens. Pharmaceuticals or medical solutions should not be stored on ice intended for consumption.

Machines that dispense ice are preferable to those that require ice to be removed from bins or chests with a scoop. Ice machines and their dispensers should be flushed and cleaned if they have not been disconnected before anticipated lengthy water disruptions All ice-storage chests should be cleaned, disinfected, and maintained on a regular basis as per manufacturers instructions.

Suggested steps to avoid improper handling of ice include

- avoiding handling ice directly by hand
- washing hands before obtaining ice
- using a smooth-surface ice scoop to dispense ice
- keeping the ice scoop on a chain short enough that the scoop cannot touch the floor,
- or keeping the scoop on a clean, hard surface when not in use
- avoiding storing the ice scoop in the ice bin.

4.3.3 Water, Sanitation, and Hygiene (WASH) in Health Care Facilities

The term “WASH in health care facilities” refers to the provision of water, sanitation, health care waste management, hygiene and environmental cleaning infrastructure, and services across all parts of a facility. “Health care facilities” encompass all formally recognized facilities that provide health care, including primary (health posts and clinics), secondary, and tertiary (district or national hospitals), public and private (including faith-run), and temporary structures designed for emergency contexts (e.g., cholera treatment centers). They may be located in urban or rural areas.

Basic WASH services in health care facilities are fundamental to providing quality care and for ensuring that primary health commitments

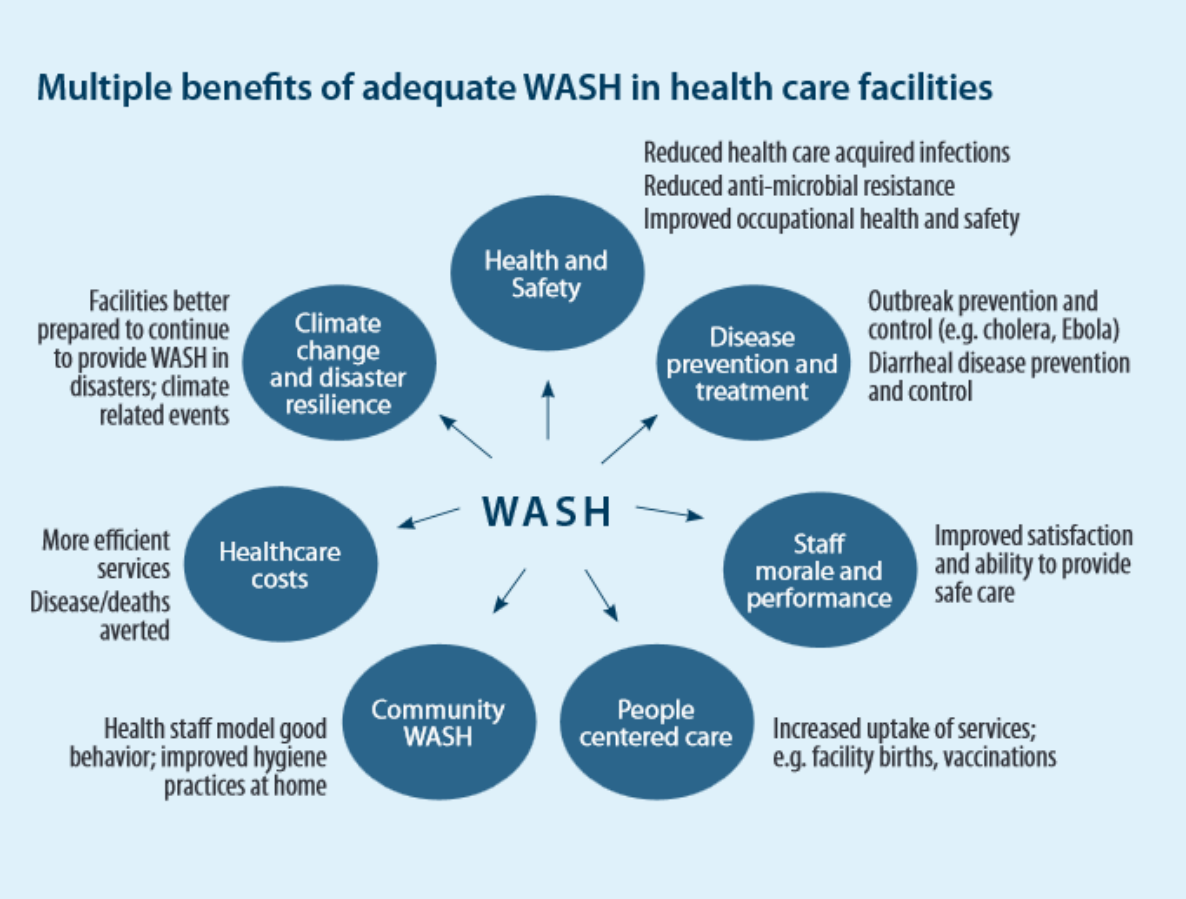


Figure 31: Benefits of adequate WASH in healthcare facilities

4.3.4 The eight practical steps for WASH implementation:

1. A situation analysis coupled with a recent assessment of current WASH in health care facility services provides a basis for planning and resource mobilization
2. Set targets and define roadmap
3. Establish national standards and accountability mechanisms
4. Improve and maintain infrastructure
5. Monitor and review data
6. Develop health workforce
7. Engage communities
8. Conduct operational research and share learning

All health care facilities should at least meet WASH basic services and the advanced WASH services as outlined in the national standards advanced.

Table 48: Water Supply, Sanitation and Hygiene (JMP) service ladders for monitoring WASH in HCF in the SDGs

Water	Sanitation	Hygiene	Health care waste	Environmental cleaning
Advanced service:	Advanced service:	Advanced service:	Advanced service:	Advanced service:
Basic service: Water is available from an improved source located on premises.	Basic service: Improved sanitation facilities are usable with at least one toilet dedicated for staff, at least one sex-separated toilet with menstrual hygiene facilities, and at least one toilet accessible for people with limited mobility. In Maldives soap and water should be available inside the toilet.	Basic service: Functional hand hygiene facilities (with water and soap and/or alcohol-based hand rub) are available at points of care, and within 5 meters of toilets. All toilets should have a separate hand washing area with access to soap and water.	Basic service: Waste is safely segregated into at least three bins and sharps and infectious waste are treated and disposed of safely.	Basic service: Basic protocols for cleaning available, and staff with cleaning responsibilities have all received training.
Limited service: An improved water source is within 500 meters of the facility, but not all requirements for basic service are met.	Limited service: At least one improved sanitation facility, but not all requirements for basic service are met.	Limited service: Functional hand hygiene facilities are available at either points of care or toilets, but not both.	Limited service: There is limited separation and/or treatment and disposal of sharps and infectious waste, but not all requirements for basic service are met.	Limited service: There are cleaning protocols, or at least some staff have received training on cleaning.
No service: Water is taken from unprotected dug wells or springs, or surface water sources; or an improved source that is more than 500 m from the facility; or the facility has no water source	No service: Toilet facilities are unimproved (pit latrines without a slab or platform, hanging latrines and bucket latrines), or there are no toilets or latrines at the facility.	No service: No functional hand hygiene facilities are available at either points of care or toilets	No service: There are no separate bins for sharps or infectious waste, and sharps and/or infectious waste are not treated/disposed of.	No service: No cleaning protocols are available, and no staff have received training on cleaning.

4.3.5 Monitoring definitions of basic serves levels and indicators for WASH in health care facilities.

The core indicators define "basic" service levels for water, sanitation, hygiene, health care waste management and environmental cleaning in health care facilities. These indicators do not fully capture the normative ideal service levels, but represent an approximation of the normative ideal which can be readily measured. These can be applied in all types and sizes of facilities (from primary to tertiary). The indicators are generally applicable at the level of the facility as a whole, rather than a particular location within a facility.

4.3.5.1 Basic water services

Definition: Proportion of health care facilities where the main source of water is an improved source, located on premises, from which water is available.

Table 49: Water sources

Element	Monitoring definition
Improved	**Improved water sources** are those which, by nature of their design and construction, have the potential to deliver safe water. Improved sources include: piped water, boreholes or tube wells, protected dug wells, protected springs, rainwater, and packaged or delivered water. Unimproved sources include unprotected dug wells or springs and surface water (e.g. pond, canals, irrigation ditches).
on premises	Water is accessed within buildings, or within the facility grounds.
available	Water from the main water source is available on the day of the survey or questionnaire.

4.3.5.2 Basic sanitation services

Definition: Proportion of health care facilities with improved and usable sanitation facilities, with at least one toilet dedicated for staff, at least one sex-separated toilet with menstrual hygiene facilities, and at least one toilet accessible for users with limited mobility.1

Table 50: Basic sanitation services

Element	Monitoring definition
Improved	**Improved sanitation facilities** are those designed to hygienically separate excreta from human contact. Improved facilities include: flush/pour flush to piped sewer system, septic tanks or pit latrines; ventilated improved pit latrines, composting toilets or pit latrines with slabs. Unimproved facilities include pit latrines without a slab or platform, hanging latrines, and bucket latrines.

	For the purpose of this document "toilets" is taken to mean any of these improved facilities.
Usable	Toilets are available, functional, and private: Available to patients and staff (toilets are on premises, doors are unlocked or a key is available at all times) Functional (the toilet is not broken, the toilet hole is not blocked, there should be no cracks or leaks in the toilet structure and water is available for flush/pour-flush toilets), and Private (there are closable doors that can be locked from the inside and no large gaps or holes in the structure) on the day of the survey or questionnaire.
Dedicated for staff	There are separate toilet facilities dedicated for patient and staff use.
sex-separated with menstrual hygiene facilities	At least one toilet is separated for use by women/girls and has a bin with a lid on it and/or water and soap available in a private space for washing.
accessible for users with limited mobility	Toilets are considered accessible if they meet relevant national or local standards. In the absence of such standards, toilets should be accessible without stairs or steps, have handrails for support attached either to the floor or sidewalls, a door which is at least 80 cm wide, and the door handle and seat within reach of people using wheelchairs or crutches/sticks

4.3.5.3 Basic hand hygiene services

Table 51: Basic hand hygiene services

Element	Monitoring definition
hand hygiene facilities	A hand hygiene facility is any device that enables staff and patients to clean their hands effectively, such as a sink with tap, water tank with tap, bucket with tap or other similar device. Alcohol based hand rub dispensers are also hand hygiene facilities, whether they are fixed or portable. *All health care facilities should have sink with or a water tank with tap. Alcohol based hand rubs should be available in all health care facilities
functional	To be considered functional, hand hygiene facilities at points of care must have either alcohol based hand rub, or soap and water. If alcohol-based hand rub is used, health care staff may carry a dispenser around between points of care. To be considered functional, hand hygiene facilities at toilets must have soap and water available within 5m of toilets. Alcohol-based rub is not considered adequate for hand hygiene at toilet as it does not remove faecal matter from hands. Chlorinated water (a prepared solution of chlorine suspended in water) is not considered an adequate substitute for soap and water, or for alcohol based hand rub.
Point of care	Points of care are any location in the health care facility where care or treatment is delivered (e.g. consultation/exam rooms).
within 5 m of toilets	Hand hygiene facilities at toilets must be located no more than 5 metres from the toilets.

4.3.5.4 Basic health care waste management services

Definition: Proportion of health care facilities where waste is safely segregated in consultation areas and sharps and infectious wastes are treated and disposed of safely.171

Table 52: Basic healthcare waste management services

Element	Monitoring definition
safely segregated in consultation area	*At least three clearly labelled or colour coded bins and bags/liners should be in place to separate (according to the national standard) (1) sharps waste – Sharp box (RED/YELLOW) (2) infectious waste – RED/YELLOW (3) non-infectious general waste –BLACK Bins should be no more than three quarters (75%) full, and each bin should not contain waste other than that corresponding to its label. Bins should be appropriate to the type of waste they are to contain; sharps containers should be puncture-proof and others should be leak-proof. Bins for sharps waste and infectious waste should have lids. Consultation areas are rooms or areas within the health care facility where care or treatment is delivered.
Treated and disposed of safely	Safe treatment and disposal methods include incineration, autoclaving, and burial in a lined, protected pit. Wastes may also be collected and transported off-site for medical waste treatment and disposal.

Sharps: Used or unused sharps, e.g. hypodermic, intravenous or other needles; auto-disable syringes; syringes with attached needles; infusion sets; scalpels; pipettes; knives; blades; broken glass.

Infectious Waste known or suspected to contain pathogens and pose a risk of disease transmission, e.g. waste and waste water contaminated with blood and other body fluids, including highly infectious waste such as laboratory cultures and microbiological stocks; and waste including excreta and other materials that have been in contact with patients infected with highly infectious diseases in isolation wards

4.3.5.5 Basic environment cleaning

Definition: Proportion of health care facilities which have protocols for cleaning, and staff with cleaning responsibilities have all received training on cleaning procedures.

Table 53: Protocols for cleaning

Element	Monitoring definition
Protocols for cleaning	Protocols should include: • step-by-step techniques for specific tasks, such as cleaning a floor, cleaning a sink, cleaning a spillage of blood or body fluids • a cleaning roster or schedule specifying the frequency at which cleaning tasks should be performed

staff with cleaning responsibilities	Includes non-health care providers, such as cleaners, whose tasks include cleaning, as well as health care providers who, in addition to their clinical and patient care duties, are responsible for cleaning
training	Training refers to structured training plans or programs led by a trainer or appropriately qualified supervisor.

Health care facility waste disposal will be according to the national HCF waste disposal guideline. Figure below gives the types and methods of waste disposal used in HCFs.

Resources:

National Health and Medical Research Council (2019). Australian Guidelines for the Prevention and Control of Infection in Healthcare, Canberra: https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019

Ministry of Health and Family Welfare, India: Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

World Health Organization and the United Nations Children's Fund, WASH in health care facilities: Global Baseline Report 2019, WHO and UNICEF, Geneva, 2019. Licence: CC BY-NC-SA 3.0 IGO. Link: https://apps.who.int/iris/bitstream/handle/10665/311620/9789241515504-eng.pdf

5. APPENDICES

5.1 STEPS OF REPROCESSING OF REUSABLE MEDICAL DEVICES

- Pre-cleaning and containment at point-of-use
- Soiled transportation
- Cleaning and Decontamination
- Preparation and packaging (If required)
- Sterilization by autoclaving
- Clean transportation and Storage

5.1.1 Pre-cleaning and containment at point-of-use before sending to CSSD:

Figure 8. Sequence of events for cleaning: from point-of-use to inspection

rinse off at point of use | sort | manual cleaning | inspection

- Wear appropriate PPE
- Remove any linen and disposable items and dispose of these items appropriately
  - Sharps, such as knife blades and needles, should be correctly discarded
  - Segregate sharps that can cause injury to health-care workers
- Remove gross soil from instruments by wiping with a damp clean dry cloth. Pre-cleaning (e.g. soak or spray) prevents soil from drying on devices and makes them easier to clean
- Cleaning products used should be appropriate for medical devices and approved by the device manufacturer
- If detergent-based products are used, ensure that they are mixed to the correct in-use dilution
- Avoid prolonged soaking of devices

- Keep the device moist in the transportation container by adding a towel moistened with water (not saline).
- Do not use saline as a soaking solution as it damages some medical devices
- Contaminated items should be contained in dedicated, fully enclosed, leak-proof and puncture-proof containers prior to transport
- Soiled instruments should be opened and kept moist
    - Spray with an enzymatic spray
    - Cover with a moist towel with water (not saline) or foam, spray, or gel specifically intended for this purpose
    - Do not transport in containers with water as water is a splash hazard

5.1.2 Soiled transportation

- Transport the contaminated devices to the decontamination area as soon as possible.
- Use a covered, fully enclosed, puncture-resistant container.
- Decontaminate the container after each use.
- Follow a designated route to avoid high-traffic and patient care areas.
- Clearly identify all contaminated carts and containers.

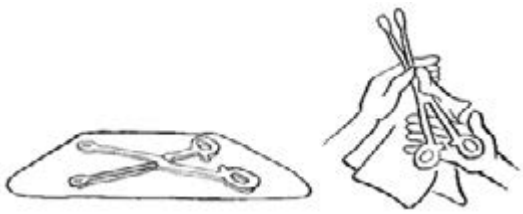
5.1.3 Cleaning and Decontamination

5.1.3.1 Immersion method

- Fill sink or any other appropriate basin with sufficient warm water for complete immersion of the device
- Add the appropriate quantity of detergent following the manufacturer's instructions for dosage
- Clean the device under the surface of the water so that aerosols are not produced

- Use appropriate brushes to properly clean box locks, lumens and other hard-to-clean areas
- Disassemble instruments and other items with multiple parts, and be sure to brush in the grooves, teeth, and joints to items where organic material can collect and stick.
- Use soft (nylon) bristle brushes so that the surface of the instrument is not damaged
- Brushes used to clean lumens must be the same diameter as the instrument to ensure that all internal surfaces can be reached

- Brushes must also be long enough to exit the distal end of the instrument
- In another sink or basin, completely immerse the device in clean purified water and rinse the device thoroughly
- Mechanically dry; if this not available or not recommended by the manufacturer, air-dry or hand-dry using a disposable clean, non-linting cloth



5.1.3.2 Non-immersion method

- Clean the device by wiping surfaces thoroughly with a disposable, clean, non-linting cloth and detergent ensuring that moisture does not enter critical areas of the device (e.g. power connections) until all visible soil is removed
- Rinse the device by wiping surfaces thoroughly with a damp, disposable, clean, non-linting cloth until all detergent residue is removed

Mechanically dry; if this is not available or not recommended by the manufacturer, air-dry or hand-dry using a disposable clean, non-linting cloth. Disposable cloths should be discarded after each use ñ Cleaning solution and water should be changed at each cleaning session and when visibly soiled.

5.1.3.3 Care of cleaning tools

- Cleaning tools need to be cleaned, disinfected and dried after every shift
- Inspect brushes and other cleaning equipment for damage after each use and discard if necessary
- The use of single-use cleaning tools is recommended. If reusable tools are used, they should be disinfected at least daily

5.1.3.4 Mechanical cleaning

Mechanical cleaning equipment may be available and do provide controlled and uniformly reliable results if the equipment is well maintained. Equipment used for the mechanical cleaning of medical devices include:

- Ultrasonic cleaners
- Automated washers or washer-disinfectors
- Automated cart washers

Whenever possible, clean devices by mechanical means:

- Use mechanical washers in accordance with the manufacturer's instructions ñ Manually clean heavily soiled devices before mechanical cleaning if necessary
- Ensure that the device to be cleaned is compatible with the mechanical cleaning equipment, cycle parameters and cleaning chemicals that are being used
- Ultrasonic washers are strongly recommended for any semi-critical or critical medical device that has joints, crevices, lumens or other areas that are difficult to clean
- Washer-disinfectors are strongly recommended for medical devices that can withstand mechanical cleaning to achieve the required exposure for cleaning and to reduce potential risks to staff When the equipment is available and devices are designed for an automated process, the advantages of using such a process for the cleaning and thermal disinfection of medical devices include faster throughput of devices, greater consistency of results, and higher standards for cleaning that can be validated and less risk to staff. Important considerations when using mechanical cleaning equipment include staff training, water quality, cleaning chemicals' dilution rates and ensuring that the equipment is in proper working condition. Washer disinfectors and ultrasonic cleaners are only effective when they are operated, loaded and serviced in compliance with the manufacturer's instructions for use.

5.1.4 Preparation and packaging

The inspection, assembly and packaging (IAP) of reused medical devices (RMDs) in the CSSD is where medical devices are visually inspected and function-tested by trained staff.

Following testing, devices are reassembled, sorted and packed either as a set of medical devices or as a single medical device packed in a transparent pouch or

wrapped in appropriate wrapping material. Some RMDs are disassembled for sterilization as per the manufacturer instructions for use. Records should be kept of all inspected and tested devices.

All devices are assembled, checked and scanned (where computerized traceability is installed). Where manual traceability is in place, medical devices are documented on an instrument tray list.

All medical devices should be inspected in a place designated and controlled to optimize the effect of the sterilization process and minimize contamination.

Use a bright light with a magnifying or a magnification light.

Figure 32: Assembly and packaging with computerized traceability

When the devices are cleaned and dried, inspect each device for:

- Cleanliness,
- Functionality/Damage,
- Defects such as breaks, chips or cracks.

Equipment

- Workbench
- Magnifying inspection glass
- Fibre optic light source
- Insulation testing equipment; diathermy pinhole tester
- Autoclave tape dispenser
- Wrapping material holder
- Baskets for medical devices (autoclave baskets)
- Heat sealing machine (for preformed sterile barrier systems [PSBS])
- Tracking and traceability scanner and computer (computerized traceability – optional)
- Raw materials (daily stock)

*Note magnifying glass for close inspection

Figure 33: Inspection of cleaned medical devices

Recommended practices

- Perform hand hygiene before carrying out this activity
- Maintain the workbench in good condition, both in terms of hygiene, with disinfection between sessions, and organization
- Do not use an oily substance for lubrication
- Do not allow a staff member with any type of dermatological lesion to carry out this activity

5.1.4.1 Inspection and function testing (post-cleaning)

- Each set should be inspected separately
- Box joints, serrations and crevices should be critically inspected for cleanliness
- Hinges on devices, such as artery forceps and clamps, should be checked for ease of movement
- Jaws and teeth should be checked for alignment ñ Ratchets should be checked for security
- Multi-part instruments should be assembled to ensure that all parts are complete and working
- Multi-part instruments should be assembled or disassembled for sterilization as per manufacturers' instructions
- Any damaged, incomplete or malfunctioning devices should be reported immediately to the supervisor
- Cannulated devices should be checked to ensure that the channels are patent
- Telescopes and light cables should be function-checked according to the manufacturers' instructions
- Each device set should be checked for completeness and defects
- Cutting edges on devices, such as scissors, rongeurs, chisels and curettes, should be checked for sharpness.

- Hinges on devices, such as artery forceps and clamps, should be checked for ease of movement.
- Devices that have an outer insulation coating, e.g. diathermy forceps, require close inspection to ensure that the insulation remains intact. Insulated devices should be checked using an insulation diathermy pinpoint tester. In accordance with manufacturer's instruction to ensure safe use of equipment. Damaged surfaces not only will allow dirt and bacteria to collect, but can also be potentially dangerous for both staff and service users
- Each device should be checked to ensure free movement of all parts and that joints do not stick. A water based lubricant may be used if required
- Each device should be checked after each cleaning cycle to ensure that all screws on jointed devices are tight and have not become loose during the cleaning process

5.1.4.1.1 Placing devices in surgical trays

- Devices shall be prepared for sterilization in the following manner:
- Clean and dry
- Jointed instruments in the open or unlocked position
- Multi-part or sliding pieces disassembled, unless otherwise indicated by the device manufacturer
- Devices with concave surfaces that will retain water must be placed in such a manner that condensate does not collect.
- Heavy items arranged so as to not damage lighter more delicate items
- Sharp instruments with tips protected without being too tight

5.1.4.2 Assembly

The purpose of assembly and checking is to ensure that:

- All devices are present in accordance with the surgical tray list.
- All devices are assembled correctly in accordance with the manufacturers' instructions
- All devices are placed in the correct tray in a manner that ensures ease of use by the user Space for assembling medical devices The area where assembly and checking takes place should be designated and controlled to optimize the effect of the sterilization process and minimize contamination of the sets.
- When preparing devices for packaging and sterilization, it is essential that all surfaces are presented to the sterilization media (i.e. steam).
- It is equally important that devices to be sterilized are disassembled and presented in this state
- Devices with ratchets should be closed on the first ratchet only to ensure that steam can penetrate to all surfaces.

- Similar devices should be kept together when placing in the tray, e.g. artery forceps can be placed on a device pin together
- The device tray is selected so that devices can preferably be placed in one single layer
- Tray liners should be placed at the base of the surgical tray
- Devices should be spread evenly by weight over the tray surface; this helps to prevent condensate flowing together
- Each device should be checked against the surgical list specific to the tray being assembled
- Plastic items should be evenly placed in the tray; avoid placing them in one section of the tray
- Ensure that sharp devices are assembled correctly to avoid penetration of the outer packaging to avoid overheating
- Protectors to be placed on sharp devices should be validated for steam penetration
- Ensure that delicate devices are placed in the tray in a manner, which will not cause damage to them
- Any device missing from a tray should be reported to the supervisor for further action and non- conformance documented
- Any extra devices found while assembling a tray should be reported to the supervisor for further action and non-conformance documented

5.1.4.3 Packaging and wrapping material

Devices require packaging prior to sterilization. Packaging material and techniques are designed to hold and protect the devices in order to facilitate sterilization and to maintain sterility and permit aseptic removal of contents at the point of use. The material selected depends on the recommended method of sterilisation and must comply with international standards

- A chemical indicator should be used inside every package to verify that the sterilizing agent has penetrated the package and reached the instruments inside. If the internal chemical indicator is not visible from the outside of the package, an external indicator should also be used.
- There should be an identification or label of the content, lot number, expiry date and initials of the operator
- Devices may be packaged in any of the following sterile barrier systems (SBS): PSBS, ssterilization wrap, rigid reusable containers
- When selecting a packaging system, the capability of each specific product to meet predetermined requirements and criteria should be evaluated
- An appropriate size of wrapping material should be chosen to achieve adequate coverage of the item being packaged ñ Hollow ware and RMDs or dressings should not be placed in textile (linen) packs as difficulties may be experienced in drying the combined pack materials and sterilization may be compromised as the temperature increases in these materials at different rates

- Single-use wraps should be used once only and discarded after use in the appropriate health-care waste stream
- Device packs should be packed in a manner that prevents damage to delicate items
- Trays used for packaging devices should be perforated to allow for penetration of the sterilant ñ Hollow ware items packaged together should be separated by non-porous material to permit efficient steam circulation
- Hollow ware should be packaged so that all openings face the same direction
- Only a minimum of raw materials commensurate with daily production should be stocked within the clean room
- Compatibility of the packaging material with the sterilization process should be established
- If chemical indicators are used inside the pack, they should be compatible with the pack
- Sequential wrapping using two barrier-type wrappers is recommended as it provides a tortuous pathway to impede microbial migration

Requirements for packaging systems

- Packaging systems must be appropriate to the items being sterilized. They should:
  - Permit identification of contents
  - Permit complete and secured enclosure of items
  - Protect package contents from physical damage
  - Permit delivery of contents without contamination
  - Maintain sterility of package contents until opened
  - Facilitate aseptic technique at all times, including opening of the package
- Packaging systems must be appropriate to the method of sterilization. They should:
  - Provide adequate seal integrity
  - Provide an adequate barrier to particulate matter and fluids
  - Be compatible with and able to withstand physical conditions of the sterilization process
  - Allow penetration and removal of sterilant
  - Maintain integrity of the pack
  - Permit use of material compatible (i.e. non-degradable) with the sterilization process
- Packaging systems must be used according to the manufacturers' instructions with the following attributes:
  - Resistance to punctures, tears and other damage that may break the sterile barrier and cause contamination
  - Resistant to penetration by microorganisms from the surrounding environment
  - Free of holes
  - Free of toxic ingredients
  - Lint-free (or low linting)
  - Tamper-proof and able to seal only once
  - Provide an adequate barrier to particulate matter and fluids Packaging materials

- Packaging materials should be stored at room temperature 18o C to 22o C and at a relative humidity of 35% to 70%. Temperature and humidity equilibrium of packaging material is important to maintain the integrity of the product.
    - Packaging materials should not be stored adjacent to external walls or other surfaces, which may be at a lower temperature or a higher temperature than the ambient temperature of the store room
- Packaging materials should be stored on shelves 10 inch/28 cm above floor level
- Packaging material should be rotated to ensure that it does not exceed its shelf life ("first in, first out")

Types of packaging material Sterilization wraps

Sterilization wraps including bleached crepe paper and wraps combining cellulose and synthetic fibres are commonly used packaging materials for steam, dry heat and ETO sterilization. They are permeable to steam, air and chemical vapours and provide an effective barrier if the packs are stored in clean, dry conditions. Medical grade paper is free from loose particles, but frees particles if packs are opened by tearing, cutting or by opening a fibre tear seal. It is important that the sterilization wraps used in the facility are used in accordance with the manufacturer's recommendations. The use of double Paper-based sterile barrier systems (PSBS) is not recommended as a wrapping method as this increases the probability that the steam may not penetrate the packing material (refer to ISO 16775 for further guidance). Paper-based sterile barrier systems are unsuitable for use in the hydrogen peroxide plasma method of sterilization as they absorb the hydrogen peroxide vapour from the chamber space, thus interfering with the subsequent generation of hydrogen peroxide plasma during the cycle.

Rigid reusable containers

Rigid reusable containers are used for the moist heat sterilization of large sets of surgical instruments. They are made from diverse metals, aluminium, high-density polymers, or metals and plastic in combination. Perforations in the base and lid are lined with a steam-permeable HEPA material. Containers should be properly loaded in terms of density to avoid problems of moisture retention and increased drying times. After use, containers should be disassembled and cleaned by washing with detergent and water and dried before sterilization. Routine inspection and maintenance is essential to ensure their ongoing effectiveness. Container systems must be validated before use.

Reusable fabrics Reusable woven cotton or cotton/polyester material can be used for heavy packs that are sterilized in prevacuum or downward displacement steam sterilizers. They are less resistant as a bacterial barrier than sterilization wraps.

Two layers of reusable fabrics with the textile configured as an inner wrap should always be used, or one layer of reusable fabric and one disposable sterilization wrap. Defects in the fabric render the wrap ineffective, such as holes and threadbare patches.

All reusable fabric outer wraps should be of double thickness. The performance of reusable fabrics (cotton or polyester/cotton materials) as microbial barriers is not as good as the many single-use sterilization wraps, but reusable fabric wraps should maintain sterility for several weeks under clean, dry storage conditions. If reusable fabrics (woven cotton/polyester materials) are used, there should be facilities and procedures in place to inspect and access the quality and suitability of such fabrics for use and reuse. Very tightly or thick woven materials may impede air removal and steam penetration and should not be used. The exception is the introduction into the Australian market of “recyclable barrier fabrics” made from completely synthetic materials. These are very durable and thus attractive for use, but validation of the attainment of sterilization conditions and reliable drying should be locally established before they are adopted in a facility. When reusable fabrics are used as a sterilization wrap, there are additional requirements to ensure the suitability of the wrap prior to each use

Non-perforated containers of glass or metal

Glass tubes closed with non-absorbent cotton wool plugs or crimped foil caps may be used only for dry heat sterilization of glass syringes and needles. As glass is a poor conductor of heat, heat penetration investigations need to be performed. Needles should be supported so that the tip does not contact the wall of the container. Glass bottles, vials and ampoules may be used for the steam sterilization of aqueous liquids by laboratories, and lidded jars may be used for dry heat sterilization of oils. Non-perforated metal containers are only suitable for dry heat sterilization. Aluminium foil may be used as a wrapping material for large articles, such as surgical drills, which are sterilized by dry heat. Pinholes may occur in the creases and thus a grade of foil thicker than the common “domestic” grade needs to be selected (~75 ÌM). Metals are impervious to steam and gas sterilizing agents.

Single-use packaging

- Medical device regulations include a requirement that sterile devices should be designed, manufactured and packed in a non-reusable pack and/or according to appropriate procedures to ensure that they are sterile
- A clearly stated preference for single-use packaging as the primary packaging for sterile devices is now observed ñ Double wrapping is recommended for medical devices used in the operating theatre

Recommendations for packaging material

- Sterilization wrap made from cellulose fibres and non-wovens made from a combination of cellulosic and synthetic fibres may be used. Both types are suitable for porous-load steam sterilization and most gas processes because they are permeable to air, steam and other gases
- Rigid reusable sterilization containers should be suitable for the method of sterilization used and compatible with the cleaning method and cleaning agent

- Transparent pouches should be placed paper to plastic for sterilization. Single instruments only should be packed in pouches

Not recommended

- Metal (sterilization) drum trays with holes that can be opened and closed manually. These do not guarantee sterility of its contents
- Newspapers, brown paper bags and other products that do not allow air removal or penetration of steam must not be used
- Recycled material packaging because these have lost their integrity and the bacterial barrier and do not allow adequate air removal or steam penetration In some parts of the world, linen is used for strength and packaging. It is possible to use linen provided that it is placed between two layers of non-woven material before being used to wrap surgical trays.

The total weight of instrument sets and their packaging should not exceed 10 kg and the total weight of wrapped basin sets should not exceed 3 kg.

Packaging techniques

Devices may be packaged in any combination of flat wrapping material (sheets, bags, pouches or reels) or containers to maintain the integrity of the product. Devices wrapped with sheet material using either the envelope or parcel fold technique. Devices are wrapped in a manner which minimizes the risk of contamination during opening and removal of contents.

Equipment required

- Packaging material
- Sterilization chemical indicator tape
- Marking pen
- Label (where applicable)
- Tray liners
- Types of wrapping
- Flat wrapping material
  - Parcel fold wrapping method
  - Envelope wrapping method
- Containers
- Pouches

5.1.4.4 Labelling

Packages to be sterilized should be labelled before sterilization. The information on the label should include the following:

- Name of product
- Name of wrapper
- Expiry date and/or sterilization date
- Where appropriate, the word “sterile”
- Load number

Label information should be documented on sterilization chemical indicator tape or label and not on the packaging material. Plastic/paper pouches can be labelled outside the heat seal line and on the clear (laminate) side as the ink may penetrate the paper on the plastic portion. Marking pen used to label the pack should be indelible, non-bleeding and non-toxic. Sharp-tipped, water-based or ballpoint type pens should not be used as these may compromise the integrity of the pack. The label fixed to the surface of the packaging should be able to withstand exposure to the sterilization process. Commercially-prepared, self-adhering labels may be used, with the advantage that they may be pre-printed and/or computer-generated. The labels should remain on the package until the point of use. Of note, the ink and adhesive should be toxin-free.

Policies, procedures, protocols and guidelines for wrapping and labelling and sealing of devices to be sterilized should be developed, reviewed periodically and readily available within the department.

A piggyback batch control label system or computer-generated system is to be used on all items that are to be used as a sterile product. This label is to be placed in the patient’s procedural record by operating theatre staff to assist with the ability to recall items.

Minimum labelling requirements:

- Sterilizer identification number or code
- Date of sterilization
- Cycle load or number
- Expiry date

Monitoring and control during labelling The following should be monitored during labelling:

- Ensure the general appearance of the packaging material
- Ensure that packages are complete
- Ensure that the correct products and packaging material are used
- Ensure that the labelling is correct on the product
- Ensure correct sealing

- Ensure the correct performance of packaging equipment, e.g. temperature gauge reading on heat-sealing equipment
- There should be no open seals, bubbles or other breaks in the integrity of the seal
- Material should be checked for tears and holes
- Container seals and filters should be checked
- Containers should be checked for damage and tamper evidence that may interfere with maintaining sterility

5.1.5 Clean transportation and Storage.

- Use an identified clean container or cart to transport sterilized items in storage area.
- Storage area is clean, dry and free of dust.
- Temperature is maintained at about 240C.
- If humidity increases such that sterile package become damp or wet (e.g.>70%) all devices are reprocessed.
- sterile supplies are stored at 20-25 cm from the soil, 45-50 cm from the ceiling and 15-20cm from the exterior wall.
- Supplies are rotated according to the sterilization dates (First in = First out).
- If items are unpacked they should be used immediately. Unpacked items are not stored.

5.1.6 Contingency measures (6 section)

- Equipment Malfunction
- Incident Response
- Spill Clean-up

Equipment malfunction

- If the autoclave does not operate exactly as expected, do not attempt to fix the problem.
- Place a notice on the autoclave indicating that it is not to be used until the problem is diagnosed and corrected.
- Record the problem in the autoclave log sheet
- Report the problem to a supervisor.
- Only qualified professionals are permitted to make repairs.

Incident response

- All incidents, including a spill or release of bio hazardous materials must be reported to your supervisor.
- If any injury occurs seek first aid or medical assistance.

- If clothing is soaked in hot water/steam, remove clothing and place the injury in cool water.
- Place a notice on the autoclave indicating that it is not to be used until the cause of the incident is determined, procedures enacted to prevent future incidents, and the autoclave is deemed safe for operation.

Spill clean-up

Spills may occur from a boil-over or breakage of containers.

- No operation of the autoclave is allowed until the spill is cleaned up.
- The operator is responsible for clean-up of spills.
- Contain the spilled material using paper towels.
- Wait until the autoclave and materials have cooled to room temperature before attempting clean-up.
- Wear appropriate PPE and review spill clean-up and disposal protocols if necessary.
- Dispose of the waste following the health care associated waste disposal protocol.
- If materials have been intermingled, follow the clean-up and disposal protocol for the most hazardous component of the mixture.
- Cracked glassware must be disposed of properly.
- Record the spill and clean-up procedure in the autoclave log sheet

Resources:

Ministry of Health, Republic of Liberia, Quality Management Unit (QMU).2018. National Infection Prevention and Control Guidelines

World Health Organization. (2016). Decontamination and reprocessing of medical devices for health-care facilities. https://apps.who.int/iris/bitstream/handle/10665/250232/9789241549851-eng.pdf

5.2 STANDARD OPERATING PROCEDURE OF AUTOCLAVE

Equipment to protect against scalds and burns

- lab coat,
- safety glasses,
- heat resistant gloves
- closed-toe shoes.

Indicators:

- Chemical Indicators
- Physical indicators
- Biological (spore strips),

Safety measures

- The name of the person responsible for the autoclave shall be posted near the autoclave.
- SOP for the autoclave should be available.
- Ensure employees are trained before operating any autoclave unit.
- Procedural and instructional documents provided by the manufacturer must be followed.
- Proper PPE must be worn when loading and unloading the autoclave.
- Autoclaves must be inspected at least annually.
- A basic visual inspection should be performed monthly by the person responsible for the autoclave.
- The inspection, service and repair records should be available upon request.
- Spore strips may be used to validate autoclave effectiveness, if available. Check feasibility of supply

Using the autoclave

- Place Biological Indicators (Spore strips) in the first load of the day and as indicated
- Place Chemical Indicators in each package in each load (inside every package and if chemical indicatior is not visible put an external chemical indicator too).
- Complete the log sheet

Autoclave procedure

1. Place packs of wrapped items inside drum so steam can circulate.
2. Do not sterilize wrapped and unwrapped items at the same time.
3. Heat sterilizer at 121 ^{0} Celsius (250^{0}F) with pressure of kgf/cm (15 lbs / inches or 106kpa)
4. Once pressure valve starts steaming, sterilize for 20 minutes
5. Remove sterilizer from heat source
6. **IMPORTANT NOTE: ONLY OPEN THE STERILIZER AFTER RELEASING THE STEAM** and allow to cool for 15-30 minutes before opening.
7. Leave items in steam sterilizer until completely dry.
8. Remove items from steam sterilizer with sterile forceps
9. Place items on a surface padded with sterile paper or fabric
10. Only store after items reach room temperature.

Ministry of Health, Republic of Liberia, Quality Management Unit (QMU).2018. National Infection Prevention and Control Guidelines

5.3 APPENDIX 2: CLEANING AND DISINFECTION OF EQUIPMENT FOR GASTROINTESTINAL ENDOSCOPY

Cleaning and disinfection of endoscopes

The cleaning and disinfection of endoscopy equipment is a specialised procedure and should only be carried out by personnel who have been trained for the purpose and who have an understanding of the principles involved. If an emergency endoscopic procedure is done out of hours, someone with this knowledge should be available and be responsible for the cleaning and disinfection of the equipment.

The most important aspect of the process is the manual cleaning of instruments with detergent. The aim is to remove all blood, secretions and other organic material prior to the surfaces coming into contact with the disinfectant. If this process is not performed thoroughly, organic material may become fixed and organisms may not come into contact with the disinfectant. The utmost care must be taken at this stage of the cleaning process. All modern endoscopes are fully immersible but caps must be fitted when required (e.g. with video endoscopes). Manufacturers' instructions must be assiduously followed.

The following recommendations are made for cleaning and disinfection of endoscopes for which an automated system is preferred.

At the start of the day

1. Instruments to be used during the list should be checked for faults.
2. If instruments have been thoroughly cleaned and disinfected at the end of the previous day, they should be put through an automated cleaning and disinfection process (or through a manual disinfection procedure) with, in the case of glutaraldehyde, 10 minutes' exposure at the start of the next day. There is no necessity to clean the endoscope channels providing this was done at the end of the previous day.
3. All channels should be flushed with the disinfectant either independently or by using an all-channel irrigator. Care should be taken to ensure disinfectant emerges from all ports on the light guide connector and distal end of the instrument. Appropriate personal protection must be worn by staff before immersing equipment in disinfectants.
4. The instrument should be fully immersed in disinfectant for the correct contact time; a timer should be used to indicate when the correct time is attained. A variant of this might be to include the endoscope in the self-disinfection cycle of the automated washer/disinfector at the start of a day or session, provided that an endoscope compatible disinfectant is used.

5. The raiser bridge or auxiliary channel in some endoscopes requires flushing manually using a 2 ml syringe and a channel adapter. A new syringe should be used for each endoscope.
6. The valves that will be used during the list, ideally one set per case, should be disinfected in the same way.
7. After disinfection, endoscopes and valves should be rinsed in bacteria-free water ensuring that all traces of disinfectant are removed from the channels, control body and eyepiece. Rinse water should be changed frequently to avoid the build-up of toxic disinfectant residues. The endoscopes should be dried carefully and the valves inserted.
    a. The instrument should then be plugged into the light source and connected to the suction pump. Air should be blown through all the channels to expel excess fluid.
    b. The instrument should then be ready for use. When an automated washer/disinfector is used, steps 3–7 will be performed by the machine.

Between cases

1. Before the instrument is detached from the light source or video processor the air/water channel should be flushed with water for at least 15 seconds to ensure that blood, mucus and other debris are expelled. Some manufacturers provide a special valve for this. The auxiliary washing pipe should be connected to the biopsy port and the suction button depressed for 15 seconds with the distal tip of the endoscope and the washing pipe in clean water to remove gross debris from the suction and biopsy channels. The outer surface of the insertion tube should be wiped to remove organic material. The endoscope may then be disconnected.
2. The instrument should be tested for leaks and checked for obvious faults or damage before being immersed in a suitable neutral or enzymatic detergent.
3. The outer surface of the endoscope should be carefully cleaned, particularly around the control section, the angulation controls, the distal end (especially the air/water nozzle) and the bridge mechanism of duodenoscopes, using a soft toothbrush.
4. All valves should be removed and cleaned individually with a cotton wool bud or small brush.
5. The suction/biopsy channel must be cleaned with a flexible brush of the correct size. This is repeated until the cleaning brush appears visually clean at the distal end and light guide connector. The brush is passed through the suction port in two directions—that is, insertion tube and umbilicus. When it appears at the distal end the brush is cleaned using a soft toothbrush before it is withdrawn. This should be carried out preferably under water to prevent the risk of splashing or aerosol production. Prior to reinsertion the brush is again cleaned using the toothbrush.
6. When the channels have been cleaned the suction and air/water ports must be cleaned with a cotton wool bud or small toothbrush.

7. All channels of the endoscope should be irrigated now with a neutral or enzymatic detergent using an all channel irrigation device. Suction and air insufflation should be used to remove fluid residue.
8. After manually filling any auxiliary or raiser channel with disinfectant, the endoscope can be disinfected in an automated washer/disinfector. If this process is done manually, steps 3 and 4, described previously under “At the start of the day”, should be followed. Once completed all channels must be rinsed with bacteria-free water in the same manner. Air may be blown through the channels at this stage to expel excess fluid which might otherwise dilute the disinfectant.
9. The endoscope is now ready for disinfection. The instrument must be fully immersed in disinfectant for the correct contact time, ensuring that all channels are filled with disinfectant. A timer will ensure that immersion times are correct.
10. The instrument is rinsed as in steps 7 and 8 “At the start of the day”.
11. The relevant work surfaces, such as the top of the endoscopy trolley, should be wiped clean between patients, usually with an alcohol wipe, in accordance with local hospital policy. Once the endoscope has been disinfected, rinsed and dried, fresh valves should be inserted and the instrument placed on the clean surface ready for use.

After the last case

1. Endoscopes used during the list should be tested for leaks, cleaned and disinfected. When 2% glutaraldehyde is used the contact time should be 20 minutes, whereas for peracetic acid and chlorine dioxide this should be for five minutes.
2. Endoscopes should be dried before storage. Seventy per cent alcohol may be aspirated through the channels to assist drying. Thorough drying reduces the risk of subsequent microbial proliferation.
3. Endoscopes should then be stored hanging vertically in a designated ventilated cupboard, not in their transit cases.
4. All valves used during the list should, after disinfection and rinsing, be dried with a cotton wool bud and lubricated with silicone oil as instructed by the manufacturer. They should not be placed in the endoscope case for storage.

Cleaning and disinfection of accessories

Accessories require the same attention to detail. Some accessories are single use and, where access for cleaning is difficult or the item is heat sensitive, their use should be encouraged. Cytology brushes, polypectomy snares, injection needles, and some ERCP accessories may be purchased as single use. The risk of transfer of infection by reusing possibly contaminated items must be weighed against the cost of single use accessories. Many accessories are autoclavable and their use should be encouraged; these include water bottles, biopsy forceps, dilators, and guidewires. During ERCP, disposable accessories should be used whenever possible or if reusable there should

be sufficient autoclavable accessories to allow one per case with no requirement to disinfect during a list.

Biopsy forceps which have a spiral construction and other accessories which are difficult to clean by hand should be cleaned ultrasonically and rinsed prior to autoclaving or disinfection. Other accessories requiring disinfection, including the cleaning brushes themselves, should be cleaned in detergent using a soft brush before disinfection.

Protection of personnel

It is essential that endoscopy staff have the correct personal protective equipment available at all times and are trained in its use.

Each endoscopy unit must have a policy for dealing with disinfectant spillage and all staff must be trained in its implementation.

There should always be sufficient numbers of trained staff and items of equipment to allow enough time for thorough cleaning and disinfection to take place. Training of staff in these aspects of their work is vital.

Staff health

All staff using or coming into contact with glutaraldehyde should be included in a health screening programme which comprises:

- Pre-employment enquiry regarding asthma, skin and mucosal symptoms, such as rhinitis and conjunctivitis, and lung function testing by spirometry.
- Annual lung function tests by spirometry.
- Annual completion of a health questionnaire.
- Immediate notification of skin rashes, chest and sinus problems.
- Records must be kept for 30 years.

It is recommended that this policy is extended to include other disinfectants used in endoscopy because hazards associated with the alternatives are largely unknown.

In addition, although endoscopy is not a designated “exposure prone procedure” it is strongly advised that all staff involved in endoscopic practice should be vaccinated against hepatitis B and follow recommendations relating to risk of needle stick injury and hazards relating to open cuts, abrasions and other skin lesions.

Resource:

BSG Endoscopy Committee Working Party. (2020). Guidance on Decontamination of Equipment for Gastrointestinal Endoscopy, The Report of a Working Party of the British Society of Gastroenterology Endoscopy Committee. Link: https://www.bsg.org.uk/clinical-resource/guidance-on-decontamination-of-equipment-for-gastrointestinal-endoscopy/

5.4 APPENDIX 3: PROCEDURES FOR CLEANING, DISINFECTION AND STERILIZATION BASED ON INFECTION RISK

Adapted from: Indian Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

A. Procedures for non-critical patient-care items

Article	Standard procedure
Ambu bag and mask (Disposable preferred; change mask after each patient)	Clean with detergent and water and dry Preferably get autoclave ones, now available and autoclave after each use in CSSD
Ampoules	Wipe neck with 70% alcohol
Aprons (Disposable recommended)	If reusable, clean with detergent and water, dry and disinfect with 70% alcohol
Baths	Clean after each use with detergent and water In case of baths by infected patients/open wound, disinfect with sodium hypochlorite (5.25–6.15% household bleach diluted 1:500 to provide >100 ppm available chlorine)
Baby baths	Clean with detergent and water
Baby equipment (feeding bottles and teats) (Disposable preferred)	If reusable, return to CSSD for heat sterilization or Wash in hot water and detergent and rinse followed by immersion in 1% hypochlorite solution (freshly made)
Baby-weighing scale/ changing table	Fresh liner should be used for each baby Clean tray with detergent and water after use If visibly soiled, clean first with friction and then wipe down with LLD
Bed pans and urine bottles (Disposable preferred; wash hands thoroughly after handling)	Preferably wash in machine with heat disinfection cycle Alternatively, clean and disinfect with 0.5% sodium hypochlorite or phenolic germicide (used according to the manufacturers' instructions) Dry completely before reuse
Bed and couch frames	Clean with detergent and water between patients; wipe with LLD like 70% alcohol/phenolic germicide if disinfection is necessary.* For isolation rooms, after cleaning, wipe with disinfectant (sodium hypochlorite or phenolic germicide).*
Blood pressure apparatus and cuff (Disposable preferred; after use in isolation facility, lauder cuffs in washing machine)	Clean cuffs, tubing, bulb (if manual) with 70% alcohol/ other LLD after each use. If visibly soiled, wash in soap/detergent and water, rinse and hang to dry.
Brushes (nail, avoid use) (Disposable nail brushes preferred)	If reusable, heat-sterilize

Adapted from: Indian Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

Article	Standard procedure
Boots	Clean with detergent water. If visibly soiled, disinfect with LLD.
Canes, walkers, crutches, wheel chairs and rehabilitation equipment	Clean with detergent and water If soiled, clean patient contact surfaces by wiping with sodium hypochlorite (>100 ppm available chlorine)/ 70–90% alcohol or phenolic germicide at a concentration recommended for low-level disinfection
Cloth appliances (neck and arm traction, etc.)	Wash after each use with detergent in hot water, rinse well and dry before reuse.
Denture pots (Disposable may be used)	To be cleaned by patient themselves with detergent and water
Drainage bottles (Disposable preferred; after use in isolation, wipe with sodium hypochlorite (1–2%) and dry)	If reusable, rinse and return to CSSD for heat disinfection Clean with detergent and water and disinfect with 0.5% hypochlorite and dry
Duvets (Disinfect with sodium hypochlorite (>100 ppm available chlorine) if contaminated)	Heat disinfect or wash with detergent and dry
Doppler (fetal/vascular)	Wipe head of Doppler after each use with 70% IPA
Earpieces for otoscopes (To be returned to CSSD after use in isolation)	Clean with detergent and water and dry
High-touch surfaces (door knobs, phones, keyboards, light, switches, bedside tables, drawer pulls and other “hand-touch” items) (Choice dependent on material)	Clean at least twice daily and when soiled. Clean with 70% alcohol/sodium hypochlorite/some iodophors/ quaternary ammonium compounds If visibly soiled, clean with soap/detergent first.
IV monitoring pumps and feed pumps (After use, in isolation, wipe with sodium hypochlorite 2%.)	Clean with detergent and water and dry Disinfect with LLD (70% alcohol or sodium hypochlorite)
IV stands	Clean with detergent and water; dry before use
Incubator Infant incubators (Avoid using phenolic disinfectants)	Clean with detergent and water and thoroughly dry; disinfect (if needed) with chlorine-releasing agent (125 ppm) or 70% alcohol
Leads and monitors	Disassemble, clean with detergent and water and dry
Mattresses and pillows	Clean with detergent and water between patients and as required
Metal basin/Kidney tray (Disposable preferred)	Wash after each use with enzymatic detergent and rinse well; then autoclave
Otoscope handle	Wipe all surfaces with 70% alcohol/any other LLD
Otoscope speculum (Disposable preferred)	If reusable, wash and disinfect after each use Soak for 20 minutes in IPA (70%)

Adapted from: Indian Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

Article	Standard procedure
Pressure-relieving devices	Clean with detergent and water and dry
Pulse oximeter probe (Disposable preferred)	Wipe inside and outside with 70% IPA or any other LLD
Reflex hammer	Wipe handle and head after each use with IPA or LLD
Soap dispensers and dishes Spillage (Avoid use of soap dishes; use liquid soap dispensers)	Clean nozzle and outside daily and dry Clean inside of the container with detergent before refilling Do not top-up soap
Sputum pots/containers	Use disposable only, with close filling lid Discard into clinical waste for incineration If reusable, empty with extreme caution and steam sterilize
Stethoscopes	Clean with detergent and water and dry Wipe with 70% alcohol Wipe bell and tubing after each use with 70% IPA or LLD
Suction bottles	If disposable, seal when 75% full and place in yellow plastic bag If reusable, clean with sodium hypochlorite and dry Must be heat disinfected/sterilized. Change daily and in between each patient. Store dry when not in use.
Telephone/ Mobile	Disinfect with 70% alcohol
Thermometer (Use individual thermometers; do not mix oral and rectal thermometers)	Cover with disposable sleeve before use and store dry in individual holder (inverted) Clean and wipe with 70% alcohol after every use
Trolleys (dressing)	Clean daily with detergent and water. After each use, wipe with 70% alcohol/sodium hypochlorite (>100 ppm available chlorine)
Urine-measuring jugs	Heat disinfect after each use in bed pan washer
Vomit bowls	Empty contents into sluice, rinse, wash and disinfect with hot water and detergent
Wheel chairs	Clean between patients with detergent and water
X-ray equipment (Wipe with 70–90% alcohol/any other LLD)	Clean with cloth dampened dust with detergent and water

* used according to the manufacturers' instructions

Adapted from: Indian Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

B. Procedures for semi-critical items

Item	Method
Anaesthesia equipment (airways, endotracheal tubes, etc.)	Preferably sterilize by heat
Applanators (tonometer prisms)	Wipe tips clean. Immerse in sodium hypochlorite (500 ppm available chlorine) up to 10 mm Disinfect with 3% H_2O_2/70% isopropyl alcohol Prepare fresh solution of hypochlorite at the start of clinic After disinfection, rinse thoroughly in tap water and dry
Breast pumps	Wash with detergent and water, immerse in sodium hypochlorite (>100 ppm available chlorine). Dry before use.
Breast pump accessories	Disinfect by boiling for 5 minutes Long-handled tongs that have been disinfected Dry on a paper towel
Cervical caps	Wash with soap and hot water; dry. Soak in 70% alcohol for 20 minutes/ 1:10 dilution of household bleach, rinse with water and dry. Store in clear plastic bags at a cool, dry place
Cryosurgical probes	Autoclave if possible If heat labile, use low-temperature sterilization or ethylene oxide Less acceptable alternative: immerse in 2% glutaraldehyde
Diagnostic ultrasound transducers (transvaginal/transrectal/ transoesophageal/endobronchial)	Sterilization with H_2O_2/PAA-based systems (if compatible with them)/ EO/ high-level disinfection with compatible, instrument grade disinfectant according to the manufacturers' instructions Transducer heads may be disinfected with 70% alcohol Store to prevent recontamination *Note:* Activity of alcohol against HPV is unknown
Diaphragm fittings Rings and pessaries Ear suction tips	Wash with soap and water, followed by immersion in 70% alcohol for 15 minutes Heat/ sterilize/ boil Immerse in 2% glutaraldehyde
Syringe nozzle and ear speculum, ear suction tip	Sterilize with heat, boil/immerse in 2% glutaraldehyde (if plastic), iodophors or alcohol Sterilize by heat/immerse in glutaraldehyde (2%)
Laryngeal mirror	High-level disinfection/ sterilization with heat or immerse in glutaraldehyde

Adapted from: Indian Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link:

https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

Procedures for cleaning and sanitation various areas/ items in the hospital

Area/Items	Process	Item/ equipment	Method/ procedure
General clinical areas	Dust mops Mop (No broom will be used for sweeping)	Sweeping	Sweep with the dust mop or damp mop to remove surface dust. Sweep under the furniture and remove dust from corners. Gathered dust must be removed using a hearth brush and shovel. • The sweep tool should be cleaned or replaced after use.
Ceiling and walls	Sweeping tool Duster Bowl/ small bucket of soap solution Plain water	Damp dusting	• Damp dusting with a long handled tool for the walls and ceiling done with very little moisture, just enough to collect the dust. • Damp dusting should be done in straight lines that overlap one another. • Change the mop head/ cover when soiled.
Floors (clinical areas) – daily mopping	Detergent/ sanitizer–hot water Three buckets (one with plain water and one with solution; one bucket for hypochlorite (1:50 dilution)	Cleaning Daily mopping	• Prepare cleaning solution using cleaning agent with warm water (detergent/ sanitizer). • Use the three-bucket technique for mopping the floor, one bucket with plain water and one with the detergent solution. • First mop the area with the warm water and detergent solution. • After mopping clean the mop in plain water and squeeze it. • Repeat this procedure for the remaining area. • Mop area again using hypochlorite 1:50 dilution after drying the area. • In between mopping if solution or water is dirty change it frequently. • Mop the floor starting at the far corner of the room and work towards the door. • Clean articles between cleaning. *Note:* Mopping should be done thrice a day, in each shift
	Care of mop	Hot water Detergent Hypochlorite 1:1000	• Clean with hot water and deterrent solution, disinfect it with hypochlorite and keep for drying upside down.

Adapted from: Indian Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

Area/Items	Process	Item/ equipment	Method/procedure
Walls and doors, door knobs	Damp cloth or Sponge squeeze mop Detergent	Thorough washing	• The walls and doors are to be washed with a brush, using detergent and water once a week (usually on Sundays); gently apply cloth to soiled area, taking care not to remove paint, then wipe wall with warm water to remove excess cleaning agent. • Door knobs and other frequently touched surfaces should be cleaned daily.
Floors	Scrubbers Hot water Detergent Mop	Thorough washing	• Scrub floors with the hot water and detergent with using minimal water. (Do not pour the water.) • Clean with plain water • Mop area, and allow to dry • Hypochlorite 1:100 mopping can be done.
Isolation room	Detergent/ Sanitizer–warm water Three buckets (one with plain water and one with solution); separate bucket for hypochlorite (1:50 dilution)	Terminal cleaning	• Before cleaning an isolation room, liaise with infection control team for details of any special requirements. Staff will be instructed on specific cleaning procedures required with reference to – Safety uniform to be worn. – Chemicals or disinfectants to be used. – Also, if bed screen and shower screen are to be cleaned or changed, refer cleaning in isolation rooms.
All clinical areas/ Laboratories	Hypochlorite 0.5% Gloves, Goggles/face Apron/gowns Disposable Paper towels Detergent and water Tongs	Blood and body fluid spill care	• Put on non -sterile disposable gloves (other PPE) • Ventilate room • Remove broken glass with tong • Use disposable paper towels to absorb the body fluid and discard as infectious waste • Wipe area with detergent and water • Saturate area with sodium hypochlorite 0.5% (1:10 dilution of bleach solution) for 10-20 minutes • Wash and disinfect used materials and dispose of infectious waste • Wash hands with soap and water
Book case, files, lockers, tables, cupboard, wardrobes, benches, shelves and cots	Damp duster Warm water Detergent Dry duster	Damp dusting	• Damp dust with warm water and detergent.

Adapted from: Indian Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

Area/Items	Process	Item/ equipment	Method/ procedure
Cots, railings and lockers	Detergent/ Sanitizer–hot water Three small buckets/ or big bowls One with plain water One with solution One for hypochlorite 1:100 dilution	Daily dusting	• Damp dust with warm water and detergent followed by disinfection with hypochlorite or as per hospital policy.
Bathroom showers	Warm water Detergent powder Nylon Scrubber Hypochlorite 1:100 dilution	Cleaning	• Thoroughly scrub the basin/ tiles with warm water and detergent inside and outside. • Special attention to soap runs under the basin. • Tap fittings to be washed and dried. *Note:* Do not use powder cleanser dry as it can scratch the chrome on the taps. If required disinfection to be done.
Taps and fittings	Warm water Detergent powder Nylon scrubber	Cleaning	• Wipe over taps and fittings with a damp cloth and detergent. • If heavily soiled, sprinkle a little powder cleanser onto a wet cloth, fold cloth over and rub into a paste and polish. *Note:* Do not use powder cleanser dry as it can scratch the chrome on the taps. • Care should be taken to clean the underside of taps and fittings. • Taps should be dried after cleaning
Mirrors and Glass	Warm water Detergent water/ cleaning solution Damp cloth Wiper	Cleaning	• Using warm water and a small quantity of detergent and using a damp cloth, wipe over the mirror and surround, then using a dry lint-free cloth, buff the mirror and glass to a clean dry finish.
Sluice room Stainless steel/ Any other sink	Powder cleanser Detergent powder Wiper Cloth	Cleaning	• Sinks are to be cleaned with a powder cleanser. • First wet the sink. Sprinkle on a little powder cleanser and work around the surface with a cloth, include the plug hole. • Do not use the powder cleanser on dry sink. • After removing spillage and any stains, flush away with running water. Wipe down the surface of the sink.

Adapted from: Indian Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

Non-critical medical equipment and some environmental surfaces. Examples include commodes, blood pressure cuffs, exam tables and counters LLD is performed after the equipment is thoroughly cleaned, rinsed and is dry. Some cleaning products used in health facilities combine cleaning and disinfecting in one solution and thus reduces this to a one-step cleaning/ disinfecting method (Virex 256 is one of these cleaner/disinfectant solutions).

The container used for disinfection must be washed, rinsed and dried when the solution is changed.




Non-critical medical equipment requires decontamination using a low-level disinfectant.

Government of Nunavat, Canada. Reprocessing of medical equipment; Cleaning, Disinfection and Sterilization. Link: https://www.gov.nu.ca/sites/default/files/files/15_%20Reprocessing%20of%20Medical%20Equipment%20-%20March%205%20-%20low%20res(1).pdf

Area/Items	Process	Item/ equipment	Method/ procedure
Bed pans, urinals kidney trays, sputum mugs, urine measuring jugs	Detergent water Brush scrubber Hypochlorite (1:50)	Cleaning and disinfection	• After washing with soap and water immerse in 1:50 dilution of hypochlorite for 20 minutes. • Keep it for air dry in a stand in such a way that water will drain downward.
Suction bottles	Soap and water Hypochlorite 1%	Cleaning and Disinfection	• Should be emptied in sluice room. If soiled with blood and body fluids they should be decontaminated with 1% hypochlorite. • Wash with detergent and disinfect with hypochlorite for 20 minutes. • Must be cleaned daily and in between each patient. • To be stored dry when not in use.
Suction tubing	Tap water Detergent	Cleaning	• After each use should be cleaned under running water and with a detergent. • Should be sent to CSSD for further cleaning and sterilization. • For each patient separate sterile suction tubing should be used.
Suction catheters (rubber and plastics)	Tap water Steel basin with Chlorhexidine-cetrimide solution for onsite rubber catheters cleaning (if they are reused)	Cleaning	• Use sterile suction catheter for tracheotomy suctioning each time. • After use of suction catheter suck catheter with the plain water and discard catheters in soap solution and sent to the CSSD. • Collect rubber catheters in chlorhexidine-cetrimide solution. • Clean it under running water. • Send it to CSSD for further cleaning and sterilization as disposal.
Pantry furniture	Duster	Dusting	• Damp dust
Telephone	Warm water detergent solution Duster	General cleaning	• Damp dust with warm water and detergent. • Paying special attention to the ear and mouth piece and dry it properly.
Desks	Damp cloth Furniture polish	Dusting	• Wipe top sides and draw handles with a damp cloth. Wooden desks should be cleaned with furniture polish and buffed to clear glows. Pen holder etc. to be cleaned or dusted.
Chairs (Vinyl)	Warm water and detergent	Cleaning	• Wipe down with warm water and detergent. Remove any marks under arms and seat. Check for damage to stoppers, if stopper require replacement, report to maintenance department.

Area/Items	Process	Item/ equipment	Method/ procedure
Fabric chairs	Vacuum cleaner Warm water and detergent Stain remover	Cleaning	• Vacuum the cloth area of the chair and wipe down remainder of the chair with warm water and detergent. Remove stains from fabric with stain remover.
Furniture and fittings	Warm water and detergent Rag piece	Dusting	• Using warm water and detergent, damp dust all furniture and fittings, including chairs, sofas, stools, beds, tables, cupboards, wardrobes, lockers, trolleys, benches, shelves and storage racks, waste/ bins, fire extinguishers, oxygen cylinders, televisions window sills and dry properly.
Bed tables, bedside lockers	Warm water and detergent Wiper Duster	Cleaning	• Wipe down over bed table. Wipe top and underneath base and stand, using warm water and detergent. Dry on completion. • Wipe down the bedside. Remove marks from fronts of draws and sides. Using warm water and detergent, wash the top to remove any sticky marks and dust.
Light switches and over-bed lights	Damp cloth (never wet) Detergent Warm water	Cleaning	• Light switches to be cleaned of dust, spots and finger marks. Clean with a damp cloth (never wet) and detergent. • Over-bed lighting to be damp dusted. Light housing to be wiped down with warm water and detergent.
Screens and Screen rails	Damp	Dusting	• Screen rails should be damp dusted using warm water and detergent. This includes rail supports. • Screens to be replaced on a set rotation basis or as soon as they are visibly soiled.
Curtains, blinds and drapes	Vacuum cleaner Soft clothes Water Mild soap solution	Cleaning	• Curtains blinds should be vacuumed, then wiped down with moist, soft cloth. • Always start at the top and work down • Solution for cleaning blinds should not contain strong detergents. Cloth should not be wet or these conditions could stain the blind. • Always use fresh cleaning solution and replace if it becomes soiled. • Rinse cleaning cloth regularly.

Area/Items	Process	Item/ equipment	Method/ procedure
Air-vents and filters	Vacuum cleaner Duster Detergent solution	Cleaning	• Vents are vacuumed to remove any dust and wipe out with a cloth and detergent. • Some vents require removal to wash the back and entrance of the ducting. • Metal vents and filters are washed under running water and dried with a lint-free cloth to remove stubborn soil age. It should be done in collaboration with the engineering department.
Stethoscope	Detergent and water Alcohol-based rub	Cleaning	• Should be cleaning with detergent and water. • Should be wiped with hand rub before each patient contact.
Thermometer	Detergent and water Alcohol rub Individual thermometer holder	Cleaning	• Should be stored dry in individual holder. • Clean with detergent and tepid water and wipe with alcohol rub in between patient use. • Store in individual holder inverted. • Preferably one thermometer for each patient.
Injection and dressing trolley	Detergent and water Duster Disinfectant (70% alcohol)	Cleaning	• To be cleaned daily with detergent and water. • After each use should be wiped with disinfectant.
Refrigerators	Detergent and water Absorbent paper or clean cloth	Cleaning (weekly)	• Empty the fridge and store things appropriately. • Defrost, decontaminate and clean with detergent. • Dry it properly and replace the things. • Weekly cleaning is recommended. `
Linen Coloured clothes	Linen disinfectant	Washing	• Linen contaminated with blood and body fluids should be immersed in compatible (linen-friendly) disinfectant as per recommendation or detergent disinfectant. • Bag it in leak-proof bags and send to the laundry for washing. *Note:* During washing soiled linen, the washing person should be given PPE.

Area/Items	Process	Item/ equipment	Method/ procedure
Mattress and pillow cover	Sodium hypochlorite 1% Tap water	Washing	• Mattress and pillows should be covered with a reusable mattress cover. • It should be changed for each patient and when soiled sent to the laundry according to schedule.
BP cuffs and covers	Detergent Hot water	Washing	• Cuffs should be wiped with alcohol-based disinfectant and regular laundering is recommended for the cover.
Hair removal clippers	Soap and water Disinfectant	Disinfection	• Safety – single use disposable blades • Electric razors should be disinfected between use.
Soap dispensers	Detergent and water	Cleaning	• Daily dusting • Should be cleaned weekly with detergent and water and dried.
ICU HEPA Air-conditioner	Soap and water	Cleaning	• Regular maintenance air-conditioners according to norms. • Regular (twice a week) cleaning of AC filters with the soap and water or according to engineering department's policy. • Dry and replace.
Footwear	Detergent and water	Cleaning	• Bone marrow transplant unit footwear should be cleaned with detergent on a daily basis. • After washing, dry properly and keep it in shoe racks.
Water jars	Vim powder Soap and water	Cleaning	• Recommended boiled water for drinking • Water jars should be scrubbed/ cleaned with soap and water and boiled water before filling with water.
Kidney trays, sputum mugs, bed pans, urine measuring mugs	Detergent and water Hypochlorite	Cleaning	• After washing with soap and water immerse in 1:50 dilution of hypochlorite for 20 minutes (each use) • Dry in a stand such that water will drain downwards. • Hypochlorite should be prepared fresh daily in tap water

Area/Items	Process	Item/ equipment	Method/ procedure
General cleaning	Detergent and warm water Mop Two buckets Clean utility gloves Hand mops	Daily mopping floors Thorough washing	• Two-hourly moping with hypochlorite with the two-bucket technique is recommended. • Scrub floors with hot water and detergent with using minimal water. (Do not pour the water.) • Clean with plain water. • Allow to dry • Hypochlorite 1:50 mopping can be done. *Note:* Recommend general cleaning procedure
Ventilators Ventilator tubing	Alcohol-based disinfectant Detergent and water	Disinfection	• Should be cleaned with an alcoholic disinfectant. • Change of circuit after every patient as per policy and when necessary, if the circuit is reusable, it can be sent to CSSD for sterilization after detergent and water cleaning.
Humidifiers (Note: HME= Heat & moisture Exchange)	Detergent and water	Cleaning	• Should be cleaned with detergent and water and allow to dry. • If an HME humidifier is used, it should be disposed of within 24 hours or according to need.
Infusion pumps	Detergent and water Alcoholic disinfectant	Daily cleaning	• Should be damp dusted with detergent and water and dried after each use. • Wiping with the alcoholic disinfectant can be done.
Resuscitation bag with mask	Chlorhexidine-cetrimide	Sterilization	• After use on a patient, it should be kept in the disinfectant for 30 minutes, washed sent to CSSD.
Laryngoscope Magill's forceps	Detergent and water Chlorhexidine-cetrimide High-level disinfection		• After use, wash it under running tap water after removal of the bulb and blade. • Wipe bulb with disinfectant or detergent and water. • Blade should be washed under running water and immersed in high-level disinfectant as per recommendation. • Wash and dry it • Wipe with alcohol-based rub.
Pressure bags	Detergent and water	Cleaning	• Should be cleaned with detergent and water and dried.

Adapted from: Indian Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

Areas	Agents / Toilet cleaner	Procedure
Toilet pot/ commode	Hypochlorite/ Soap powder/ long handle angular brush	Inside of toilet pot/commode: Scrub with the recommended agents and the long handle angular brush. Outside: Clean with recommended agents; use a nylon scrubber.
Lid/commode	Nylon scrubber and soap powder	Wet and scrub with soap powder and the nylon scrubber inside and outside
Toilet floor	Soap powder and scrubbing brush/ nylon broom	Scrub floor with soap powder and the scrubbing brush Wash with water Use hypochlorite 1:50 dilution
Tap	Nylon scrubber and soap powder	Wet and scrub with soap powder and the nylon scrubber.
Outside sink	Soap powder and nylon scrubber	Scrub with the nylon scrubber.

Indian Centre for Disease Control, 2020. National Guidelines for Infection Prevention and Control in Healthcare Facilities. Link: https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf

5.5 HOW TO PREPARE CHLORINE SOLUTION

The formula for the manufacture of a solution diluted from concentrated solutions is as follows:

Number of part water = (% of concentrated bleach) / (% diluted) – 1

Calculation of chlorine solution concentrations:

When using liquid chlorine solution:

Degrees is converted into percentage (1 chlorine = 0.3%) then applying the formula in the box. Thus, the forms of bleach sold on the market equivalent to the following percentages:

8° chlorine = 8 * 0,3% = 2,4%

12° chlorine = 12 * 0,3% = 3,6%

15°chlorine = 15 * 0,3% = 4,5%

When using chlorine powder:

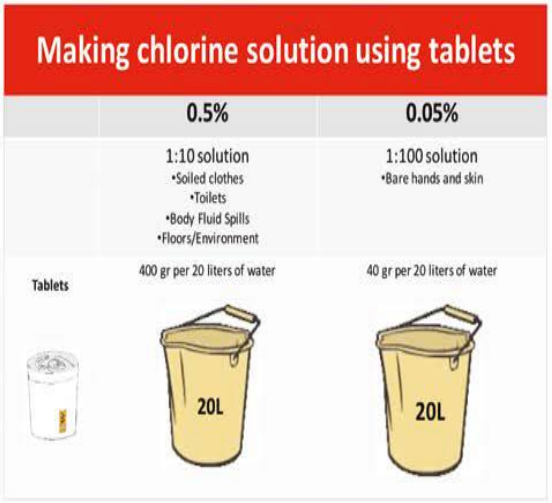
When it comes to the calcium hypochlorite powder

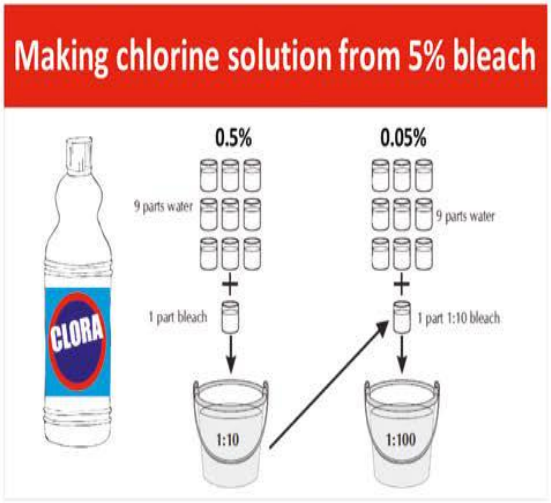
or sodium 70% consider that 1 tablespoon = 14g.

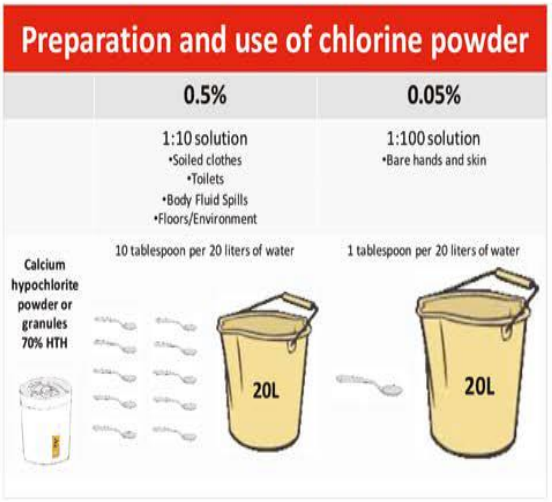
14g hypochlorite in 2 liters of water = a 0.5% CI

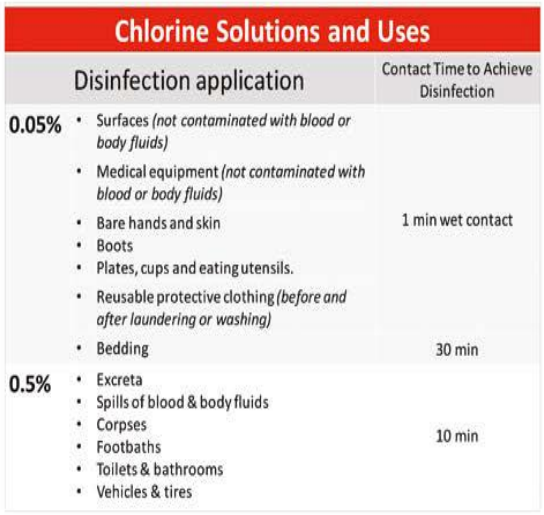
$$\textit{Number of part water} = \frac{\textit{(\% diluted)}}{\textit{\% of concentrated bleach}} \; x\; 1000$$

NOTE: Do not mix chlorine solution with an ammonia based solution, this can cause the production of toxic gas.









Resources:

Ministry of Health, Republic of Liberia, Quality Management Unit (QMU).2018. National Infection Prevention and Control Guidelines

5.6 RELEVANT PUBLIC HEALTH FORMS

5.6.1 Communicable Disease Notifying Form

CCHDC-VS-Feb-2012

Communicable Disease Notifying Form

Health Protection Agency

Male', Republic of Maldives

***Reporting Institution**, address and contact numbers (for tracing further information if required):

*** Case based Notifiable Diseases** (place ✓appropriately)

☐Acute Flaccid Paralysis	☐ Encephalitis _____	☐ Measles	☐ Scrub Typhus
☐ Chickenpox / ☐Zoster	☐ Filariasis	☐ Meningitis	☐ Tetanus/☐Neonatal
☐ Chikungunya	☐ Hand, Foot & Mouth Disease	☐ Mumps	☐ Typhoid/ ☐Paratyphoid
☐ Cholera	☐ Hepatitis: Type A/B/C/D/E	☐ Plague	☐ Whooping cough
☐ Dengue fever/☐DHF/☐DSS	☐ Leprosy	☐ Pneumonia	☐ Yellow Fever
☐ Diphtheria	☐ Leptospirosis	☐ Rubella	☐ Other emerging disease_____
☐ Dysentery	☐ Malaria		

Case Details (Mandatory fields are marked with (*). Please make sure to complete them.

***Case classification:** Suspect ☐ Probable ☐ Confirmed ☐ (as per surveillance case definition)

***Patient Name:**	***Age:** ____ /____ (Y Y / MM)	***Sex:** ☐M ☐F	**Registration number**

Permanent Address: (For identification)	Atoll:	Island:	☐If Non-national: Country of origin

***Residential Address:** (At the time of contracting illness)	***Atoll:**	***Island:**	**Contact Phone no.:**

***Date of onset of illness:** ____/____/_____ DD / MM / YYYY	***Date of Consultation /Admission:** ____/____/_____ DD / MM / YYYY
***Patient category** ☐Out-patient ☐In-patient: ☐ Ward _____ Bed _____ ☐ICU _____ Bed _____	Clinical details (include risk factors, mode of transmission, etc.)
Recent travel history if relevant (include countries visited)	Date of arrival in Maldives: ____/____/_____ DD / MM / YYYY
Condition of patient: ☐ Stable ☐ Sick ☐ Critically ill	Laboratory Confirmation:
***Case outcome**: ☐ Death ☐ On treatment ☐ Referred to higher centre ☐ Recovered with disability ☐ Recovered fully	☐ Confirmed: Test specifics_____ ☐ If Requested, Date: ____/___/_____DD / MM / YYYY ☐ Not Requested

☐***Re-notification** (required for changes in diagnosis (e.g. Dengue Fever to DHF), case confirmation or outcome (e.g. death).

Notifier details	**Data entry use**
Name:_____ Designation: _____	Date received: ___/___/___; Date of entry: ___/___/___
Signature: _____ Date: ____/____/_____	Checked and entered by: _____

For further information or inquiries, please contact:
Health Protection Agency
Roshanee Building, Sosun Magu, Male'.
Telephone: +960 3014 496, Hotline: +960 3014 333
Fax: +960 3014 484
Forms and case definition booklet are available on http://www.health.gov.mv

Instructions for completing notification forms

The adoption by the 58th World Health Assembly of the revised (2005) International Health Regulations (IHR) provides the legal framework for mandating countries to have a disease surveillance system. Therefore it is **Mandatory** under the International ***Health Regulations (IHR)*** to **report** communicable diseases.

(*) Questions marked with this asterisk are **mandatory** to complete.

1. Reporting institution name and contact phone number should be in each form. (a seal may be used)
2. Tick the appropriate notifiable disease. The diseases in **bold** in this list should be notified within **24 hours**. For a new emerging disease, i.e. a disease new to Maldives or not frequently seen, specify the disease in the space, and inform by telephone as well. For other diseases not listed, please see notes below.
3. **Case classification**: if uncertain, please check case definitions and confirmatory lab tests with the booklet: ***Case definition for notifiable diseases in Maldives 2008***, available in hospitals and on the Ministry of Health and Family website.
4. Name: as in ID card, passport or work permit card (for non-nationals)
5. Permanent address: as in ID card (and usually in admission/registration documents)
6. **Address of residence** at time of onset of illness: Please specifically ask the patient or care-giver and write the address **where patient lived when the symptoms began**.
7. **Date of onset** = approximate date **when symptoms first began**. Please ask the patient or caregiver if it is not mentioned or not clear in the notes.
8. **Re-notification:** This is required for changes in diagnosis, case confirmation or outcome.

   -Change of diagnosis includes change from DF (Dengue fever) to DHF or DSS.

   -Case confirmation includes change in status i.e. suspect, probable or confirmed according to the case definition, e.g. confirming diagnosis or causative organism by laboratory tests.

   -Case outcome: This is often not known at time of reporting. However, if a patient with the disease dies, develops life-long sequelae or disability, or develops chronic disease status or chronic carrier status, please repeat notification mentioning the new outcome. In case of death, please attach a copy of death certificate and death summary.

   You may use either the previous form, a clear copy of it or a fresh form for re-notification.

The following diseases do not require case-based notification:

- Viral fever
- Diarrhoeal disease (AGE)
- Out-patient Acute Respiratory Infections (ARIs)
- Conjunctivitis

This form need not be completed for these diseases unless you have some particular concern. These diseases are notified by institutions on a daily count basis.

The following diseases have separate forms which are available from CCHDC and on the website

- Acute flaccid paralysis (AFP)
- Tuberculosis
- Measles
- Vaccine preventable diseases
- HIV, STD's
- Food poisoning

These diseases should be informed to CCHDC by **telephone** as soon as possible. You may report it in this form under 'Other emerging diseases' and specify the name, if you wish, particularly when specific forms are not available. However, you should complete and send the disease-specific form also.

For further information or inquiries, please contact:
Health Protection Agency
Roshanee Building, Sosun Magu, Male'.
Telephone: +960 3014 496, Hotline: +960 3014 333
Fax: +960 3014 484
Forms and case definition booklet are available on http://www.health.gov.mv

5.6.2 Fever and Maculopapular Rash reporting form

Measles and Rubella Case Investigation Form
Health Protection Agency, Maldives

Part A: To be filled in by Clinicians reporting the case

This form should be completed for each case of fever and maculopapular rash on first contact

Reporting Institution:	**Case ID (HPA)** MAV- __ __- MR – 17 - __ __ __
Date of investigation: ___/____/_____	**Date of notification PHU/HPA:** ___/____/____

Patient National ID card Number Foreigners Passport number	**Date of Birth:** ___/____/_____ **,Age:** (yy/mm)	**Sex:** ☐ Male ☐ Female Pregnant: Yes ☐ No☐ NA☐ If Yes, No of weeks……..

Name of the patient: **Father's name:**	**Contact Number:**
Address:	**Atoll:** **Island:**
Criteria for suspected Measles/Rubella case: 1. Fever ☐Yes ☐No ☐Unknown 2. Date of onset of fever: ___/____/____ 3. Maculopapular rash onset date ___/____/_____	**Other findings if any;** 1. Cough ☐Yes ☐No ☐Unknown 2. Coryza ☐Yes ☐No ☐Unknown 3. Conjunctivitis ☐Yes ☐No ☐Unknown 4. Adenopathy ☐Yes ☐No ☐Unknown 5. Arthralgia ☐Yes ☐No ☐Unknown Any other _____
Vaccination History (by card/history):	
Measles containing vaccine (MCV) ☐ Yes: ☐No: reason:_____ No of doses _____, Date of last ose:_____ **Vitamin A:** _____	**Rubella containing vaccine (MMR)** ☐ Yes: ☐No: reason:_____ No of doses _____, Date of last dose:_____ **Vitamin A:** _____
Travel History (7-21 days before the onset of rash): ☐Yes ☐No. If yes, place/country visited …….. from…….. …… to ……..	**Hospitalization:** Yes☐ No☐ If Yes, Name of hospital…….. DOA…….. DOD …….. **Final Status:**☐ Recovered ☐ Referred ☐ Died ☐Unknown
Case notified by: Name of the Notifier:	**Position :**
Signature:	**Date:**

Part B: To be filled by peripheral and IGMH laboratory

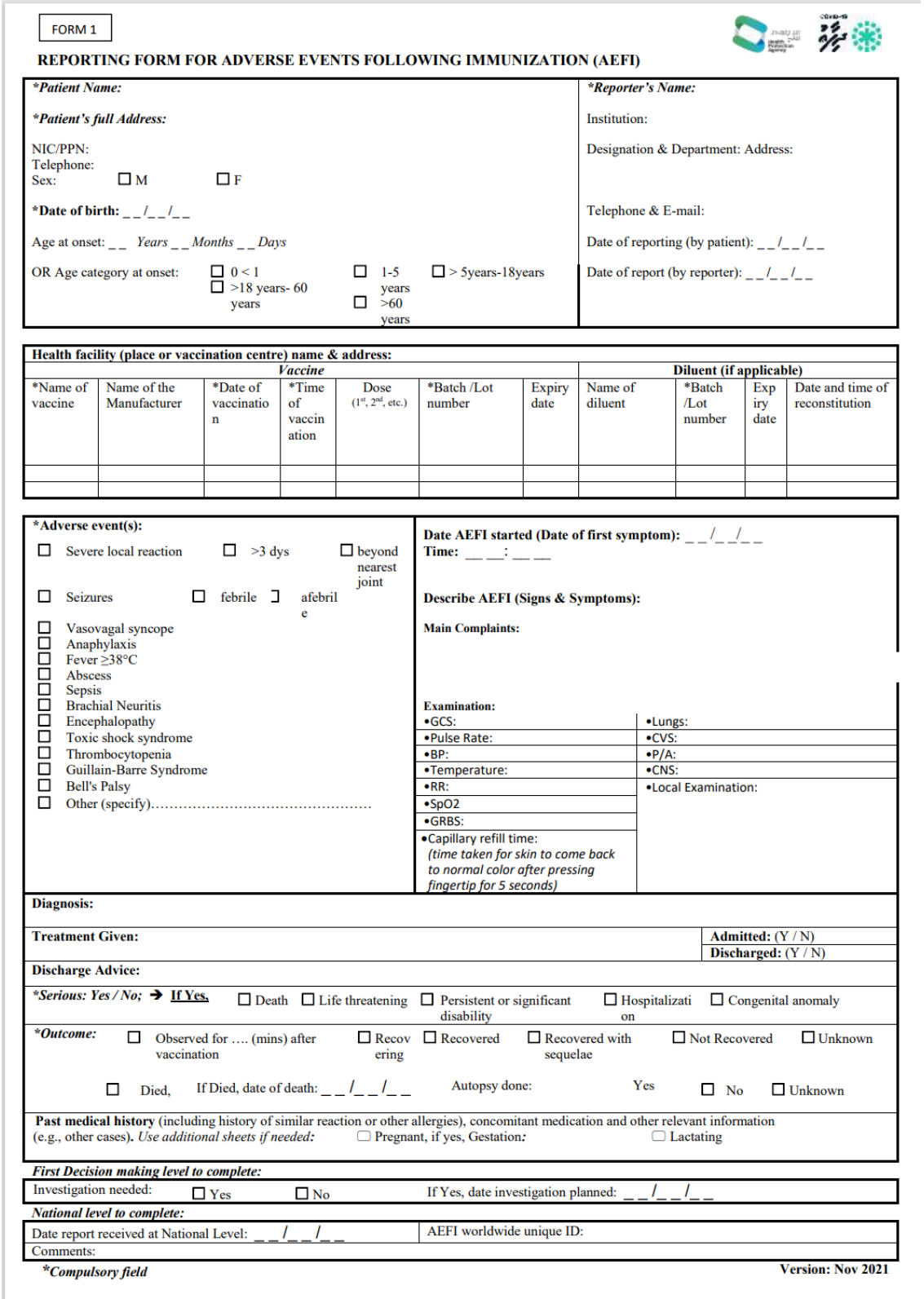
Serum Sample collection	**IGMH Lab ID:** _____	**Virology Sample collection**	**IGMH Lab ID:** _____
Specimen collected	☐Serum ☐No	Specimen collected	☐Throat swab ☐No
Collected at		Collected at	
Date of collection		Data of collection	
Date sent to IGMH lab		Date Sent to IGMH lab	
Date Received by IGMH lab		Date Received by IGMH lab	
Adequate sample	☐Yes ☐No	Adequate sample	☐Yes ☐No
Date of result		**Date of result**	
Result (IgM): **☐Measles** ☐Negative ☐Positive ☐ Equivocal ☐Pending ☐not tested	**☐Rubella** ☐Negative ☐Positive ☐ Equivocal ☐Pending ☐not tested	**Result :** **☐Measles** ☐Negative ☐Positive **☐Rubella** ☐Negative ☐Positive	
		Genotype Result	**☐Measles ☐Rubella**
		Date of result sent to HPA	

Part C: To be filled by Health Protection Agency

Final Classification: ☐ Confirmed Measles ☐ Confirmed Rubella ☐ Discarded **Basis for classification:** ☐Laboratory ☐Epidemiological Linked ☐ Clinical **Source of infection:** ☐Endemic ☐ Imported ☐Import-related ☐Unknown Reason for discard……	**FOLLOW UP for confirmed cases:** Contact tracing done? ☐Yes ☐No If yes, number of additional suspected cases detected: _____ Active case search done? ☐ Yes ☐No If yes, number of additional suspected cases detected: _____ Outcome at 30 days follow-up for confirmed cases: ☐Alive ☐Died ☐ Lost to follow-up
Contact Health Protection Agency Surveillance 3014496 or 3014333	

Public Health Surveillance Section| Health Protection Agency 2016

5.6.3 Adverse Events Following Immunization (AEFI) Reporting Form



FORM 1

REPORTING FORM FOR ADVERSE EVENTS FOLLOWING IMMUNIZATION (AEFI)

Patient Name:	***Reporter's Name:***
Patient's full Address:	Institution:
NIC/PPN: Telephone: Sex: ☐ M ☐ F	Designation & Department: Address:
***Date of birth:** _ _/_ _/_ _*	Telephone & E-mail:
Age at onset: _ _ *Years* _ _ *Months* _ _ *Days*	Date of reporting (by patient): _ _/_ _/_ _
OR Age category at onset: ☐ 0 < 1 ☐ 1-5 years ☐ > 5years-18years ☐ >18 years- 60 years ☐ >60 years	Date of report (by reporter): _ _/_ _/_ _

Health facility (place or vaccination centre) name & address:

Vaccine							Diluent (if applicable)			
*Name of vaccine	Name of the Manufacturer	*Date of vaccination	*Time of vaccination	Dose (1st, 2nd, etc.)	*Batch /Lot number	Expiry date	Name of diluent	*Batch /Lot number	Expiry date	Date and time of reconstitution

***Adverse event(s):**

- ☐ Severe local reaction ☐ >3 dys ☐ beyond nearest joint
- ☐ Seizures ☐ febrile ☐ afebrile
- ☐ Vasovagal syncope
- ☐ Anaphylaxis
- ☐ Fever ≥38°C
- ☐ Abscess
- ☐ Sepsis
- ☐ Brachial Neuritis
- ☐ Encephalopathy
- ☐ Toxic shock syndrome
- ☐ Thrombocytopenia
- ☐ Guillain-Barre Syndrome
- ☐ Bell's Palsy
- ☐ Other (specify)……

Date AEFI started (Date of first symptom): _ _/_ _/_ _

Time: __ __: __ __

Describe AEFI (Signs & Symptoms):

Main Complaints:

Examination:

•GCS:	•Lungs:
•Pulse Rate:	•CVS:
•BP:	•P/A:
•Temperature:	•CNS:
•RR:	•Local Examination:
•SpO2	
•GRBS:	
•Capillary refill time: *(time taken for skin to come back to normal color after pressing fingertip for 5 seconds)*	

Diagnosis:

Treatment Given: **Admitted:** (Y / N) **Discharged:** (Y / N)

Discharge Advice:

Serious: Yes / No; ➔ **If Yes,** ☐ Death ☐ Life threatening ☐ Persistent or significant disability ☐ Hospitalization ☐ Congenital anomaly

Outcome: ☐ Observed for …. (mins) after vaccination ☐ Recovering ☐ Recovered ☐ Recovered with sequelae ☐ Not Recovered ☐ Unknown

☐ Died, If Died, date of death: _ _/_ _/_ _ Autopsy done: Yes ☐ No ☐ Unknown

Past medical history (including history of similar reaction or other allergies), concomitant medication and other relevant information (e.g., other cases). *Use additional sheets if needed:* ☐ Pregnant, if yes, Gestation: ☐ Lactating

First Decision making level to complete:

Investigation needed: ☐ Yes ☐ No If Yes, date investigation planned: _ _/_ _/_ _

National level to complete:

Date report received at National Level: _ _/_ _/_ _	AEFI worldwide unique ID:
Comments:	

Compulsory field

Version: Nov 2021

5.6.4 Suspected Congenital Rubella (CRS) case reporting form

Congenital Rubella Syndrome (CRS) Case Investigation Form
Health Protection Agency
Male', Maldives

Reporting Institution:

Instructions:
1. This form should be completed for each clinically suspected case of CRS.
2. All cases must have samples collected and sent to IGMH laboratory for testing.
3. Please put dates in DD/MM/YYYY format

Case ID: _____ **Date of notification :** _____/_____/_____

Date of investigation: ____/_____/_____ **Date of reporting :** _____/_____/_____

Case identification

1. **Patient ID Card Number (Foreigners passport number):**
2. **Date of Birth:** ___/____/_____ **4. Age:** _____ (yy/mm) 5**. Sex:** ☐ Male **or** ☐ Female
3. **Name of patient:** **6. Contact Number:**

Address: **Atoll:** **Island:**

7. Place infant delivered: **8. Name of mother:**

Clinical Information

Group A (Please complete all)	**Group B** (Please complete all)
▪ Congenital Heart Disease: ☐Yes ☐No ☐UK	▪ Purpura : ☐Yes ☐No ☐UK
▪ Cataract: ☐Yes ☐No ☐UK	▪ Microcephaly : ☐Yes ☐No ☐UK
▪ Congenital glaucoma: ☐Yes ☐No ☐UK	▪ Meningoencephalitis : ☐Yes ☐No ☐UK
▪ Pigmentary retinopathy: ☐Yes ☐No ☐UK	▪ Jaundice : ☐Yes ☐No ☐UK
▪ Hearing impairment: ☐Yes ☐No ☐UK	▪ Splenomegaly : ☐Yes ☐No ☐UK
	▪ Developmental delay : ☐Yes ☐No ☐UK
	▪ Radiolucent bone disease: ☐Yes ☐No ☐UK

▪ Other abnormalities: ☐Yes ☐No, if Yes please describe:

Maternal history/Antenatal care

▪ Mother age : _____ years	▪ No of previous pregnancies:_____
▪ Vaccinated against rubella: ☐Yes ☐No ☐UK	▪ If yes, date: ___/____/_____
▪ Maculopapular rash: ☐Yes ☐No ☐UK	▪ If yes, date of onset: ___/____/_____
▪ Wes rubella laboratory confirmed: ☐ Yes ☐No ☐UK	▪ If yes, when (date): ___/____/_____
▪ Exposed during pregnancy to any ☐ Yes ☐No ☐UK	▪ If yes, when (date): ___/____/_____

person of any age with maculopapular rash	Where_____

Vaccination History

MMR vaccination status: ☐Yes ☐No If YES Date: ___/____/_____ if NO reason:_____

Measles vaccination status ☐Yes ☐No If YES Date: ___/____/_____ if NO reason:_____

Laboratory test of infant/child

Specimen collected: ☐Yes ☐No ☐UK

If yes type of specimen: ☐ Serum, ☐ Throat Swab, ☐ Urine, ☐ Cerebrospinal fluid, ☐ Other

Date of specimen collection: ___/____/_____; Date of specimen sent to IGMH Lab: ___/____/_____

Date lab received sample: ___/____/_____; Date lab reported result: ___/____/_____;

Rubella IgM : ☐ Not tested, ☐ Positive, ☐ Negative, ☐ Equivocal, ☐ In process

Sustained Rubella IgG Level* : ☐ IgG not tested, ☐ Yes, ☐ No, ☐ In process

*(sustained IgG level on at least 2 occasions between 6 and 12 months of age)

Rubella virus isolation : ☐ Not tested, ☐ Positive, ☐ Negative, ☐ In process

Rubella PCR: ☐ Not done, ☐ Positive, ☐ Negative, ☐ In process, Genotype_____

Final classification:

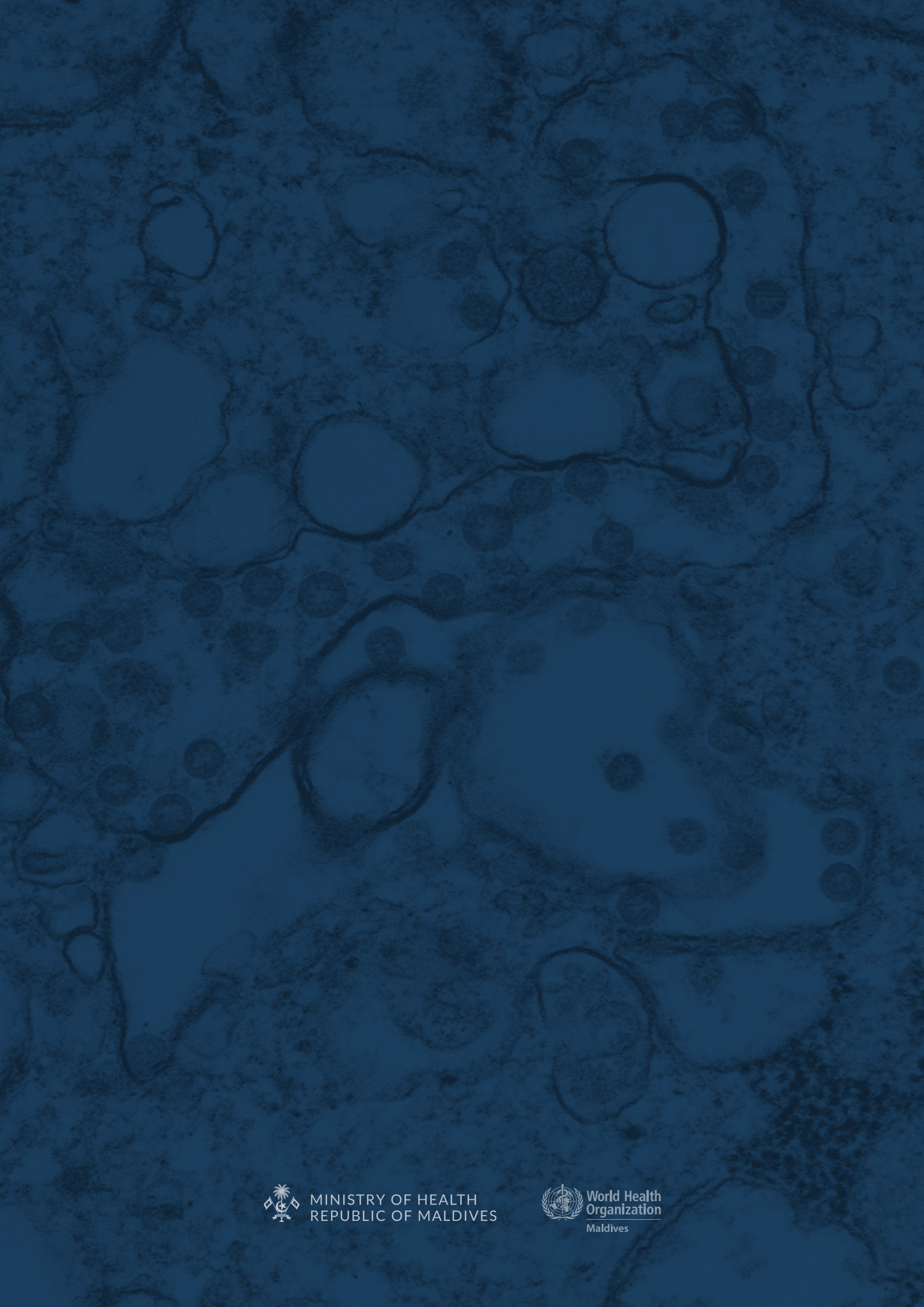
☐ CRS, ☐ Discarded, If discarded, please specify_____

Case classification as ☐ Laboratory confirmed, ☐ Epidemiologically linked, ☐ Clinically confirmed,

Classification by origin: ☐ Endemic, ☐ Imported, ☐ Import-related, ☐ Unknown

Date of final classification: ___/____/_____;

Name of the investigator:	Position:
Date : ___/____/_____;	Signature:



MINISTRY OF HEALTH
REPUBLIC OF MALDIVES

World Health Organization
Maldives