K.E.M HOSPITAL

INFECTION CONTROL COMMITTEE

INFECTION CONTROL MANUAL

2021

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Edited in June, 2021

SECTION 1– INTRODUCTION TO HEALTHCARE ASSOCIATED INFECTIONS

Healthcare Associated Infections (HCAI) or Hospital Acquired Infections (HAIs) are one of the MOST COMMON ADVERSE EVENTS which affect patient safety and reflect on quality of care. These are infections that were neither present nor incubating at the time of health care delivery but developed usually after 48 hours as a consequence of healthcare delivery. Risk factors for developing hospital acquired infections include extremes of age, immunosuppressed states, longer hospital stays, presence of long standing co-morbid conditions, frequent visits to healthcare facilities, invasive procedures, presence of any indwelling devices and admission to intensive care unit.

In a 2011 report on the burden of endemic health care associated infections released by the World Health Organization (WHO), which includes the results of systematic reviews of the literature from 1995 to 2010 in high- and low/ middle-income countries, pooled HCAI prevalence in mixed patient populations was 7.6% in high-income countries. On the other hand, in developing countries, hospital-wide prevalence of HCAI varied from 5.7% to 19.1% with a pooled prevalence of 10.1%. Surgical site infections were the commonest. The report however goes on to state that the data available from developing countries is scant and from a few regions only. [WHO; Patient Safety Report on The Burden of Endemic Healthcare Associated Infections Worldwide, 2011 available online @ http://whqlibdoc.who.int/publications/2011/9789241501507_eng.pdf ref]

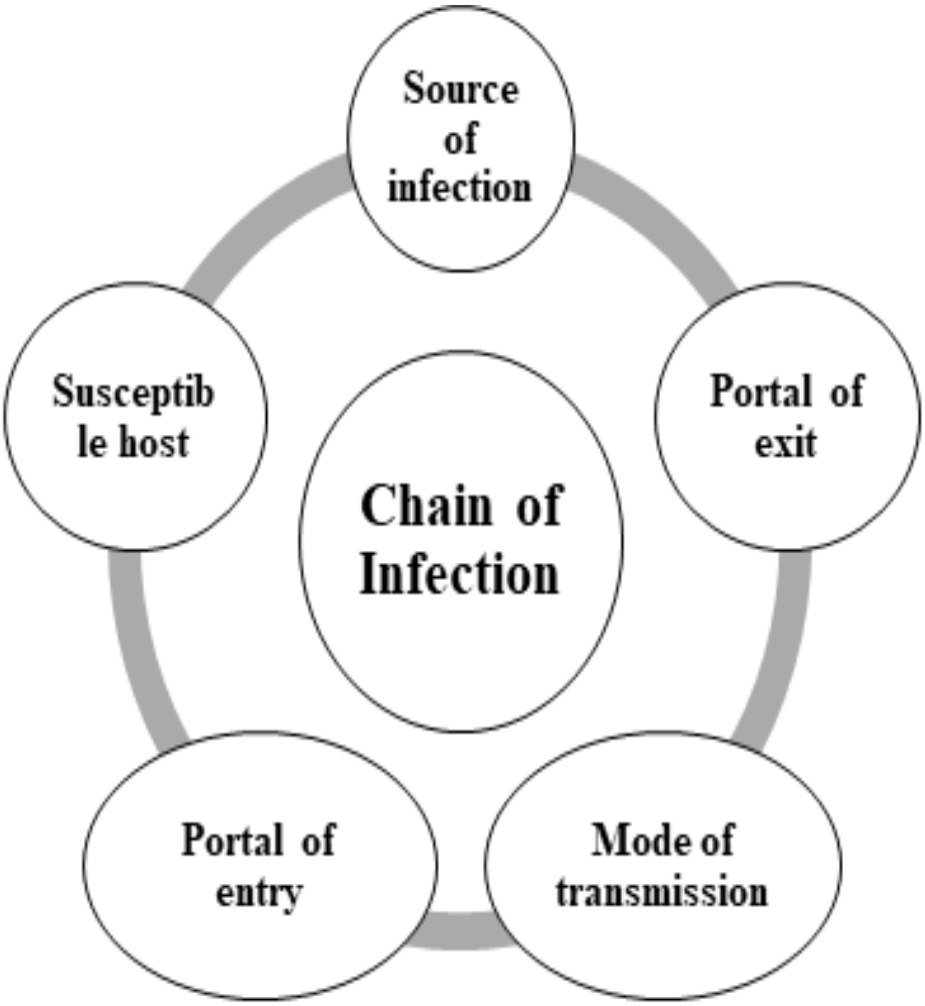
In low- and middle-income countries, the frequency of ICU-acquired infection is at least 2–3 folds higher than in high-income countries. Considering that the rate of HCAIs in ICUs in developed countries is 30%, these numbers in developing countries would be staggering and disturbing. Device-associated infection densities are also up to 13 times higher than in the USA. New-borns are at higher risk of acquiring health care-associated infection in developing countries, with infection rates three to 20 times higher than in high-income countries. [WHO; Patient Safety; Clean Hands Save Lives; Factsheet available online @ http://www.who.int/gpsc/country_work/gpsc_ccisc_fact_sheet_en.pdf]

The evidence that HCAI could be prevented was first brought out in 1847, by Dr Ignaz Semmelweis, who by introducing a simple hand hygiene intervention, reduced maternal mortality due to puerperal fever, significantly. That robust infection control programmes can reduce HCAIs, was brought out by the path breaking SENIC [Study on the Efficacy of Nosocomial Infection Control] project undertaken by Center for Disease Control, USA. This nationwide study was undertaken in 1974, to evaluate approaches to infection control. The study was designed to determine whether infection control programs using CDC-recommended practices actually reduced the risks from HAIs. The SENIC study showed that

hospitals with infection control programs had significantly lower rates of HAIs than did hospitals without such programs

The common healthcare associated infections include surgical site infections, health care associated pneumonias, followed by GI infections, UTIs and primary bloodstream infections. The detrimental effects of HCAIs include infections with multi-drug resistant organisms with consequent increase in length of stay, increased cost of treatment and increase in morbidity and sometimes mortality. These detrimental effects can be offset with an effective infection control program which prevents or reduces the risk of developing HCAI.

Transmission / Acquisition of infection – The “chain of infection”



Breaking the chain of infection

Reducing the source / reservoir	**Portal of exit**	**Mode of transmission**	**Portal of entry**	**Susceptible host**
Early diagnosis	Skin – Hand hygiene	Hand hygiene	Asepsis	Nutrition
Effective treatment	Blood – Gloves and Gown	Personal protection	Care of devices	Vaccination
Environmental hygiene	Secretions – Respiratory hygiene and cough etiquette	Isolation – Contact Airborne Droplet	Protective isolation as required	Correction of metabolic and biochemical parameters
Sterilization / Disinfection of equipment	Excretions – Containers hand hygiene Personal protection		Hand hygiene, PPE	Employee health
	STANDARD PRECAUTIONS			

Preventing Healthcare Associated Infections

- Hand hygiene and other standard precautions
- Transmission based precautions - Contact precautions, droplet precautions and airborne infection isolation
- Bundle care for device associated infections, SSI and wound care
- Appropriate antimicrobial prophylaxis particularly for surgeries
- Antibiotic stewardship to avoid rise of MDR organisms

SECTION 2 - INFECTION PREVENTION AND CONTROL PROGRAMME

1. Introduction and Rationale

Infection control programs can help healthcare organizations identify, monitor and improve practices, identify risks for acquiring infections through periodic audits and establish policies to prevent the spread of infections. K.E.M Hospital with an annual inpatient attendance of over 85,000, provides a fertile ground for hospital acquired infections to occur, unless effective measures are in place to prevent and control HCAIs. The IPCP is thus a mandatory requirement, will be planned by the infection control committee which is a multi-disciplinary team and has the following goals:

2. Goal of Hospital Infection Control Committee (HICC)

- Promote a culture of safety for both patients and healthcare workers
- Reduce the risk of healthcare associated infections
- Reduce the risk of spread of multi drug resistant organisms

3. Functions of HICC

- Develop and recommend written policies and procedures pertaining to infection prevention and control
- Update the policies based on evolving evidence
- Recognize and investigate outbreaks of infections in the hospital
- Educate and train health care workers, patients, and relatives as applicable
- Monitor practices regularly and periodically
- Conduct surveillance on HCAI by collecting data from respective departments, analyse and suggest appropriate measures
- Collect annual antibiogram data from microbiology department, analyse and provide feedback
- Develop, implement and monitor antibiotic policy with the antibiotic audit sub-committee
- Develop, implement and monitor infection prevention practices in operating rooms with the Theatre sub-committee
- Develop, implement and monitor airborne infection control plan with Airborne Infection Control sub-committee
- Develop and implement policies pertaining to isolation
- Implement and monitor biomedical waste management
- Provide guidance on setting up of infrastructure, engineering and ventilation that would minimize the risk of infection

- Communicate effectively with concerned staff / department
- Stay updated with the current developments

4. Composition of HICC

K.E.M.H-ICC was constituted in the year 1990 and as of June 2021 has the following members.

Sr No	Name & Designation	HICC Designation	Responsibility
1	Dean (G & K)	Chairperson	See 3.1 below
2	Designated Microbiologist	Convener / Nodal officer	See 3.2 below
3,4	Asst./ Associate Professor Microbiology and Asst. Medical Officer	Infection Control Officers	See 3.3 below
5,6	Sister Tutors / Designated nursing staff	Infection Control Nurse	See 3.4 below
7 - 25	Heads of Departments / Authorised /Designated Staff Anaesthesia Chest Medicine Cardiology Community Medicine CVTS ENT GI surgery Medicine and MICU Microbiology Neonatology Neurosurgery Nephrology Orthopaedics OBGY Ophthalmology Pediatrics & IPCU Pediatric surgery Pathology Pharmacology Surgery	Members	See 3.4 below
26	Pharmacy / CCSD in charge	Member	
27	Matron	Member	
28	OT sister in charge	Member	

29	Civil Engineering	Member	
30	Mechanical & Electrical Engineering	Member	
31	Deputy Dean	Member and I/c in absence of Dean	
32 - 34	Head Clerks (Stores) Timekeeper Security Officer	As required	

There should be one infection control nurse for every 100 patients as per the revised criteria of WHO.

Contact details:

Name & Designation	Email ID	Mobile / Landline number (ext.)
Dr Gita Nataraj	gitanataraj@gmail.com	9820067349 24107552 Ext:7552
Dr Shreeraj Talwadekar	drshreerajt@gmail.com	Intercom: Mobile no: 976847003 Ext 7518 Landline: 24107518
Dr Richa Thakker	drrichathakker@gmail.com	Intercom: Ext 7518 Landline: 24107518

5. Duties and Responsibilities of HICC members

5.1 Administration (Dean / Medical Superintendent)

- Serve as the chairperson of the committee and nominate the convener / secretary
- Constitute sub-committees to oversee specific infection prevention plans
- Ensure that appropriate resources in terms of manpower, equipment and consumables are available at all times to prevent the risk of infection
- Ensure that effective arrangements are in place for infection prevention and control and that appropriate resources are made available to manage the risks of infection.
- Promote a culture of safety and accountability in all staff members
- Approve suggestions of the committee and authorise the committee to monitor compliance
- Approve the list of committee members and their role
- Review the data on HCAIs and approve suggested corrective measures

- In absentia, authorise Deputy Dean to chair the committee

5.2 Convener / Secretary

- Report directly to Dean
- Convene meetings after obtaining consent from the chairperson
- Identify the agenda / points of discussion for these meetings
- Oversee local infection control policy implementation with ICC, ICO and ICN
- Authorised by chairperson / Dean, to intervene when inappropriate practices are brought to notice by ICD / ICN
- Assess the impact of current practices, provide feedback to department/s and section /s and with HICC plan appropriate interventions if needed
- Prepare and communicate the annual report on HCAIs with feedbacks received from clinical department heads especially with reference to device associated infections and surgical site infections.
- Prepare and communicate the antibiogram of various clinical departments with feedback from Microbiology especially of multi-drug resistant organisms.
- Plan and conduct training of different healthcare workers with the respective heads of department, designated department co-ordinators and other members of HICC.
- Plan an annual surveillance program of healthcare workers with designated department and HICC members
- Any other activity as identified by Dean

5.3 Role of ICO and ICN

- Assist convener / secretary for all identified tasks / function
- Assist Convener / Secretary and HICC in implementing and monitoring practices on a regular basis as decided by HICC
- Provide appropriate feedback to convener / HICC on observations
- Identify and assist in investigating outbreaks
- Assist in investigating detection of unusual organisms or highly resistant organisms
- Assist with procurement (AMO)
- Troubleshoot issues pertaining to BMW management

5.4 Role of Members

- Promote a culture of safety in their own settings and in the hospital
- Participate actively to achieve the objectives
- Assist in investigating outbreaks as applicable
- Plan, implement and update Infection Control Manual
- Conduct training of their department staff on appropriate practices of infection prevention and control
- Pharmacist to develop and ensure that the sterilization and disinfection practices are appropriate

- Pharmacist to collect and review data periodically on antimicrobial indents from various departments

Qualifications of Infection Control Officer (ICO)

- Should be a faculty / staff member of the hospital
- M.D (Microbiology) preferred / M.B.B.S with administrative designation / M.D or MS in any medical / surgical discipline / AMO willing to serve as ICO
- One year experience of working with the ICC / has undergone a certificate / fellowship course in IPC

Qualifications of Infection Control Nurse (ICN)

- Should be a faculty / staff member of the hospital
- Preferred - Has undergone a certificate / fellowship course in IPC
- Willing to perform the duties of ICN

SECTION 3 – UNIVERSAL AND STANDARD PRECAUTIONS

Preventing the transmission of infections requires the implementation of universal and standard precautions. **Universal precautions** are precautions that need to be practiced to prevent blood and body fluid exposures / transmission and considers every sample as being potentially infectious**. Standard precautions** are precautions that need to be practiced for every patient as being potentially infectious**.**
Standard precautions are those measures that need to be practiced by all healthcare workers, while caring for all patients, at all times whether infection is present or not. This ensures safety for patients, healthcare workers, visitors and the environment. These measures reduce the risk of transmission of infections in a healthcare setting from both recognised and unknown sources. The source of infection includes blood and body fluids, secretions and excretions, mucous membrane, non-intact skin, contaminated equipment or environment. The level of application of these precautions would depend on the anticipated risk of exposure.

Scope: For all healthcare staff

Purpose:
Standard Precautions are designed to minimize exposure to and transmission of infections that can be acquired by health care workers through occupational contact with any of the following:

- Blood including dried blood,
- All other body fluids, secretions and excretions (excluding sweat), tissues, organs, viscera regardless of whether they contain visible blood
- Non-intact skin (including rashes),
- Mucous membranes
- All materials including cotton swabs, gauze, sponges, bandages, bed-linen and garments used in the management of patients that might be contaminated with blood or body fluids

Responsibility:
Heads of Departments, Unit heads, Section In-charges and Senior Sisters are responsible for the operational implementation of this policy; ensuring that all the staff members working under their supervision are aware of the standard precautions and that it is their responsibility to adhere to the measures stated in the hospital infection control committee policy.

Clinical and Laboratory staff members are responsible for ensuring safe work practices of their colleagues or co-workers, students or trainees under their supervision.

All employees are responsible for ensuring that the principles of Standard Precautions are strictly adhered to for patient safety, their own safety, the safety of employees working with and around them as also the general public.

It is the duty of all employees to report any breach of this policy immediately to the Head of their section/department.

All healthcare workers are strongly urged to report occupational exposures immediately.

Procedures:

The key elements of standard / universal infection control precautions include:

- Hand hygiene
- Personal protective equipment
- Sharps management
- Biomedical waste management
- Environmental hygiene and infection control
- Care of blood and body fluid spills
- Safe handling and transport of specimens
- Equipment reuse
- Respiratory hygiene and cough etiquette

Each of the above elements will be discussed in detail in the subsequent sections.

References:

1. CDC Universal Precautions for Preventing Transmission of Bloodborne Infections http://www.cdc.gov/niosh/topics/bbp/universal.html
2. Healthcare Wide Hazards (Lack of) Universal Precautions https://www.osha.gov/SLTC/etools/hospital/hazards/univprec/univ.html
3. Universal Precautions. http://ehs.utah.edu/research-safety/biosafety/tools-and-resources/universal-precautions
4. SAFETY MESSAGE Universal Blood and Body Fluid Precautions Compiled By USDA-APHIS-CCEP http://www.aphis.usda.gov/emergency_response/downloads/health/UniversalBloodandBodyFluidPrecautions.pdf
5. Johns Hopkins Safety Manual Policy Number HSE 501Subject Bloodborne Pathogen Exposure Control Plan Last Review Date 09/20/13
6. Universal/Standard Infection Control Precautions, Royal United Hospital Bath, NHS Trust.
7. Standard Precautions in Health Care – World Health Organisation. www.who.int/csr/resources/publications/EPR_AM2_E7.pdf

8. Chapter 13 - Standard precautions and infection control – ASHM
www.ashm.org.au/images/...a.../hiv_viral_hep_chapter_13.pdf
9. Standard Precautions – a guide for health care workers. Department of Health & Human Services. Tasmanian Infection Prevention & Control Unit.
http://www.dhhs.tas.gov.au/__data/assets/pdf_file/0006/75714/Standard_Precautions_Guidance_V1.0.pdf

SECTION 4: HAND HYGIENE

Introduction

Hand hygiene is the single most important measure for the prevention of health care associated infections. Hands carry two types of flora, transient flora and resident flora. Though evidence for its importance was demonstrated by Dr Ignaz Semmelweis in mid-19th century, compliance with hand hygiene has generally been poor. The poor compliance has been attributed to various reasons chief amongst which are lack of time, the emergency nature of medical care, non-availability of running water, poor accessibility and dryness of hands.

Gathering evidence only vindicates Dr Semmelweis's dogma. In the backdrop of the increasing numbers of patients developing or at risk of developing health care associated infections, an urgent need for improving compliance with hand hygiene is required. Hand hygiene can be achieved by using plain soap and water, soaps containing antiseptic formulations which have better microbicidal range and alcoholic formulations which have rapid onset of action, good kill potential, need reduced time and no water. While it is important to practice hand hygiene as and when required, using an appropriate technique should not be overlooked.

Purpose

The purpose of this SOP is to describe the indications and the procedure of hand hygiene thereby creating awareness to this important task, improve compliance and reduce the rates of healthcare associated infections.

Scope

This SOP is meant for all categories of health care providers.

Definitions

Hand Hygiene is a means of achieving a reduction in or removal of visible soiling, transient or resident organisms and/or other hazardous toxic substances from the surface of hands while maintaining the integrity of the skin.

Hand washing. is defined as a vigorous, brief rubbing together of all surfaces of lathered hands, followed by rinsing under a stream of water. This removes all soiled matter and most transient flora. It does not kill the microbes.

Hand rub is a waterless alcohol-based compound (e.g., ethanol, n-propanol, or isopropanol) that when used to wet and rub the hands is effective in eliminating and killing almost all transient flora and a few resident flora.

Resident flora are those microorganisms that are normally present in every individual, deeply seated within the epidermis, under the fingernails and in the deeper layers of skin (hair follicles, sweat glands and sebaceous glands). They are also known as "normal" flora

and are not readily transferred to other people or surfaces. These organisms are usually harmless and, in most situations, do not need to be removed from the skin while providing normal routine clinical care. Their numbers can be reduced by the combination of detergent and a microbicide.

Transient flora are the microorganisms picked up during the course of health care delivery. These are more dangerous since they are usually the more resistant and more virulent nosocomial pathogens.

Responsibility

Administration – for ensuring uninterrupted supply of soap, water, alcoholic hand rub, elbow operated taps where possible and hand dryers

Sister in charge – for ensuring uninterrupted supply of soap and alcoholic hand rub by computing the requirement, placing an indent to medical stores and stocking for one month; providing soap near hand washing area; providing a clean towel for every shift; providing alcoholic hand rubs between every fourth patient area and procedure room; displaying the steps of hand hygiene at the hand wash station; ensuring hygiene of hand wash station

Every health care provider – to perform hand hygiene during all indications

Unit in charge – monitoring compliance with hand hygiene

Infection control committee / infection control team – sensitization programme of health care workers to be conducted at least annually; periodic audit of hand hygiene practices with reference to supply, awareness and compliance.

Indications for performing hand hygiene

There are five major indications for hand hygiene

1. Before patient contact
2. Before aseptic task
3. After patient contact
4. After body fluid exposure
5. After touching patient's surroundings

- After removing gloves

Requirement

- Hand washing soap – Schedule V item no:
- Alcoholic hand rub – Schedule V item no:
- Clean towel

Pre-requisites

- Remove jewellery from fingers and wrists
- Remove wrist watch
- Keep nails short
- Cover cuts and abrasions with waterproof dressing

Procedure for hand hygiene using soap and water –

To be used when (i) hands are visibly soiled, (ii) after using the washroom or (iii) after caring for patients with clostridial infections

- Ensure supply of soap and water
- Wet all the surfaces of hands under running water
- Take approximately 5 ml of liquid soap in the palm of one hand
- Apply it evenly to all the surfaces
- Rub hands systematically as depicted in the figure below
- Each step should be repeated at least ten times
- Wash off the lathered hands under running water
- Dry with clean towel

Procedure for hand hygiene using alcoholic hand rub –

To be used when hands are visibly clean

- Ensure supply
- Take approximately 3-5 ml of the hand rub (single plunger)
- Apply it evenly to all the surfaces
- Rub hands systematically as depicted in the figure below
- Continue to rub till all surfaces are dry
- Do not rinse with water either before or after procedure

Monitoring hand hygiene compliance

- The infection control officer and infection control nurse will monitor the compliance with hand hygiene using the mobile app created by KEMHIC, periodically.
- Initially, for a period of two weeks, each ICU will be monitored sequentially.
- The respective unit in charge and HoD will be provided with the feedback.
- Measures to correct deficiencies will be identified and implemented.
- Trends in compliance rate will be monitored and analysed

References World Health Organization Patient Safety WHO Guidelines on Hand Hygiene in Health Care Geneva 2009

CDC USA Guidelines on hand hygiene in health care settings 2002

Hand Hygiene Technique with Soap and Water

Duration of the entire procedure: 40-60 seconds

0

Wet hands with water;

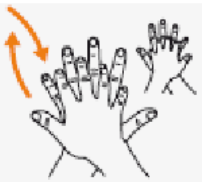
1

Apply enough soap to cover all hand surfaces;

2

Rub hands palm to palm;

3



Right palm over left dorsum with interlaced fingers and vice versa;

4

Palm to palm with fingers interlaced;

5

Backs of fingers to opposing palms with fingers interlocked;

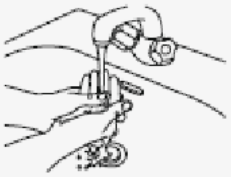
6

Rotational rubbing of left thumb clasped in right palm and vice versa;

7

Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

8

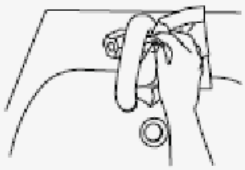


Rinse hands with water;

9

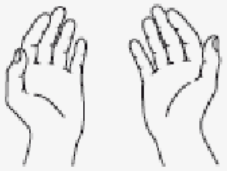
Dry hands thoroughly with a single use towel;

10



Use towel to turn off faucet;

11

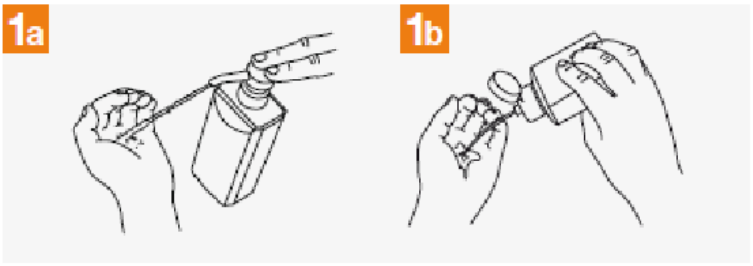


Your hands are now safe.

Hand Hygiene Technique with Alcohol-Based Formulation

Duration of the entire procedure: 20-30 seconds

1a 1b

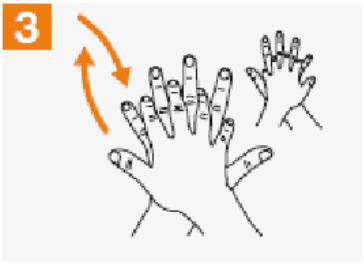


Apply a palmful of the product in a cupped hand, covering all surfaces;

2

Rub hands palm to palm;

3



Right palm over left dorsum with interlaced fingers and vice versa;

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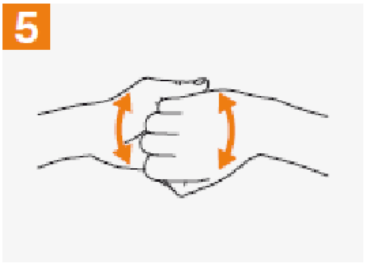
Palm to palm with fingers interlaced;

5



Backs of fingers to opposing palms with fingers interlocked;

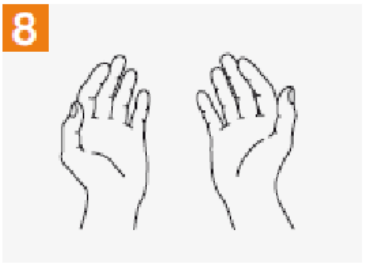
6

Rotational rubbing of left thumb clasped in right palm and vice versa;

7

Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

8



Once dry, your hands are safe.

SECTION 5: PERSONAL PROTECTIVE EQUIPMENT (PPE)

Introduction

Personal protective equipment (PPE) is worn to prevent transmission of microorganisms from patient-to-patient, from patient-to-staff and from staff-to-patient, by placing a barrier between a potential source of infection and one's own mucous membranes, airways, skin and clothing.

The selection of PPE is based on the nature of the interaction with the patient and/ or the likely mode(s) of transmission of infectious agents, according to the risk assessment. PPE includes gloves, gown and facial protection.

PPE should be put on just prior to the interaction with the patient. When the interaction for which the PPE was used has ended, PPE should be removed immediately and disposed of in the appropriate receptacle. The process of PPE removal requires strict adherence to a formal protocol to prevent recontamination. Personal Protective Equipment should be changed if they become heavily contaminated or torn/split during a procedure.

Gloves

The hands of clinical staff are the most likely means of transmission of healthcare associated infection. Hand washing is the single most effective step in reducing infection. Through hand washing and the appropriate use of gloves the risk of cross infection is minimized. Please remember that gloves are not a substitute for hand hygiene, which must be performed before putting on gloves and after glove removal.

Gloves are worn for contact with mucous membranes, non-intact skin, blood, body fluids, secretions, excretions or equipment and environmental surfaces contaminated with any of these.

Gloves must be worn:	**Gloves should not be worn:**
When touching mucous membrane	When there is no risk of exposure/ splash/ contact with blood, body fluids and non-intact skin
When changing a dressing, or having contact with non-intact skin	When assisting or feeding a patient
When changing diapers or adult briefs	For social touch
When performing personal hygiene for clients	When pushing a wheelchair
When performing mouth care	When delivering meals, mail, clean linen
When indicated for Additional Precautions	For providing care to clients with intact skin, e.g., taking temperature

Appropriate glove use:

- Perform hand hygiene before putting on gloves.
- Put on gloves immediately before the activity for which they are indicated.
- Remove gloves and discard immediately after the activity for which they were used.
- Change gloves between care for each patient.
- Do not re-use or wash gloves.
- Perform hand hygiene after gloves are removed.

There are a number of materials used in the manufacture of gloves, including latex, nitrile and vinyl (PVC). The choice of material will depend on the type of task being performed, contact with chemicals and the risks associated with latex sensitization. The use of vinyl gloves is not recommended when contact with blood or body fluids is anticipated. Staff must ensure that the appropriate type of glove is selected for particular procedures with the purpose to ensure safety and protection for staff and patients/residents. When considering the nature of the task, the need for sterile or non-sterile gloves should be assessed.
Sterile gloves are worn to protect the patient during aseptic invasive procedures.
Non-sterile gloves, latex or latex alternative (e.g. nitrile) are worn to protect the healthcare worker where direct exposure to blood or body fluids and other microorganisms is anticipated.
Storage of disposable gloves: it is important to store latex and nitrile gloves separately **at all times**. Nitrile gloves are recommended as an alternative product to latex in the presence of allergy.
Non-disposable household gloves are worn for tasks other than direct patient care (e.g. laundry, or for all work requiring chemicals, cleaners and disinfectants) ensuring that employees are aware of and comply with these protocols. Gloves must meet WorkSafe BC standards for the task

- Non-disposable gloves must be designated to the individual worker, and must be inspected by the worker daily to ensure that the gloves have no holes or tears in them. If gloves are damaged, they must be discarded and replaced
- They must be dried and stored in a clean, dry area
- Disposable gloves must not be used as a line
- If disposable gloves are used, then they must be changed regularly to ensure integrity and cleanliness.
- Regardless of type of glove, they must be washed between clean and dirty tasks and whenever the floor bucket disinfectant solution is changed

Gowns

Disposable gowns and/or plastic aprons should be worn when a procedure or care activity is likely to generate splashes or sprays of blood, body fluids, secretions or excretions or while providing care that may contaminate skin or clothing.

Cloth gowns do not provide the required protection and should not be used. They must be worn when the uniform is likely to become contaminated by microorganisms, e.g. during bed making

Scrubs or laboratory style coats/jackets worn over clothing are not considered to be PPE and must not be worn in place of a disposable gown. Their long sleeves also inhibit correct hand hygiene, and can be a source of contamination.

Gowns and aprons are worn as single use items, and must be disposed of after one procedure or episode of patient care.

Appropriate gown use:

- Put the gown on immediately before the activity for which it is indicated.
- Remove the gown immediately after the activity for which it is used.
- Change gown between care for each patient.
- Wear a gown properly, i.e., appropriately tied at neck and waist.
- Discard gown into an appropriate receptacle after each use and do not re-use.
- Perform hand hygiene after the gown is removed.

Facial Protection

A mask and eye protection are used to protect the mucous membranes of the eyes, nose and mouth from care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions, or within two metres of a coughing patient. A mask is also used by healthcare personnel when performing some aseptic procedures, such as central line insertions and wound dressings & when engaged in aerosol generating procedures with a patient with a droplet infection, e.g. open suctioning, nebulized medication, bronchoscopy

Appropriate mask use:

- Put on a mask immediately before the activity for which it is indicated.
- Remove the mask immediately after the activity for which it is used.
- Secure mask over the nose and mouth.
- Change the mask if it becomes wet.
- Do not touch the mask while being worn.
- Do not allow the mask to hang around the neck.
- Do not fold the mask or store it in a pocket.
- Do not reuse the mask.
- Perform hand hygiene after removing the mask.

A fit tested N95 mask is to be worn during the care of patients/residents who are diagnosed or suspected as having an airborne infection (e.g. Pulmonary Tuberculosis). N95 masks must be used during the entire period of infectiousness. A single-use N95 mask must only be worn once.

Eye protection may be disposable or, if reusable, should be cleaned and disinfected after each use. Prescription eye glasses are not acceptable by themselves as eye protection, but they may be worn underneath face shields and some types of eye protection.

Appropriate use of eye protection:

- Put on eye protection immediately before the activity for which it is indicated.
- Remove eye protection immediately after the activity for which it is used.
- Discard eye protection after use or place into an appropriate receptacle for cleaning and disinfection.
- Ensure eye protection is comfortable.
- Ensure eye protection does not interfere with vision.
- Ensure eye protection fits securely.

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SECTION 6 – SHARP WASTE MANAGEMENT

Introduction

"Sharps" is a term used for all those sharp or pointed items such as broken glassware, scalpel and razor blades, lancets, hypodermic syringes with needles, suture needles, broken or unbroken vials, ampoules, tubes, pipettes and other items which can pierce and /or cause cuts or puncture injuries. These include both used and unused sharps. "Sharps waste" is that sharp which has been used in the diagnosis, treatment and immunization of humans and animals or those sharps that need to be disposed due to being expired or unusable for any reason. Injury with sharps poses the risk of transmission of infectious agents such as blood borne pathogens. If the sharps waste is not segregated appropriately, the injury can occur to the healthcare workers, waste handlers and public. It is the responsibility of every person handling and generating the sharp waste to handle appropriately and dispose safely. Sharps are of concern because of the risk of injury (especially needle stick injury) and reuse potential. The sharp waste is disposed off finally by autoclaving flowed by shredding / incineration.

Sharp waste management

- reduce any unnecessary injections
- use needleless devices
- use engineered needles that automatically retract, blunt, resheath, or disable the sharp
- Disposal of sharps
  - All sharps should be disposed in the designated rigid, puncture and tamper proof containers
  - Sharp containers should be readily accessible (in the same injection / dressing trolley)
  - Where possible, the needles and syringes should be mutilated prior to disposal (use the needle cutter if available)
    - The advantages of mutilation include - prevents reuse of syringe either inadvertently or illegally, it reduces volume of sharps wastes, potential for recycling of syringes after the waste has undergone adequate disinfection / sterilization
  - Do not try to disassemble used needle syringe assembly. They can be disposed off as a single unit
  - The container should be adequately labelled with the date and area of generation, should only be three fourths full and not more and should bear the biohazard sign
  - Before being sent to the temporary waste storage area, i.e., before handling the sharps waste container, check for any protruding sharp.

- Entry should be made in the log book by the concerned sister in charge of the ward / ICU / OT or designated laboratory staff.
- Ensure new container is available before removing the old one

Don'ts

- Do not dispose sharps in containers other than the identified ones (never mix sharps with other categories of waste)
- Do not bend, break or recap needles
- Do not overfill the sharps container
- Sharps should never be passed by hand
- Do not leave sharps on beds, tables or drop on the floor, for others to dispose

SECTION 7: BIOMEDICAL WASTE MANAGEMENT

1. INTRODUCTION

Every health care setting generates waste. This waste can broadly be classified into hazardous and non-hazardous waste. Biomedical waste is a type of hazardous waste. The waste disposal policy followed is as per the Biomedical Waste Management Rules, 2016, and Bio-Medical Waste Management (Amendment) Rules, 2018.G.S.R 234(E) issued by the Ministry of Environment, Forests and Climate change, Government of India. It is important to handle, collect, segregate, store, transport and dispose of the waste as per the guidelines and the mandate of Maharashtra Pollution Control Board (MPCB). If the biomedical waste is not properly disposed of, it can spread infections in the hospital as well as in the community.

Prior to this, the 1998 biomedical waste management and handling rules were followed.

The major changes in the current rules are,

(a) The rules apply also to vaccination camps, blood donation camps, surgical camps or any other healthcare activity

(b) Bio-medical waste has been classified into 4 categories instead of 10 to improve the segregation of waste by removing dual disposal options provided earlier

(c) Pre-treatment by sterilization / disinfection of four types of waste is mandatory prior to disposal. These include laboratory waste, microbiological waste, blood samples and blood bags.

(d) Providing training to all its health care workers and vaccination of all health workers regularly is also required.

(e) Establishing a Bar-Code System for bags or containers containing bio-medical waste for disposal is now a requirement.

Briefly the waste categories are as follows

- Waste is segregated at source into one of the **four colour coded categories** recognized by the Rules into colour coded bags /containers.
- The different colour codes (Schedule I of BMWM Rules, 2016) include

A. **Yellow** for the (a) incinerable human anatomical (b) animal waste (c) soiled waste which includes items contaminated with blood, body fluids (d) expired or discarded medicines such as antibiotics, cytotoxic drugs and items contaminated with the latter (e) chemical waste which includes used or discarded disinfectants (f) chemical liquid waste such as discarded formalin, liquid from laboratories and floor washing, (g) discarded linen, mattresses beddings (h) microbiology (test cards / cassettes , buffer, controls, BACTEC bottles), biotechnology and other clinical laboratory waste.

B. **Red** recyclable (plastic) contaminated waste such as tubings, bottles, syringes and vacutainers, gloves, plastic aprons etc.
C. **White –** sharps, includes needles, syringes with fixed needles, cut needles, scalpel blade, microscopy slides and coverslips or any other sharp object.
D. **Blue –** broken or discarded and contaminated glass including medicine vials and ampoules, broken petri dishes / other lab glassware

- All biomedical waste containers / bags should carry the biohazard symbol.
- All bags when three fourths full or at the end of each day whichever is earlier should be tied (tamper proof).
- The bags / cans are labelled with the date and area of generation (for e.g., 2.1.2017, Bacteriology)
- The sharp cans should be discarded when 3/4ths full, or every 48 hours, whichever is earlier. Close the can's screw cap tightly, label and send.
- Shift the red bags, yellow bags, cardboard boxes with blue mark and the sharp cans to the temporary storage room near gate number 7.
- Before transporting out from the area of generation, the entry of such bags and cans is made in the log book maintained at each generation site.
- The person carrying the waste bags should be provided with PPE (gloves and apron), should have received HB vaccination and carry the bags in a trolley designated for the same.
- When the bags are deposited in the room, take the signature of the person receiving.

SMS Envoclean is the authorized Central Biomedical Waste Treatment Facility.

2. PURPOSE

This SOP describes the procedure to be followed for biomedical waste disposal.

3. SCOPE

This is applicable to the entire staff of this hospital.

4. DEFINITION

Bio-medical waste means any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps.

5. RESPONSIBILITY

Appropriate biomedical waste management is the responsibility of all staff members. All staff should be aware of and adhere to the contents of this SOP. It is mandatory for all staff that they segregate the biomedical waste at the point of generation itself. Appropriate segregation of waste is the responsibility of every staff generating it. It is also the responsibility of the staff to bring to the attention of the sister in charge / superior, any lapses occurring during biomedical waste management.

- The sister in charge and in her absence, the unit head / HOD is responsible for the supervision of waste disposal at that site.
- He/she is responsible for

✓ Pre labelling the bags, cardboard boxes and the puncture proof container with the name of the lab generating the waste and date when in use

✓ for maintaining the log book

✓ Occurrence (accident) Log

- The designated housekeeping staff of the grade of sweeper and in his/her absence, the alternate sweeper and in the absence of sweepers, the servant posted in the section is responsible for collecting and transporting the waste to the designated temporary storage area near gate number 7 and 8 respectively.

6. PROCEDURE

A. Waste collection and segregation

- Segregate waste at source into one of the four colour coded categories recognized by the Rules.
- Discard all sharps into the 'sharps' can without sodium hypochlorite.
- Disinfect all liquid waste which includes blood and body fluids with equal volume of 1% sodium hypochlorite prior to disposal in the drain.
- Mutilate all needles and syringes prior to disposal.

Area	Type of waste generated	Procedure to be followed
Any laboratory		
Blood collection room / other areas	Used needle and syringe	burn / cut the needle, cut the nozzle of the syringe and discard the remaining part in the puncture proof labelled container (Sharp can)
	Plastic wrapper, paper etc.	Discard in blue bag

	Cotton ball for skin disinfection	Discard in yellow bag
	Cotton ball used by patient to stop bleeding	Discard in yellow bag kept near collection counter at the exit
Blood testing lab	The pipette tips or droppers used for the test	Discard in a labelled puncture proof container
	The Kit controls, buffer, conjugate and substrate Bottles	Discard in red bag which needs to be pre-treated(autoclaved) locally
Serum Separation Room	Sample bulb / tube	Discard in red bag which needs to be pre-treated(autoclaved) locally
	Slides containing stained / unstained smear, wet mounts and other used glass slides, coverslips and pipette tips	Discard in a labelled puncture proof container
Any area		
Wards	Patient care items made of plastic – IV lines, gloves, polydrapes, plastic disposable gown, urine bags, suction tubes	Cut the IV line above the needle. Carefully discard the needle in sharps can.
		All used gloves, saline bottles, polydrapes, suction tubes, IV tubing, etc. should be disposed in red bag.
	Plastic wrapper, paper etc.	Discard in blue bag
	Used Cotton (for any purpose), gauze pieces, dressing material,	Discard in yellow bag

	contaminated linen, mask (surgical / N95)	
Blood collection / Injections	Needles and syringe	Unless otherwise specified, use a needle burner / cutter to burn / cut the needle and the nozzle od the syringe. Discard in sharps container without sodium hypochlorite.
	material used for cleaning and disinfecting surfaces / equipment / spills to be discarded	Discard in yellow bag
	Broken vials/ampoules	To be discarded in the cardboard box container lined with any coloured bag with a blue mark on the box
	Amputated body parts and any animal waste	Yellow bags.
	Animal carcasses and any other animal waste	
	Linen (used) If for reuse	Soak in 0.5 % sodium hypochlorite for 1 hour. Dry. Send for washing
	Linen (used) If for disposal	Discard in yellow bag
	Disposable caps/gowns other than plastic	Discard in yellow bag
	Urine and Stool	Flush in the toilet
	Body fluids and blood	Disinfect with 1% sodium hypochlorite (freshly prepared) for 1 hour and flush down the toilet.
	Microbiology cultures / samples	Locally autoclave prior to disposal in Yellow bag
Blood spill	The material used for managing blood spills/ body fluid spills / after surgery	Discard in yellow bag

	Specimen containers (test tubes, screw capped bottles, plastic containers, centrifuged tubes)	Discard in yellow bag which should be locally autoclaved
	Blood bag (used/empty), segment of blood bag, empty fresh frozen plasma bag	Discard in Yellow colour bag & Autoclave locally
	Syringes with specimen	Syringes containing clinical material such as pus / other body fluid to be collected in the red bag, autoclaved locally and then disposed.
	Unused syringes	The nozzle should be cut in the needle burner / cutter before discarding in red bag.
	All specimens with container including vacutainers	To be collected in red bags and autoclaved locally
	Used/unused cytotoxic drugs, Used/expired Medicine for discard/ Expired vaccine	Either to be handed over to manufacturer or discarded in yellow bag
	Placenta	Discard in yellow bag
	Autopsy specimen	Discard in yellow bag
	Specimen from pathology in formalin / Histopathological specimens	Discard in yellow bag
	Dead foetus (As per MTP act 1971)	Discard in yellow bag (to be accompanied by a certificate from any competent authority of the unit
	Chemical waste (Discarded disinfectant)	Discard in yellow bag
	Sharps like needles/blades/	Discard in a labelled puncture proof container

	Autolock needles/ Anaesthesia needles/ Guide wires	
	Waste sharps like guide wires	Discard in a labelled puncture proof container
	Metallic body implants	To be discarded in the cardboard box container lined with any coloured bag with a blue mark on the box
	Diapers (Children/adult)	Discard in yellow bag
	Sanitary napkins	Discard in yellow bag
	Plaster casts	Discard in yellow bag
Non-infectious dry waste		To be discarded in blue bag
Non-infectious wet waste like left over food		To be discarded in green bag

B. Waste Transport and storage

- Personnel of respective area should be given responsibility for the supervision of waste disposal at that site.
- He/she is responsible for

✓ Pre labelling the bags and the puncture proof container with the name of the lab generating the waste and date when in use

✓ for maintaining the log book

✓ Occurrence Log

- After donning appropriate PPE, the sweeper / servant should tie the blue (non-infectious dry waste), green (non-infectious wet waste) yellow and the red bags when three fourths full or at the end of each day whichever is earlier, seal the cardboard box, stick the blue mark & seal the puncture proof container.
- The designated housekeeping staff of the grade of sweeper and in his absence, the alternate sweeper or the servant posted in the area is responsible for collecting and transporting the non-infectious and non-infectious waste to the designated temporary storage area for infectious and non-infectious waste near gate number 7 and 8 respectively.
- Before transporting, he/she should confirm the log book entry.

7. Trouble shooting

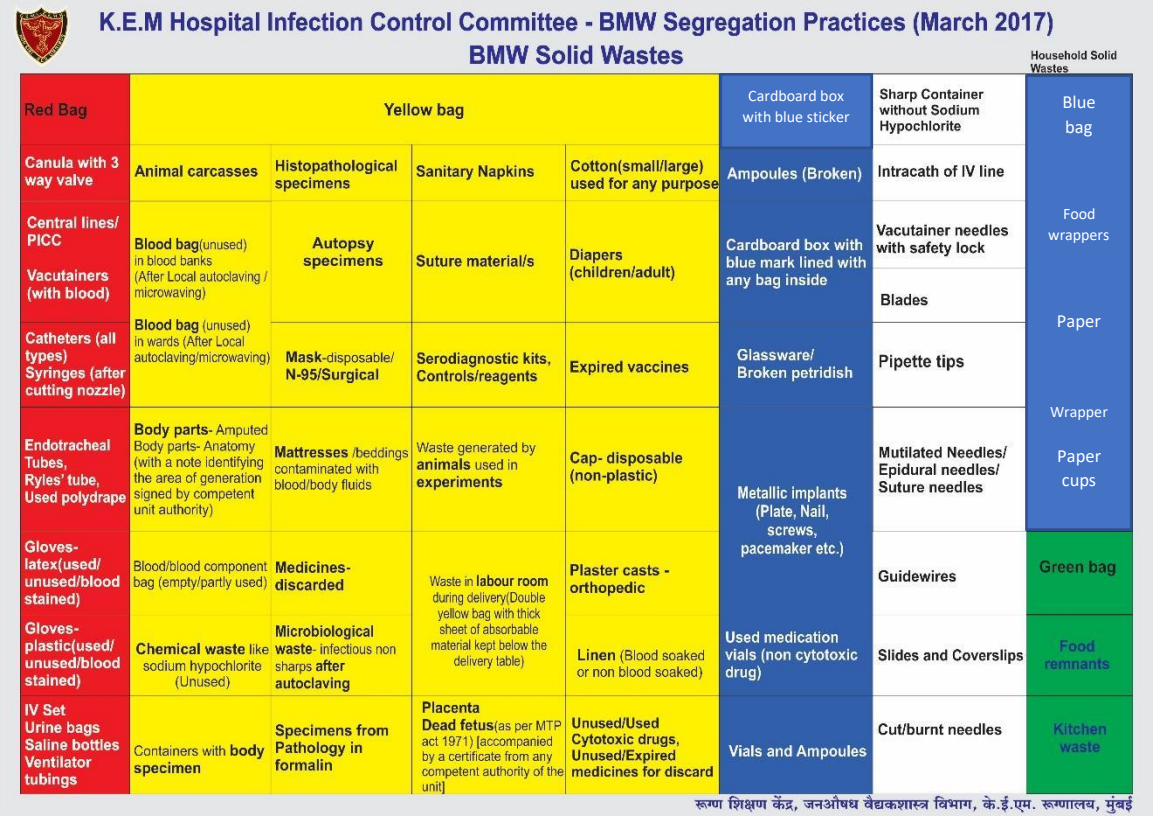
- In case of an accident while handling waste, immediately wash the area with soap and water, inform the immediate superior or division in charge and take necessary action.

- In any case of lapse occurring in the biomedical waste management, the in charge reviews the process, identifies deficiency/ies if any and conducts re-training as required.

8. References

a) British standards ISO 15190: 2003Medical laboratories —Requirements for safety, 1st edition, page: 21-22.
b) Biomedical Waste Management Rules 2016. Available at http://mpcb.gov.in/biomedical/pdf/BMW_Rules_2016.pdf. last accessed on 4th April 2018.
c) The Bio-Medical Waste Management(Amendment) Rules, 2018.G.S.R 234(E). Available athttp://www.moef.nic.in/sites/default/files/Bio%20medical%20waste%20management%20(amendment)183847.pdf. last accessed on 4th April 2018.
d) World Health Organization (WHO) Laboratory Safety Manual. 3rd edition 2004. Page: 17-19.

Appendix 1: Poster for BMW Solid wastes



K.E.M Hospital Infection Control Committee - BMW Segregation Practices (March 2017)

BMW Solid Wastes

Red Bag	Yellow bag				Cardboard box with blue sticker	Sharp Container without Sodium Hypochlorite	Household Solid Wastes: Blue bag
Canula with 3 way valve	Animal carcasses	Histopathological specimens	Sanitary Napkins	Cotton(small/large) used for any purpose	Ampoules (Broken)	Intracath of IV line	
Central lines/ PICC Vacutainers (with blood)	Blood bag(unused) in blood banks (After Local autoclaving / microwaving)	Autopsy specimens	Suture material/s	Diapers (children/adult)	Cardboard box with blue mark lined with any bag inside	Vacutainer needles with safety lock	Food wrappers
						Blades	Paper
Catheters (all types) Syringes (after cutting nozzle)	Blood bag (unused) in wards (After Local autoclaving/microwaving)	Mask-disposable/ N-95/Surgical	Serodiagnostic kits, Controls/reagents	Expired vaccines	Glassware/ Broken petridish	Pipette tips	
Endotracheal Tubes, Ryles' tube, Used polydrape	Body parts- Amputed Body parts- Anatomy (with a note identifying the area of generation signed by competent unit authority)	Mattresses /beddings contaminated with blood/body fluids	Waste generated by animals used in experiments	Cap- disposable (non-plastic)	Metallic implants (Plate, Nail, screws, pacemaker etc.)	Mutilated Needles/ Epidural needles/ Suture needles	Wrapper Paper cups
Gloves-latex(used/ unused/blood stained)	Blood/blood component bag (empty/partly used)	Medicines-discarded	Waste in labour room during delivery(Double yellow bag with thick sheet of absorbable material kept below the delivery table)	Plaster casts - orthopedic		Guidewires	Green bag
Gloves-plastic(used/ unused/blood stained)	Chemical waste like sodium hypochlorite (Unused)	Microbiological waste- infectious non sharps after autoclaving		Linen (Blood soaked or non blood soaked)	Used medication vials (non cytotoxic drug)	Slides and Coverslips	Food remnants
IV Set Urine bags Saline bottles Ventilator tubings	Containers with body specimen	Specimens from Pathology in formalin	Placenta Dead fetus(as per MTP act 1971) [accompanied by a certificate from any competent authority of the unit]	Unused/Used Cytotoxic drugs, Unused/Expired medicines for discard	Vials and Ampoules	Cut/burnt needles	Kitchen waste

रूग्ण शिक्षण केंद्र, जनऔषध वैद्यकशास्त्र विभाग, के.ई.एम. रूग्णालय, मुंबई

SECTION 8 – ENVIRONMENTAL HYGIENE AND INFECTION CONTROL

1. Introduction

Environmental surfaces get easily contaminated with microorganisms. Microbiologically contaminated surfaces can serve as reservoirs of potential pathogens, and the transmission is not direct but largely via hand contact with the surface.[2,3] Although hand hygiene is important to minimize the impact of this transfer, cleaning and disinfecting environmental surfaces as appropriate is fundamental in reducing their potential contribution to the incidence of healthcare-associated infections. Patients with pathogens such as methicillin-resistant *S. aureus* (MRSA), *Clostridium difficile*, vancomycin-resistant enterococci (VRE), and *Acinetobacter* frequently contaminated environmental surfaces in their immediate vicinity. These organisms can remain viable in the environment for weeks or months. A number of studies have shown that improved cleaning and disinfection of environmental surfaces can reduce transmission of pathogens such as *C. difficile,* vancomycin-resistant enterococci (VRE), and methicillin-resistant *S. aureus* (MRSA).

A clean environment plays an important role in the prevention of hospital associated infections (HAI). Many factors, including the design of patient care areas, operating rooms, air quality, water supply and the laundry, can significantly influence the transmission of HAI.

1.1 Air

Ventilation

Ventilation systems should be designed and maintained to minimize microbial contamination. The air conditioning filters should be cleaned periodically (at least weekly) and fans that can spread airborne pathogens should be avoided in high-risk areas. High-risk areas such as operating rooms, critical care units and transplant units require special ventilation systems. Filtration systems (air handling units) designed to provide clean air should have high efficiency particulate air (HEPA) filters in high-risk areas. Unidirectional laminar airflow systems should be available in appropriate areas in the hospital construction. Ultra clean air is valuable in some types of cardiac surgery/neurosurgery/implant surgery theatres and transplant units.

Operating room – Refer to section on OT cleaning and Disinfection, the critical parameters for air quality include:

1.2 Water

The health care facility should provide safe water. If it has water storage tanks, they should be cleaned regularly (monthly) and the quality of water should be sampled periodically (quarterly) to check for bacterial contamination.

Safe drinking water

Where safe water is not available, boil water for 5 minutes to render it safe. Alternatively, use water purification units. Store water in a hygienic environment. Do not allow hands to enter the storage container. Dispense water from a storage container by an outlet fitted with a closure device or tap. Clean the storage containers and water coolers regularly.

2. Cleaning and Disinfection of Environment

2.1 General

The principles of cleaning and disinfecting environmental surfaces take into account the intended use of the surface or item in patient care. In 1991, CDC proposed an additional category designated "environmental surfaces" to Spaulding's original classification[7] to represent surfaces that generally do not come into direct contact with patients during care. Environmental surfaces carry the least risk of disease transmission and can be safely decontaminated using less rigorous methods than those used on medical instruments and devices. Environmental surfaces can be further divided into medical equipment / clinical contact surfaces (e.g., knobs or handles on haemodialysis machines, x-ray machines, instrument carts, and dental units) and housekeeping surfaces (e.g., floors, walls, and table tops).

2.2 Items frequently contaminated near patients include:

- Bed rails
- Bed linen
- Overbed tables / Side tables
- Procedure trolleys
- Nurse's station
- Urinary collection bags
- Blood pressure cuffs
- Intravenous pumps
- Wash rooms

2.3 Factors influencing the choice of disinfection procedure for environmental surfaces:

a) The nature of the item to be disinfected,
b) The number of microorganisms present,
c) The innate resistance of those microorganisms to the inactivating effects of the germicide,
d) The amount of organic soil present,
e) The type and concentration of germicide used,
f) Duration and temperature of germicide contact, and
g) If using a proprietary product, other specific indications and directions for use.[9,10]

3. Procedure [1]

3.1 Cleaning is a form of decontamination that renders the environmental surface safe to handle or use by removing organic matter, salts, and visible soils, all of which interfere with microbial inactivation.[11,12] If the surface is not cleaned before the terminal reprocessing procedures are started, the success of the sterilization or disinfection process is compromised.

3.2 Frequency of cleaning

High risk areas (ICU, burns ward, Labour ward) – In each shift
Moderate risk areas (general wards, laboratories) - Each day
Low risk areas - Every week (OPDs)

3.3 Common Agents Used for Disinfection of Environmental Surfaces

- Chlorine and Chlorine releasing compounds
  - Sodium hypochlorite (5.25 – 6.15% solution delivering 52500 to 61500 ppm of chlorine) – "bleach"
  - Sodium dichloroisocyanurate tablets
  - Demand-release chlorine dioxide, chloramine-T
- Ethyl or isopropyl alcohol (70-90%)
- Quaternary ammonium germicidal solutions
- Phenolic germicidal detergent solutions (5%)
- Accelerated hydrogen peroxide solutions

3.4 Sodium hypochlorite (5.25 – 6.15% solutions) "household bleach"

Preparation	Parts per million (ppm) available chlorine	Comments
Household bleach (undiluted)	52,500 - 61,500	
1:10 dilution of household bleach	5,250 - 6,150	Active against *C. difficile* spores
1:50 dilution of household bleach	1,050 - 1,230	Active against Mycobacterium tuberculosis, Norovirus
1:500 dilution of household bleach	105 – 123	Active against vegetative bacteria

3.5 Standard Operating procedures for cleaning

3.5.1 General Cleaning Practices for All Health Care Settings

Before cleaning:

- Clean hands before entering the room.
- Gather materials required for cleaning before entering the room.
- Remove clutter before cleaning.
- Follow the manufacturer's instructions for proper dilution and contact time for cleaning and disinfecting solutions.
- Prepare disinfectant (or detergent) solutions, fresh and as needed, and on a daily basis. Discard the left-over solution.
- Change cleaning solutions as per manufacturer's instructions. Change more frequently in heavily contaminated areas, when visibly soiled and immediately after cleaning blood and body fluid spills.
- Remove needles and other sharp objects before beginning the cleaning activity. Safely handle and dispose of sharps into a puncture proof container. Report incident to supervisor.
- Clean hands with soap and water on leaving the room.

During cleaning:

- Progress from clean to dirty areas.
- Remove gross soil (visible to naked eye) prior to cleaning and disinfection.
- Use two buckets, one with clean water and the other with soap/disinfectant solution.
- Use clean mop between the beds, under the bed and bed railing.
- Do not 'double-dip' mops (dip the mop only once in the cleaning solution).
- An area of 120 square feet to be mopped before re-dipping the mop in the solution.
- Cleaning solution to be changed after cleaning an area of 240square feet.
- Where facility of laundering mops is not available, mops should be changed at following defined intervals

After cleaning:

- Tools used for cleaning and disinfecting must be cleaned and dried between uses.
- Clean mop heads daily with soap and warm water.
- All washed mop heads must be dried thoroughly before reuse.
- Clean the buckets after every use.

3.5.2 Cleaning of Patient Care Area/Room

3.5.2.1 Daily Routine Patient Bed Space / Room Cleaning

Hospital cleaning of patient care areas/rooms should follow a methodical, planned format that includes the following elements:

- Wash hands and put on gloves.
- Start by cleaning doors, door handles, and touched areas of the frame.
- Check walls for visible soiling and clean if required.
- Clean light switches and thermostats.
- Clean wall mounted items such as alcohol-based hand rub dispensers.
- Check and remove fingerprints and dirt from glass partitions, glass door panels, mirrors and windows with glass cleaner.
- Clean all furnishings and horizontal surfaces in the room including chairs, window sill, television, telephone, computer keypads, over bed table etc. Lift items to clean the table. Pay particular attention to high-touch surfaces.
- Wipe equipment on walls such as top of suction bottle, intercom and blood pressure manometer as well as IV pole.
- Clean bed rails, bed controls and call bells.
- Clean bathroom/shower (applicable for single room) (see bathroom cleaning procedure).
- Clean floors (see floor cleaning procedure)
- Remove gloves and clean hands with alcohol-based hand rub; if hands are visibly soiled, wash with soap and water. Do not leave room wearing soiled gloves
- Replenish supplies as required (e.g., gloves, ABHR, soap, tissue roll/paper towel etc.)

High dusting includes all surfaces and fixtures above shoulder height, including vents. Ideally, the patient/resident should be out of the room during high dusting to reduce the risk of inhaling spores from dust particles. High dusting should be done once a month.

3.5.2.2 Procedure for Routine, Discharge/Transfer Cleaning of a Patient Bed Space/ Room

- Wash hands and put on gloves.
- Remove dirty linen
- Strip the bed, discarding linen into linen bag designated for the same
- Check walls if visibly soiled.
- *Remove gloves and clean hands*

3.5.3 Cleaning the bed / mattress

- Clean the top and sides of the mattress, turn over and clean the underside.
- Clean exposed bed springs and frame.
- Check for cracks or holes in mattress and have mattress replaced as required
- Inspect for pest control.
- Clean headboard, foot board, bed rails, call bell and bed controls; pay particular attention to areas that are visibly soiled and surfaces frequently touched by staff.
- Clean all lower parts of bed frame, including castors
- Allow mattress to dry

- Clean bathroom/ shower (see bathroom cleaning procedure)
- Clean floors (see floor cleaning procedure)
- Remove gloves and clean hands with ABHR; if hands are visibly soiled, wash with soap and water. Do not leave the room wearing soiled gloves.
- Remake bed and replenish supplies as required (e.g., gloves, ABHR, soap, paper towel, toilet brush).
- Return cleaned equipment (e.g., IV poles and pumps, walkers, commodes) to clean storage area.

3.5.4 Routine Bathroom Cleaning

NOTE: Bathrooms require bleach solution or powder

Working from clean areas to dirty areas:

- Clean door handle and frame, light switch.
- Clean inside and outside of sink, sink faucets and mirror; wipe plumbing under the sink; apply disinfectant to interior of sink; ensure sufficient contact time with disinfectant; rinse sink and dry fixtures.
- Clean all dispensers and frames.
- Clean ledges/ shelves.
- Clean shower, faucets, walls and railing, scrubbing as required to remove soap scum; apply disinfectant to interior surfaces of shower, including soap dish, faucets and shower head; ensure sufficient contact time for disinfectant; rinse and wipe dry; inspect and replace shower curtains monthly or as required.
- Clean bedpan support, entire toilet including handle and underside of flush rim; ensure sufficient contact time with disinfectant.
- Remove gloves and wash hands.
- Replenish paper towel, toilet paper, waste bag, soap and ABHR as required.
- Report mould and cracked, leaking or damaged areas for repair.

3.5.5. Mopping Floors using Wet Loop Mop and Bucket

Working from clean areas to dirty areas:

- Prepare fresh cleaning solution according to the manufacturer's instructions using appropriate PPE according to Material Safety Data Sheet (MSDS).
- Place 'wet floor' caution sign outside of the room or area being mopped.
- Divide the area into sections (e.g. Corridors may be divided into two halves, lengthwise, so that one side is available for movement of traffic while the other is being cleaned.)
- Immerse mop in cleaning solution and wring out.
- Push mop around skirting first, paying particular attention to removing soil from corners; avoid splashing walls or furniture.
- In open areas use a figure eight stroke in open and wide spaces, overlapping each stroke; turn mop head over every five or six strokes. While in small spaces, starting in

the farthest corner of the room, drag the mop toward you, then push it away, working in straight, slightly overlapping lines and keeping the mop head in full contact with the floor.

3.5.6 Cleaning of Sterile Areas

Sterile Processing Areas in CSSD/TSSU *

- Clean all counters and floors daily.
- Clean shelves daily in sterilization areas, preparation and packing areas and decontamination areas.
- Clean shelves daily in sterile storage areas.
- Clean case carts after every use.
- Clean walls once every month.
- Clean light fixtures, sprinkler heads and other fixtures once every month.

3.5.7 User Units/Clinics, Endoscopy Suites and Other Sterile Storage Areas

- Clean counters and floors daily.
- Clean shelves daily.
- Clean walls once every month.
- Clean light fixtures, sprinkler heads and other fixtures once every month

3.5.8 Prepare a log sheet of the cleaning activity

3.5.9 Laundry and Bedding

- Employer Responsibilities
- Employers must launder workers' personal protective garments or uniforms that are contaminated with blood or other potentially infectious materials.
- Laundry Facilities and Equipment
  - Maintain a separate receiving area for contaminated textiles
- Ensure that laundry areas have hand washing facilities and products and appropriate PPE available for workers.
  - Use and maintain laundry equipment according to manufacturers' instructions.
  - Do not leave damp textiles or fabrics in machines overnight.
- Handle contaminated textiles and fabrics with minimum agitation to avoid contamination of air, surfaces, and persons.
- Bag contaminated textiles and fabrics at the point of use.

3.5.10 Mattresses and Pillows

- Mattresses and pillows should have impervious covers

- Keep mattresses dry; discard them if they become and remain wet or stained, particularly in burn units.
- Clean and disinfect mattress covers using sodium hypochlorite
- Maintain the integrity of mattress and pillow covers.
    - Replace mattress and pillow covers if they become torn or otherwise in need of repair.
    - Do not stick needles into the mattress through the cover.
- Clean and disinfect moisture-resistant mattress covers between patients using sodium hypochlorite
- Change the mattress and pillow covers if integrity of outer cover is compromised, or is visible soiled
- Blood spills should first be covered by 1% Sodium Hypochlorite Solution/ Bleaching solution for 10 mins and then cleaned.

3.5.11 Cleaning of Delivery tables: Responsibility of Nurse-in-charge

- The delivery tables should be covered with Macintosh and deliveries should not be conducted on bare table tops.
- Macintosh should be first wiped with sodium hypochlorite solution.
- Similarly, any blood spilled area in the delivery table as well as floors should be first cleaned with hypochlorite solution.
- Cots and mattresses:
- Clean daily with 1:100 hypochlorite solution, freshly prepared
- Replace mattresses whenever surface covering is broken
- Floors and walls
- Walls (every day if there is spillage of blood / body fluid) and sinks (every shift) must be routinely decontaminated
- Wet mopping of the room should be done three times a day
- Avoid sweeping and dry dusting

3.5.12 Flowers and potted plants should be avoided in patient care areas.

4.0 Pest Control

Get pest control done whenever there is bugging problem detected or quarterly

5.0 Monitoring practices

Environmental-surface culturing can be used to verify the efficacy of hospital policies and procedures before and after cleaning and disinfecting rooms.

5.1 Recommendations—Environmental Sampling

I. General Information

A. Do not conduct random, undirected microbiological sampling of air, water, and environmental surfaces in health-care facilities.
B. When indicated, conduct microbiological sampling as part of an epidemiologic investigation or during assessment of hazardous environmental conditions to detect contamination and verify abatement of a hazard.
C. Limit microbiologic sampling for quality assurance purposes to 1) biological monitoring of sterilization processes; 2) monthly cultures of water and dialysate in haemodialysis units; and 3) short-term evaluation of the impact of infection-control measures or changes in infection control protocols.4) Validation / verification of practices

References:

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3. Danforth D, Nicolle LE, Hume K, Alfieri N, Sims H. Nosocomial infections on nursing units with floors cleaned with a disinfectant compared with detergent. J Hosp Infect 1987;10:229–35.
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5. Practical Guidelines for Infection Control in Health Care Facilities. SEARO Regional Publication No. 41, 2004.
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7. Guidelines for Environmental Infection Control in Health-Care Facilities Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC) U.S. Department of Health and Human Services Centers for Disease Control and Prevention (CDC) Atlanta, GA 30329 2003 Updated: July 2019

Section 9: Equipment Reuse

Introduction:

Cleaning, disinfection and sterilization of surgical instruments plays a major role in reducing hospital associated infections. The prime role of this is to prevent the transmission of disease-causing microorganisms from medical items to susceptible patients.

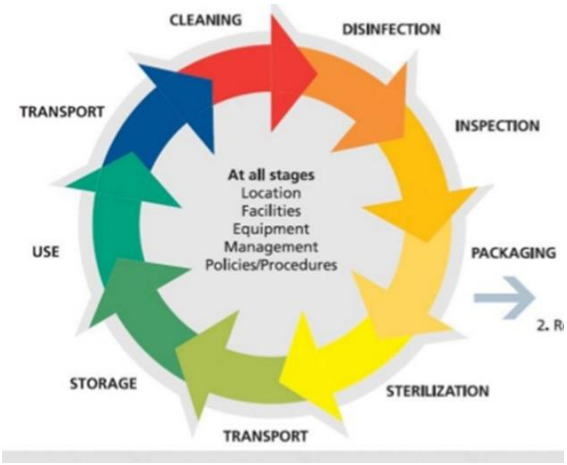


Fig 1: Cycle of cleaning and disinfection process*

*Assistive Systems for Quality Assurance by Context-Aware User Interfaces in Health Care and Production - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/The-instrument-decontamination-cycle-as-per-Potomac-Labs-7_fig1_281458285 [accessed 24 Sep, 2019]

Definitions:

Decontamination: According to OSHA, "the use of physical or chemical means to remove, inactivate, or destroy blood-borne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal".

Cleaning: Mechanical removal of foreign material (e.g., soil, and organic material) from objects or surfaces and is normally accomplished using water with detergents or enzymatic products.

Antisepsis: Prevention of infection by inhibiting or arresting the growth and multiplication of germs (infectious agents).

Disinfection: Reducing the number of pathogenic microorganisms to the point where they no longer cause diseases. Usually involves the removal of vegetative or non-endospore forming pathogens

Sterilization: Killing or removing all forms of microbial life (including endospores) in a material or an object.

Contact time: Time a disinfectant is in direct contact with the surface or item to achieve disinfection/sterilization.

Disinfectant: usually a chemical agent (but sometimes a physical agent) or heat that destroys disease-causing pathogens or other harmful microorganisms but might not kill bacterial spores.

The level of microbial control required to use / reuse an equipment/ device on a given patient has been described by Spaulding as follows:

Spaulding's classification

Device classification	Item used	Objective	Process
Critical items	surgical instruments, cardiac and urinary catheters, implants, and ultrasound probes used in sterile body cavities.	Objects that enter sterile tissue or the vascular system must be sterile because any microbial contamination could transmit disease	Must be purchased as sterile or be sterilized with steam if possible. Heat-sensitive objects can be treated with EtO, hydrogen peroxide gas plasma; or if other methods are unsuitable, by liquid chemical sterilant. Germicides categorized as chemical sterilant include ≥2.4% glutaraldehyde-based formulations, 0.95% glutaraldehyde with 1.64% phenol/phenate, 7.5% stabilized hydrogen peroxide, 7.35% hydrogen peroxide with 0.23% peracetic acid, 0.2% peracetic acid, and 0.08% peracetic acid with 1.0% hydrogen peroxide.

Semi-critical items Semi critical items contact mucous membranes or nonintact skin.	This category includes respiratory therapy and anaesthesia equipment, some endoscopes, laryngoscope blades, oesophageal manometry probes, cystoscopes, anorectal manometry catheters, and diaphragm fitting rings.	These medical devices should be free from all microorganisms; however, small numbers of bacterial spores are permissible. Intact mucous membranes, such as those of the lungs and the gastrointestinal tract, generally are resistant to infection by common bacterial spores but susceptible to other organisms, such as bacteria, mycobacteria, and viruses.	Minimally require high-level disinfection using chemical disinfectants. Glutaraldehyde, hydrogen peroxide, *ortho*-phthalaldehyde, and peracetic acid with hydrogen peroxide. Compatibility to be checked and contact time to be followed rigidly. Laparoscopy and arthroscopes entering sterile tissue ideally should be sterilized between patients. Items should be rinsed and flushed thoroughly using sterile water after high-level disinfection After rinsing, items should be dried (forced air drying or alcohol flush expedites drying) and stored (e.g., packaged) in a manner that protects them from recontamination
Noncritical items are those that come in contact with intact	Noncritical items are divided into noncritical patient care items and		Low level disinfectants

skin but not mucous membranes.	noncritical environmental surfaces		

Disinfectants:

RECOMMENDED CONCENTRATION# AND MICROBICIDAL SPECTRUM

Chemical Disinfectants. Guideline for Disinfection and Sterilization in Healthcare Facilities (2008) Available at https://www.cdc.gov/infectioncontrol/guidelines/disinfection/disinfection-methods/chemical.html [Last accessed on September 24,2019]

Disinfectant	**Conc.**	**Effectivity against**				
		GPB & GNB	**Spores**	**Mycobacteria**	**Viruses**	**Fungi**
Phenols	2%	Y	N	Y	V	Y
Chloroxylenol	2.5-5%	Y	N			
Chlorine	1% free available chlorine	Y	M	Y	Y	Y
Chlorhexidine	4%	GPB – Y GNB – M	N	N	F	V
Alcohols	70%	Y	N	Y	V	Y
Aldehydes	Gluter-2% Forma-8%	Y	Y	Y	Y	Y
Hydrogen peroxide	3%	Y	F	Y	Y	Y
Peracetic acid	200-500ppm	Y	Y	Y	Y	Y

Iodophore	450ppm	Y	Y	Y	Y	Y
Quaternary ammonium compounds	0.2%	Y	N	N	Y	Y

GPB=Gram positive bacteria, GNB = Gram negative bacteria, Y = effective, F= Fair,
V= variable, N = not effective
*As per manufacturer's recommendations

- A minimum contact time of 20 minutes of complete immersion is recommended for all disinfectants (follow label instructions where available).
- For mycobacteria, glutaraldehyde is recommended, contact time 1 hour.
- Aldehydes are high level disinfectants. (capable of killing spores, if the contact time is for 8 hours).

Disinfectant	**Suggested Use**
Alcohol (70%)	Skin antisepsis
Bacillocid (2%)	OT spraying in an emergency.
Carbolic acid (2%)	Surface and environmental disinfection.
Formaldehyde (280 ml for 1000 cu.ft)	Fumigation
Glutaraldehyde (activated 2%)	For instruments and scopes
Lysol	For instruments (sharps) before autoclaving
Sodium hypochlorite (1%)	Environmental and surface disinfection and for soiled linen
Sodium hypochlorite (1%)	Spills
Alcoholic hand rub with chlorhexidine	Hand wash solution
Chlorhexidine with cetrimide	Skin decontamination

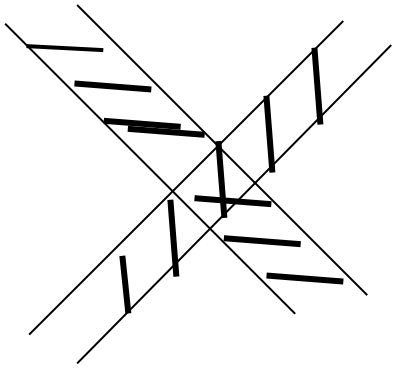
Sterilization:

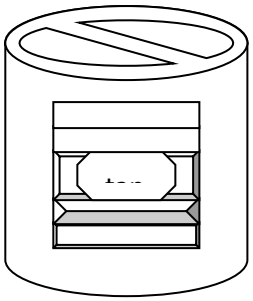
Prerequisite – Cleaning, drying, packing with appropriate packing material

Autoclave:

- Commonly used method of sterilization
- Heat sterilization depends on the temperature to which the articles are exposed, the type of heat (moist better than dry heat) and the exposure time.
- **Steam or water boiling** at atmospheric pressure and at a temperature of 100°C **DOES NOT** sterilize.
- At a pressure of 15 lb/in^2, water boils at 121° C and at a pressure of 32lb/in^2 water boils at 134° C. Steam at these temperatures will sterilize objects in 15 mins and 3 mins respectively. This is the principle of the autoclave.
- The temperature and holding time for sterilization for clean items is 121°C for 20 minutes or 134°C for 3.5 minutes depending on the setting of the autoclave.

- All air should be removed from the autoclave for increasing the efficiency of steam.
- This can be achieved by the 'downward displacement autoclave', or by vacuum method.
- **Tests for effectiveness of sterilization** by the autoclave. (Records need to be maintained)
  a. Temperature and pressure records of each cycle.
  b. Indicator tapes with each cycle (store as per manufacturer's instructions and do not use expired tapes)
  c. Chemical indicator class I and V with every cycle
  d. Biological indicator once a week and with every implant cycle
  e. The indicator is placed above the drain outlet
  f. Bowie Dick Autoclave Tape Test (For vacuum-based sterilizer): In the centre of the

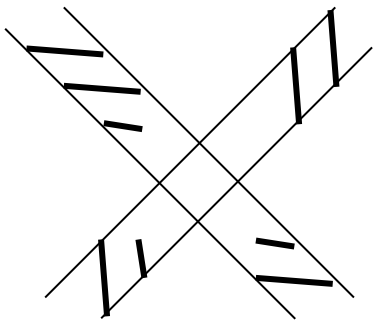




load, is placed a piece of paper to which is fixed a cross of approved autoclave tape. This tape shows a colour change whenever exposed to steam. If all the air has been removed the tape will show a uniform colour change.

- If all the air has not been removed, when steam is admitted the air will be forced in the centre of the pack where it will collect as a 'bubble' and there will be no change in the colour of the tape in that region.

A failed Bowie – Dick test



Reading of the test – When the cycle is finished, the pack should be taken out and the strip examined. All these tape results should be recorded and the tapes themselves preserved.

g. <u>Chamber leak test every week for vacuum-based autoclave.</u>

For vacuum autoclaves, the chamber leak rate test should be performed daily.

Performance of the chamber leak rate test – Draw a vacuum in the autoclave chamber, close all valves leading to the chamber, stop the vacuum and observe the chamber pressure at the end of 5 mins and 15 mins respectively. At the start of the test, the chamber pressure should be less than 40m bar. During the last 10 mins, the chamber pressure should be less than 13m bar.

ETO sterilizer:

The following points need to be noted.

- ETO is used for sterilizing heat sensitive equipment.
- Test for effectiveness of sterilization – using spore strips containing 10^6 spores *of B.subtilis var niger*.
- Each cycle should be monitored using at least one spore strip.
- All articles which have undergone ETO should be well aerated before use.

Methods for cleaning and decontamination of equipment
is important to perform the steps in the right order for several reasons

The protocol of disinfecting instruments should be as follows:

Step 1 – Decontamination

Step 2 – Cleaning with soap and water

Step 3 – High level Disinfection

Step 4 – Rinse with sterile water to remove traces of disinfectant.

Step 5 – dry or store dry before using on the next patient.

Disinfection and sterilization cannot be achieved without proper pre-cleaning.

Personal protection equipment to be used while cleaning like long sleeved impervious gowns, goggles, mask with face shield, gloves, cap and fluid resistant shoes.

Methods:

1. Heat — Autoclaving is the most reliable method.

It should be used for all heat resistant materials.

Boiling is not an alternative to autoclaving.

Boiling is a method of heat disinfection.

2. Disinfectants	a) Clear soluble phenolics	1% e.g., carbolic acid
	b) Chlorine releasing agents	1000 ppm available chlorine
	c) Glutaraldehyde	2%
	d) Ethanol	60 – 80%
	e) Isopropanol	70%

Contact time: Bacteria	10-15 minutes	Check label on container for instructions by manufacturer
HIV and HBV	20 minutes	
Mycobacteria	1 hour	
Spores	4 hours	

Table listing method of microbial control:

Equipment/site	**Routine method**	**Alternative**
Airways and endo tracheal tubes	Heat sterilize	For patients with tuberculosis, use disposables or heat. For others, may use alcohol.
Ampoules	Wipe neck with (d) above	Do not immerse.
Anaesthesia trolley	Wash with soap and dry followed by disinfectant used routinely in Operation theatre.	
Bed frames	Wash with soap and dry.	After infected patients wipe with (a) / (b)
Bedpans	Flush the contents down the drains.	
	Wash well with running water, drain and dry	For infected patient, Wash with hot water or use phenolic disinfectant.
BP cuff	Wash with soap and water and dry/alcohol wipe	

Bowls (surgical)	Autoclave	
Bronchoscopes	Check manufacturer's instructions 2% glutaraldehyde for 20 minutes	60 minutes after use on suspected/known TB patients.
Cheatle forceps	Do not use	If used, autoclave daily and store dry. Before reuse, disinfect with alcohol and store dry.
Cystoscopes	2% glutaraldehyde for 10 mins.	
Drains	Clean regularly Disinfect weekly with chlorine 100ppm	
Door knob	Clean with alcohol	
Dialysis machine	Clean with alcohol	
Endoscopes Check section below	Follow manufacturer's instructions Clean all channels thoroughly in soap and water, running water and heat disinfect	If heat sensitive, immerse © for at least 30 mins and in suspected TB cases for 1 hour.
Floors (wet cleaning)	Wash with detergent.	Known contaminated spillage use (a) or (b)
Gastroscopes	Follow Manufacturer's instructions 2% glutaraldehyde for 20 mins/ 70% ethanol for 4 mins.	
Humidifier container	Wash with soap and water and keep it dry. Disinfect with 100ppm chlorine	

Infant incubators	Wash with detergent and dry.	After infected patient, wash with detergent and wipe with (d) or 0.0125% (b)
IV stands	Wash with detergent and dry.	After infected patient, wash with detergent and wipe with (d) or 0.0125% (b)
Laparoscopes	2% glutaraldehyde for 20 mins.	
Mops (Replace weekly in ICUs and bi-monthly in wards)	Rinse after each use. Wring and store dry. Heat disinfects periodically.	If chemical disinfection is required, rinse in water, soak in (b) for 30 minutes, rinse again and dry.
Monitors	Wipe with alcohol	
Pulse oximeter	Alcohol wipe	
Razors	Disposable	
Stretchers	Wash with soap and water	
Sputum containers	Use disposables only	Autoclave with contents. Dispose as per BMW rules in red bag.
Spot light	Wash with soap and dry followed by disinfectant used routinely in Operation theatre.	
Surgical instruments	Decontamination, cleaning by enzymatic cleaner followed by drying and autoclaving	
Thermometers	Wipe with (d) and store dry.	
Telephones	Alcohol wipe	

Tubings (anaesthetic / ventilator)	Heat disinfection	For patients with TB/HIV infection, use disposables or heat disinfect.
Ultrasound machine	Clean with soap and dry	
Urinals	See bedpans.	
Ventilator (mechanical)	Heat disinfection / disposable circuit.	If no filters are present, disinfect with4% formaldehyde/6% H_2O_2.
Wash basin	Clean with detergent	If contaminated, use (a)or (b)
Wheel chairs	Wash with soap and water	

Flash method of sterilization is not to be used for implants.

Heat for disinfection: 80-100°C for 20 minutes.

Endoscopes:

Steps for endoscope reprocessing: Follow manufacturer's instructions/If not available

1. Clean: It is necessary to remove the visible debris/tissue mechanically internal and external surfaces including brushing (of appropriate size) internal channel with water.
2. Flush: Flushing of all the lumens is necessary with water followed by enzymatic cleaner. Discard enzymatic cleaner after each use.
3. Disinfection (High level): Outer part as well as channels to be cleaned with disinfectant by immersing the endoscope and flushing the disinfectant inside the channels and exposed for a recommended time.
4. Rinse: Endoscope should be cleaned with sterile water. Channels should be flushed to remove any residual disinfectant.
5. Dry: Dry the channels with air gun. Ensure that the endoscopes are dry visibly.
6. Storage: Endoscopes to be hung vertically in a hygienic closed cabinet in a clean room to promote drying and also avoid contamination.

Storage:

Sterile items should be used within 24 to 48 hours. During this period, it should be stored in clean area to prevent from dust or any type of contamination. The trays should be packed either in SMS paper/ clean cloth. Follow the rule of first in first out by checking the date on the class I indicators. If not used within desired time, the same to be sent for autoclaving again.

Regular training:

Regular training about sterilization and disinfection to personnel related to the same should be carried out on yearly basis and documented.

Audit:

Three monthly audits of sterilization and disinfection practices will help improve the practices and bring it at the standard level in all the different operation theatres.

Roles and responsibilities:

The responsibility of cleaning and disinfection lies with the sister in charge. Although cleaning and disinfection will be carried out by the dressers but under the supervision of Sister in-charge/ senior staff nurse.

Documentation

Proper documentation of sterilization and disinfection practices is necessary.

***The log book should capture the following information atleast.**

Sr No	Date of run	Cycle no	Temp	Pressure	Holding time (not less than 20 mins)	Drum no	Content of drum	Tray no	Content of tray	Record of indicator tapes including biological when used	Sign

Quality control:

Mechanical indicator: Documentation of gauges/displays and print outs (if available). Although it is not considered as indicator for sterilization, documentation is recommended.

Chemical indicators: Different types of chemical indicators (Class I to Class VI) can be used. The routinely used is Class I chemical indicators which has to be placed outside and inside the wrapper of the tray. Document the same in the Autoclave log book. Class V indicator to be placed with each autoclave cycle and pasted in the autoclave log book.

Biological indicators: 10^6 spores of B. stearothermophilus to be placed over the drain outlet. After the cycle is complete, send it to microbiology department for validation. The biological indicators to be tested initially daily for a week, then weekly and with each cycle in case of implants.

References:

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5. Ayliffe's Control of Healthcare Associated Infections – a practical handbook Edited by Adam P Fraise and Christina Bradley 5th Edition 2009 Hodder Arnold

SECTION 10 - BIOLOGICAL SPILL CONTROL

1. INTRODUCTION

All biological spills are potentially hazardous. It is important to contain and decontaminate the spill for the safety of the HCWs, patients, relatives and environment. Disinfectants at much lower concentration can easily inactivate HIV and Hepatitis B viruses.

2. PROCEDURE

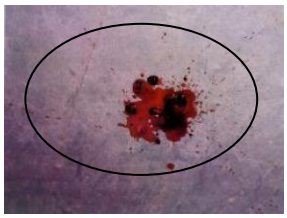
2.1 For spills with blood and body fluids

- Use spill kit box
- Clear the area of spill and start spill containment
- Instruct the housekeeping on the protocol which is as follows:
- Don appropriate personal protective equipment (impervious gown, gloves, face shield or goggles and fluid resistant shoes if spill is large.).
- Wear heavy duty gloves and then pick up any broken glass with the help of forceps and discard into a sharps container.
- Cover spill with paper towels / absorbent (gauze) and allow soaking.
- Discard in a yellow bag.
- Cover spill again with paper towels / absorbent (gauze).
- Squirt disinfectant (1% hypochlorite) onto absorbent with circular motion, from the outside towards the centre.
- Allow to stand for a minimum of 2 minutes up to a maximum of 10 minutes.
- Clean up paper towels/ absorbent (gauze) and place them in the red biohazard bag.
- Disinfect contaminated surface with appropriate disinfectant (1% Na hypochlorite) and wipe with mop.
- Disinfect the heavy-duty gloves and forceps with 1% Na hypochlorite before storage.

3. REFERENCES

a) British standards ISO 15190: 2003 Medical laboratories —Requirements for safety, 1st edition, page: 35-36
b) World Health Organization (WHO) Laboratory Safety Manual. 3rd edition 2004. Page: British standards ISO 15190: 2003Medical laboratories —Requirements for safety, 1st edition, page: 95-97
c) Occupational safety and Health administration US department of Labour. Laboratory Safety Guidance.2011. Page: 15-19.
d) Chinn RY, Sehulster L. Guidelines for environmental infection control in health-care facilities; recommendations of CDC and Healthcare Infection Control Practices Advisory Committee (HICPAC). 2003
e) World Health Organization. WHO guidelines on drawing blood: best practices in phlebotomy. World Health Organization; 2010.

2.2 Flow chart for steps for management of spills



Blood/Body fluids spill

(Mark the spill area)

Wear PPE
Place absorbent over spillage
Allow to soak
Discard as infectious material in yellow bag

Again, place absorbent over spillage area
Pour 1% Sod hypochlorite
Leave in contact for a minimum of 2 minutes up to a maximum of 10 minutes

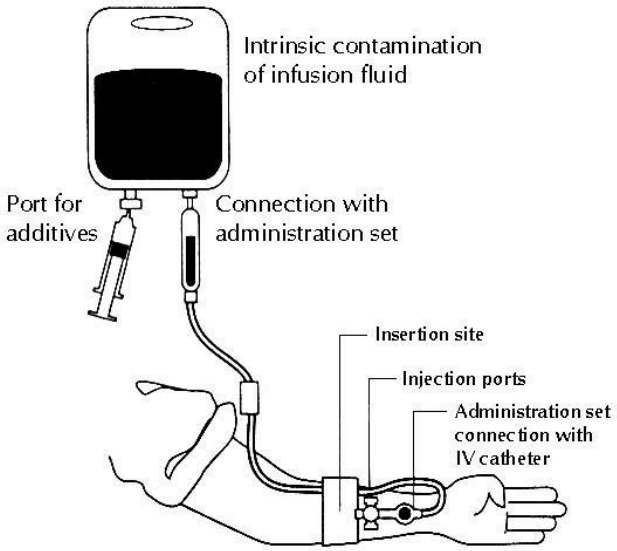
Remove
Discard as infectious waste in yellow bag

Use clean mop
Wipe with disinfectant (1% Na hypo) again
Mop to dry
Clean the mop
Allow the mop to dry

SECTION 11: ASEPTIC TECHNIQUES

Introduction

The term asepsis refers to practices that minimize the introduction of microorganisms to patients during patient care. Poor aseptic practices have resulted in the development of health care associated infections and outbreaks. Broadly aseptic practices are categorized into surgical asepsis (practices that minimize surgical site infection) and general/medical asepsis (practices outside operating room). Aseptic techniques also minimize the exposure of health care workers to potentially pathogenic organisms. Aseptic techniques involve practices to be performed just before, during and after an invasive procedure. Aseptic techniques comprise of hand hygiene and use of barriers, preparation of patient site for a particular procedure, maintaining an aseptic environment, handling devices and lines aseptically and no-touch technique while inserting devices into patients. Some of the common procedures done on patients have multiple opportunities of contamination if not aseptically handles. The adjacent figure depicts the possible sites of contamination of IV lines.



Possible sites of contamination of IV lines

Purpose

The purpose of this SOP is to describe the practices of medical / general asepsis that would minimize the risk of transmission of microorganisms to a patient while performing certain routine procedures. These include safe injection practices, insertion of IV lines, preparation and administration of intravenous fluids, wound care, etc. This SOP is also expected to improve the competency of health care providers in aseptic techniques.

Scope

This SOP is meant for all categories of health care providers.

Definitions

Asepsis –

Safe injection - A safe injection is one that does not harm the recipient, does not expose the provider to any avoidable risks, and does not result in any waste that is dangerous for other persons.

Responsibility

Administration – for ensuring uninterrupted supply of material required for providing asepsis.

Sister in charge – for computing the requirement for area assigned, ensuring uninterrupted supply of the requirement, placing an indent to medical stores and stocking for one month; maintaining adequate environmental hygiene of the ward and procedure room.

Every health care provider – to practice asepsis during any activity related to patient care

Unit in charge – monitoring compliance with aseptic practices and being a role model

Infection control committee / infection control team – sensitization programme of health care workers to be conducted at least annually; periodic audit of aseptic practices with reference to supply, awareness and compliance.

Requirement

- Hand washing soap – Schedule V item no:
- Alcoholic hand rub – Schedule V item no:
- Antiseptic hand washing soap
- Sterile wipes
- Antiseptics – 70% alcohol, Povidone iodine, Chlorhexidine gluconate, povidone iodine scrub, clean gloves, Sterile gloves, Sterile gauze for wound dressing, Sterile cotton, Disposable gown, Steridrape
- Sterile syringe and needle
- Injectable medication
- Sterile IV infusion cannula
- Sterile IV infusion set

Procedure

A. Insertion of intravenous line

- Keep requirement ready
- Use no touch technique during insertion, maintenance and removal of cannula.
- Where possible, inform the patient about the procedure and make the patient comfortable
- Wash hands with soap and water
- Allow to dry / dry with sterile wipes

- Use antiseptic soap if working in intensive care unit / immunosuppressed patients
- Use alcoholic hand rub
- Wear clean gloves
- Check and choose the site of insertion
- Place an absorbent material under the site of (elbow) IV insertion
- Place a tourniquet as required.
- Prepare the site of insertion using alcohol or chlorhexidine gluconate. Thoroughly scrub to remove all organic matter. Move in circular manner from centre to periphery. The application should last at least 30 seconds.
- Apply chlorhexidine gluconate / alcoholic chlorhexidine again
- Instead of chlorhexidine gluconate use povidone iodine scrub followed by povidone iodine paint.
- Allow to dry
- Remove gloves
- Do not touch the site of insertion after antisepsis
- Use alcoholic hand rub
- Wear a disposable gown if profuse bleeding is expected.
- Wear sterile gloves after hands have dried
- Check sterility and expiry date of the IV set to be used
- Prepare the IV infusion set
- Insert the IV cannula slowly, check infusion rate and stabilize using scotch tape.
- Wipe the hub of the cannula with an alcoholic wipe before attaching the administration set.
- Place and anchor a sterile dressing.
- Clean the adjacent area with 70% alcohol.
- Label the tape with date and time of insertion.
- Discard waste appropriately.
- Remove gloves and gown and discard in red bag after making a minor nick.
- Wash and dry hands.
- Do not keep IV line beyond 72-96 hours

Maintenance of IV lines

- Maintain a closed circuit
- Check regularly for swelling or signs of infection
- Keep the area clean and dry
- Assess need for line daily
- Remove the catheter at the first sign of infection or after 72-96 hours whichever is earlier

B. Injection safety (Use of multidose vials)

- Always use sterile equipment
- Give injections only when required
- Perform hand hygiene prior to preparing the injection and before giving injections

- Inspect packaging to detect breaks / leaks / visible contamination
- Check expiry of needle and syringe and medication
- Prepare injections in a clean area designated for the same away from likelihood of contamination
- Inform the patient and make the patient comfortable
- **A multidose vial** should be used for the same patient. Check the multidose vial before use for visible contamination. Store and use multidose vials as instructed by manufacturer.
- *Do not leave a needle inserted into a multi-dose vial to facilitate frequent aspirations.*
- If multidose vials have to be reconstituted use separate sterile assemblies of syringe and needle for reconstitution and other draws for patient use.
- Swab the port of the multidose vial with an alcohol wipe prior to aspiration using a clean disposable swab and 70-90% alcohol
- Choose the appropriate site and disinfect with 70% alcohol. Use enough alcohol to wet the site.
- Use fresh clean swabs every time. *Do not use wet stored swabs.*
- Allow to air dry before injecting
- Do not touch those parts of the syringe that come in contact with the injectable material.

Drawn out piston	Hub of needle	Tip of needle

- Inject slowly under strict aseptic condition
- After injection, remove needle slowly while pressing the cotton pad to the site of injection.
- Provide clean cotton and ask patient to hold at the site of injection to stop bleeding. After injection, the health care worker should not apply pressure at the injection site with bare hands as contamination with patients' blood can occur.
- *Do not use the same syringe for multiple patients even if needles are changed.*
- After use, discard the needle and syringe in the sharps container after burning / cutting the needle and mutilating the tip of the syringe
- If needle and syringe cutter / burner is unavailable, discard as a single unit in the sharps container. *Do not leave it anywhere else.*
- Avoid recapping / bending / breaking the needle by hand

- Perform hand hygiene after giving the injection

C. Wound care and wound dressing

- Prepare the dressing trolley with sterile wound dressing pack, local antiseptics as required, a pair each of clean and sterile gloves
- Wash hands (use an alcoholic hand rub)
- Wear clean gloves and remove the old dressing. Discard in red bag
- Inspect the wound
- Perform an antiseptic hand wash, dry hands and wear sterile gloves
- Clean the wound thoroughly using sterile gauze and a cleaning solution using forceps. Do not use hands.
- Press the edges of the wound to exude all possible purulent material. Debride as required.
- Clean the wound again and dry.
- Apply local antiseptic as required and close the wound with sterile dressing.
- Wipe the wound site dry.
- Discard all material generated into red bag.
- Wash hands with soap and water and allow to dry.

D. **Insertion and maintenance of urinary catheter**

E. **Insertion and maintenance of central venous cannulae**

SECTION 12 – SOP FOR INFECTION PREVENTION IN OPERATION THEATRES

Contents

This document describes the standard operating procedures to be followed in operation theatres for infection control and prevention.

This document is applicable to all categories of staff working in an operation theatre as per their assigned responsibility. The head of the department and the sister in charge of the operation theatre are responsible for ensuring that all measures are in place to prevent infections during pre-operative, operative and post-operative stages.

1. Responsibilities:

Sr No	Staff Designation	Responsibility
1	Head of Dept. and Head of Unit	● To have this document read and understood by all staff working in ward and operation theatre. ● To designate staff for specific activities described below, monitor practices followed and any additional as per need. ● To make available all equipment / instruments / accessories that would be required for carrying out surgeries. ● To prepare the list of items which are for single use and those that can be reused after sterilization / disinfection. ● To identify the method, whether sterilization / disinfection for each of the above items in consultation with Microbiology.

		● To identify the compatible cleaning solutions for special equipment. ● To confirm that all resident doctors working in the OT are trained for the procedures and use of equipment. ● To review this document periodically and revise if required in consultation with ICC at local level (annually)
2	OT sister in charge	● Read and understand the contents of this document. ● Train the staff nurses, the dresser and any other staff posted in the OT for the activities that they are responsible for. ● To supervise / get supervised, cleaning, disinfection, sterilization and fogging practices carried out. ● To supervise the collection of samples for validating the procedure of terminal cleaning and send them to Microbiology. ● To ensure that sterile items are being used for patients. ● To supervise that the log book for autoclaving maintained by the dresser and staff nurse is appropriate and updated daily. ● To monitor if the cleaning of instruments that have been used follows standard practices before being sent for sterilization. ● To have a system of maintenance and calibration of all critical equipment required for sterilization and disinfection such as autoclaves, flash sterilizers, ETO machines and any other. ● All autoclaves to be calibrated annually and have a preventive maintenance program quarterly through engineering department. ● To call AE (M & E) to confirm the ventilation standards, temperature and humidity as described below.
3	Staff nurse (OT)	● To perform all tasks aseptically. ● To instruct and supervise used instrument cleaning prior to packing for sterilization. ● To check that the autoclave tapes (indicator strips) or other similar indicators are placed on the drum / instrument tray both on the outside and on the inside of each drum / tray and are labelled with the date.

		● To confirm that the autoclave tapes have changed to appropriate colour and record the same before issuing to surgeon. ● To ensure that the items have been autoclaved in the last 24 hrs (newspaper) / 48 hrs (closed tray which is wrapped or appropriate wrapper for autoclaves) depending on physical integrity and wrapping material ● Any other activity as instructed by the sister in charge / HoD
4	Dresser / CSSD supervisor	● Read and understand the contents of this document. ● To use calibrated and well-maintained equipment for sterilization (Autoclaves / ETOs / Flash sterilizers / other). ● To ensure that the instruments for sterilization have been cleaned. ● To pack the instruments in a tray / drum. ● To stick the autoclave tapes (indicator strips) on the outside and inside of each drum and tray that is autoclaved. These tapes should have the date of autoclaving **written with a ball pen** (and not with felt pen, marker pen or gel pen) before sticking. ● Biological indicators should be tested once a week / monthly. ● To maintain a record of the validation parameters for each cycle which should include Temperature, holding time (after the autoclave has reached 121 degree Celsius), pressure. ● To remove the indicator strips of each drum and tray and stick it to the autoclave log book after every cycle on a daily basis. ● To record the results of biological indicator when used. ● Cleaning solutions to be used should be confirmed with the sister in charge prior to use. ● CSSD supervisor where available, should prepare an SOP for cleaning of instruments prior to sterilization.
5	Administration	● To ensure that trained staff are posted to OTs especially for the purpose of autoclaving. ● All staff working in OT have received TT and Hep B vaccination.

		● To ensure regular supply of all consumables and equipment.
6	Hospital Infection Control Committee	● To monitor operation theatre practices periodically (monthly) ● To review the SOP annually with HoD
7	AE (M & E)	● Provide documents regarding engineering parameters such as number of air changes per hour (ACH), number of fresh air changes, working temperature and humidity. ● Should confirm that temperature and humidity are appropriate on a weekly basis. ● To confirm that ACH is appropriate on a monthly basis. ● To get the ducting cleaned on a quarterly basis / as per need, and the filter weekly / monthly as per need. ● To replace HEPA filters in a timely manner.
8	AE (Civil)	● To confirm that the quality of water supplied to the OT is appropriate by having a plan for cleaning of overhead tanks, plumbing and water quality testing. ● Quality of water supplied to OT should be tested from the MCGM water testing laboratory at least six monthly. ● To maintain the drainage in OT. ● To rectify civil related issues immediately.
9	Residents	● To perform all tasks aseptically. ● To confirm that the instruments that will be used have been sterilized.

2. <u>Requirements</u>

- **A dedicated separate area for instrument washing and a separate area for surgeons' hand wash and surgical scrub should be available.**
- **Separate area for storing sterile and unsterile items should be available.**
- **Plumbing and drainage should be satisfactory.**
- **Examples of sterile single use items**
    - Blades and instruments
    - Implants
    - Gloves
    - IV set, Ringer lactate, Balanced salt solution

3 Operative measures

3.1 General

- OT list to be available
- Sterile instrument sets should be used and as many as the number of surgeries to be performed.
- Anaesthetist /pulse oximeter should be available
- Emergency drugs
- Anaesthetic equipment
- Personal protective equipment - sterile
- Sterile bedsheets / drapes for the table should be available for each case
- Other items as per patient needs and type of surgery
- All patients should be injected inside OT
- Doors of the OR should always be kept closed and movements restricted.
- Restrict the number of personnel to the minimum during surgery.

3.2 Surgeon / Operating team and assistants

- No street clothes inside OT for staff
- Jewellery to be removed
- Clean, washed OT dress should be worn
- Surgical (sterile) mask - Masks should cover nose properly. In addition, use N 95 respirators /masks while operating on patients with infections which can be transmitted by the airborne route.
- OT cap – to be worn properly, tucking in all hair
- Hand washing with liquid soap and running tap water followed by surgical scrub as per standard protocol for all OT personnel with Betadine / Chlorhexidine for at least 3 minutes and done twice (minimum) prior to surgery. (Chlorhexidine surgical scrub is preferred)
- Position of hand after scrubbing and gloving- above waist and upright in front
- Use sterile powder free gloves
- Sterile Gown: change for every case
- Surgeon should not come out of OT in OT gown
- Separate washable OT rubber shoes that cover the front of the foot should be worn – different colour coding
- Separate bathroom slippers
- Doctors / staff with URTI/skin infection or any other obvious infection should not enter the OT
- OT etiquette to be displayed
- Important Do’s and Don’ts to be displayed
- No contact procedures like (Biometry/Tonometry) on day of surgery
- Do not perform more than 25 cases/surgeon/day (8 hours) provided sterile instruments / accessories are available for each case

- Surgeons should confirm verbally that the instruments provided are sterile / disinfected as per the need of the case
- All instruments / accessories / devices entering the eye should necessarily be sterile

3.3 Use of fluids

- Note the batch number and expiry date
- One bottle for One patient (No double autoclaving)
- Physical inspection against light
- Preferably keep infusion bottle for 24 hours after use

3.4 Patient preparation

- Bath with soap and water before surgery
- Patients to wear clean, washed OT dress with cap and gown (no street s clothes)

4. Post- surgery care

- Personal hygiene to be emphasised
- Document all intra op and post op findings
- Surgeon/assistant to be available at the venue for at least 7 days

5. OT (Operating room)

5.1 Suggested lay out-

- Outer zone- Reception
- Clean zone-Changing Room/transfer zone
- Aseptic zone- Scrubbing/gowning/gloving/operation room/autoclaving room
- Disposal zone- Equipment and supplies are washed and processed
- The washing area should be labelled as “Dirty washing area”.

5.2 OT commissioning

Confirm that engineering parameters are met from AE (M & E). The following parameters are as per NABH’s Revised Guidelines for Air conditioning in Operation Theatres (2015 and 2018). If the following parameters are not currently met, they should be upgraded eventually:

In the future, to place sensor driven/manual sliding doors in all the OTs.

In case of installed HEPA filters, carry out quarterly check with particulate count and leak test and document the same. In wash-up area, to install the bacterial filters in the plumbing line at the level of outlet (to be replaced once in 6 months). Also, water testing to be carried out once in 6 months. Civil department to do the needful. Documentation for the same should be with the AEs and a copy submitted to HoDs. A red tape should be placed in each OT complex beyond which eating food will not be permitted. AE(Civil) to do the needful.

5.2.1 Standard parameters – General OT

5.2.1.1 Air changes per hour

- **Minimum total air changes should be 20.**
- **The fresh air component** of the air change is required to **be minimum 4** air changes out of total minimum **20** air changes.

5.2.1.2 Air Velocity:

The airflow needs to be unidirectional and downwards on the OT table. The air face velocity of 25-35 FPM (feet per minute) from non-aspirating unidirectional laminar flow diffuser / ceiling array is recommended

5.2.1.3 Positive Pressure: There is a requirement to maintain positive pressure differential between OT and adjoining areas to prevent outside air entry into OT. The minimum positive pressure recommended is 2.5 Pascal (0.01 inches of water).

5.2.1.4 Air handling/Filtration:

- The AHU (i.e., air handling unit) must be an air purification unit and air filtration unit.
- There must be two sets of washable flange type filters of efficiency 90% down to 10 microns and 99% down to 5 microns with aluminium/ SS 304 frame within the AHU.
- The necessary service panels to be provided for servicing the filters, motors & blowers.
- HEPA filters of efficiency 99.97% down to 0.3 microns or higher efficiency may be provided. The Air quality at the supply i.e., at grille level should be class 1000/ISO Class 6 (at rest condition). Note: Class 1000 means a cubic foot of air must have no more than 1000 particles measuring 0.5 microns or larger.
- **During the non-functional hours AHU blower will be operational round the clock (may be without temperature control). Variable frequency devices (VFD) may be used to conserve energy. Air changes can be reduced to 25% during non-operating hours thru VFD provided positive pressure relationship is not disturbed during such period.**

5.2.1.5 Temperature and Humidity: The temperature should be maintained at **21C +/- 3°C** inside the OT all the time with corresponding relative humidity between **20 to 60%.** Appropriate devices to monitor and display these conditions inside the OT may be installed. Documentation of temperature and humidity on daily basis to be maintained in a log book.

5.2.1.6 Microbiological standards

- **In case of new OTs to be commissioned**, thorough cleaning, disinfection and fogging should be carried out **thrice** under supervision by sister in charge / designated staff nurse.
- Quality of air by air-sampling using either settle plates or air samplers or particle counter should be carried out after each fogging schedule. Acceptable limits are 'not more than one cfu in settle plates which is not a known or opportunist pathogen and no fungus' and for air samplers, not more than 30 cfu/ m^3 in an empty theatre for a

conventional theatre with no known bacterial pathogen or fungal spores. For laminar flow theatres, not more than 10 cfu/ m^3 in an empty theatre.
The HEPA filter particle count test should fall within Class 1000/100 range depending on the filter efficiency.

- In addition,
  - The quality of water should be checked periodically. Preferably, monthly by local microbiology laboratory and six monthly through MCGM water testing laboratory.
  - Samples (swabs) should be collected from critical areas which are frequently touched during surgery which include OT lights, operating table, instrument table, anaesthetic trolley and any monitors and others.
  - Swab should also be collected from nozzle of tap (hand wash room and instrument wash room)
  - These should be subjected to aerobic, anaerobic and fungal culture.
  - When the results are negative, the microbiological standards can be considered as met.

5.3 Running OT –

5.3.1 Cleaning and Disinfection Protocol

- **It is suggested that formaldehyde-based products should not be used as formaldehyde is a known carcinogen.**
- This SOP also describes the measures to take while operating on infected patients.
- Blood and body fluid precautions **(standard precautions)** should be followed for **all patients irrespective of their infection status.** This will prevent the transmission of blood borne pathogens and those transmitted by contact.
- For patients suffering from disease such as TB or measles or chicken pox which are transmitted by the airborne route, airborne transmission precautions should be followed. This includes N95 respirator / mask, full PPE including goggles. TB bacilli can be aerosolized even when only pus is being drained.
- **Personnel working in OT should have received all vaccinations which would include TT, MMR, Hep B, DPT etc. There should be documentation of**
  - **(i) vaccinations received,**
  - **(ii) the training on use and disposal of PPE and**
  - **(iii) Cleaning and disinfection practices.**

5.3.2 Definitions:

Asepsis: prevention of contact with micro-organisms.

Cleaning is the removal of foreign material (e.g., soil, and organic material) from objects or surfaces and is normally accomplished using water with detergents or enzymatic products.

Clinical contact surfaces: are those surfaces that are likely to be touched by the personnel or patients before, during or after surgery or which become soiled during surgery.
Contact time: time a disinfectant is in direct contact with the surface or item to be disinfected.
Decontamination: according to OSHA, "the use of physical or chemical means to remove, inactivate, or destroy blood-borne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal".
Disinfectant: usually a chemical agent (but sometimes a physical agent) that destroys disease-causing pathogens or other harmful microorganisms but might not kill bacterial spores.
Disinfection: thermal or chemical destruction of pathogenic and other types of microorganisms.

5.3.3 Responsibility

All unit heads should allot sufficient time for OT cleaning and disinfection at the beginning of the day, between cases (15-20 minutes), at the end of the day, terminal cleaning day (once a week) and following surgery on infected patients.

5.3.4 Procedures

5.3.4.1 Points to remember

- The concentration of the stock solution of detergent germicide and disinfectant should be known.
- Follow manufacturers' instructions for proper use of disinfectants (or detergent) --- such as recommended use-dilution, material compatibility, storage, shelf-life, and safe use and disposal.
- The 'in use' dilution of the disinfectant, whether for surface or for environment, should be freshly prepared for each use in a clean container on a daily basis.
- The left over should be discarded at the end of each use / day.
- Wet the surfaces to be disinfected with adequate disinfectant during the procedure. Allow a contact time of at least 1 minute.
- Allow surfaces to dry after disinfection.
- Decontaminate mop heads and cleaning cloths regularly to prevent contamination. Hang them to dry.
- For operating rooms, use fresh mop cloth every time for clinical contact surfaces. The floor mop should be changed weekly or whenever soiled whichever is earlier.
- Do not use sodium hypochlorite and formaldehyde containing product on the same surface.
- Surface and Environmental Disinfectant with microbicidal property and which can be used for fogging is an item in Schedule 5. Please check with medical stores for the product currently available. Use as per label instructions.

- The cleaning of horizontal surfaces including high hand touch surfaces should be with soap solution mop, followed by water mop, followed by disinfectant mop.
- The concentration and contact time of disinfection should be as per manufacturer's label instructions.
  When this is not available, follow as mentioned below.
- Sodium hypochlorite – Use 0.5 % (Stock is 5%)
- Contact time
  - Routine – 1 minute
  - HIV/HBV/HCV – 10 minutes
  - Gas gangrene – 1 hour following flooding technique. No fogging or fumigation is required
  - Post-surgery on cases of TB, chicken pox, measles etc. (i.e., organisms transmitted by the airborne route), cleaning and disinfection should be followed by fogging and closure of OT as mentioned on disinfectant bottle label.

5.3.4.2 Cleaning and Disinfection should be carried out periodically as follows:

1. Daily

A) At the beginning of the day
B) During surgery
C) Between surgeries
D) At the end of the day
E) Following surgery on infected patients

2. Terminal cleaning - Weekly
3. Surveillance of the activity
4. Monthly (Engineering, Pest control and Water tank)

5.3.4.2.1.A At the beginning of the day

- Keep only essential equipment (remove unnecessary items which are not required in the operating room)
- The person performing the task should have received training (record should be available)
- Wear appropriate personal protective gears (PPE) – shoe covers, head cover, plastic full-length apron, goggles, mask, gloves (rubber) in that order.
- Damp wipe all horizontal 'clinical contact surfaces' using a new, clean, lint free cloth wetted with a detergent germicide such as a freshly prepared solution containing chlorhexidine with cetrimide diluted as per manufacturer's instructions (See label on jar / bottle / can) OR soap solution followed by 0.5 % sodium hypochlorite (the stock solution is a 5% solution) OR soap solution followed by

carbolic acid (2%) or any item from medical stores labelled as surface and environmental disinfectant.

The clinical contact surfaces include - operating table, OT lights, door handle, medicine trolley, instrument trolley, anaesthetic trolley, monitors etc. Allow to remain wet for a minute.

- Allow to dry or facilitate drying by using another fresh dry lint free cloth.
- Use a clean mop to wipe the floor (clean) with 0.1% sodium hypochlorite (Freshly prepared) or 2% carbolic acid.
- Disinfect the door handles / knobs.
- Replace filters in suction apparatus and ventilators.
- Discard all used plastic items in red bag and non-plastic items in yellow bag.
- Decontaminate the cautery with alcohol wipe.
- Empty the waste bins and replace waste bags.

5.3.4.2.1.B During surgery

- Any major blood or body fluid spill should be immediately taken care of as per Section 10
- All instruments opened for a procedure are treated as contaminated whether used or not.

5.3.4.2.1.C Between surgeries

- Collect all soiled items (blood soaked / tinged/ body fluid soaked)
- Discard those that are not needed in the yellow / red bag as appropriate and plastic disposables in the red bag.
- All blood bags that are for discard should be disinfected or autoclaved prior to disposal and in yellow bags.
- Collect linen if to be reused in a separate drum (situated outside the OT, in the dirty utility section) containing 0.5 % sodium hypochlorite and after a contact time of at least one hour rinse them under running water, dry and send to the laundry.
- Treat blood/body fluid spills as mentioned in section 10.
- Remove gloves and discard in the red bag.
- Count used and unused instruments, collect and immerse them in a detergent germicide / enzymatic cleaner (both available as Schedule 5 items) for at least 30 minutes before rinsing with water. If required, also soak in 5% Lysol or > 2 % glutaraldehyde for another 30-60 minutes. Subsequently, rinse well under running water, dry and send for sterilization after appropriate packing.
- Damp wipe all horizontal surfaces such as operating table, trolleys, suction machine, monitors and OT lights with 0.1% sodium hypochlorite and dry with a fresh, clean, lint free cloth
- Wet mop the area under the table and 3 feet around it with the above disinfectant.
- Replace suction bottles and tubings for each case.

- The used suction bottles and tubings should be sent for reprocessing (reprocessing includes thorough cleaning with soap and water followed by autoclaving and drying)
- Disinfect all those areas which have come in contact with patient's blood/body fluid.
- Provide sufficient time between surgeries for this activity.
- Once cleaning is completed, give a gap of 15 minutes before the next case. This will dilute aerial contaminants released as a consequence of previous surgery due to the available air exchanges in OT.
- The sterilized trays should not be kept open at the start of the day but should be opened as and when new case arrives.
- Unwrapped items should be used on the same day.

5.3.4.2.1 D. End of the day

- Disinfect and remove all movable equipment from the room.
- Wet mop all horizontal surfaces with disinfectant.
- Clean scrub sinks and instrument wash sinks.
- Drains should be cleaned with 1 % sodium hypochlorite.
- Restock supplies.
- Liquid soap and hand scrub solution dispensers should be cleaned daily.

5.3.4.2.1 E. Following surgery on infected patients

(Includes patients infected with blood borne pathogens and gas gangrene)

Blood borne pathogens are transmitted by direct and indirect contact with non-intact skin, mucous membrane or needlestick / sharp injuries. They are not transmitted by the airborne route. Clostridia from a clinical contact surface can get deposited on an open wound. None of these are transmitted by the airborne route.

- A separate operating room should be available for performing surgery on infected patients if possible.
- If not available, infected patients should preferably be posted last.
- If surgery cannot be slated for last, no other surgery should take place in the same operating room for a distance of six feet until the area has been thoroughly cleaned and disinfected.
- Cleaning and disinfection should be done under supervision.
- The person performing the task of cleaning should have received appropriate instructions and vaccinated for Hep B, TT and other infections.
- Wear appropriate personal protective gears (PPE) – plastic full-length apron, gloves (rubber), goggles and mask.
- After surgery, manage all spills as described in section 10 above.
- Thoroughly clean with soap and water all those surfaces which have come in contact with the patient or operating team, such as the operating table, OT lights etc without generating splashes or wet a mop fully with sop solution.

- Subsequently, for disinfection, follow flooding technique i.e., pour the in-use dilution of surface and environmental disinfectant (check label for bactericidal, virucidal, fungicidal, mycobactericidal and sporicidal effect, available from medical stores, schedule 5) on these surfaces and provide a contact time of 10 mins for HIV / HBV / HCV. (Confirm the contact time by checking the label)
- A contact time of 4 hours is recommended following surgery on gas gangrene patients.
- Using a new, clean lint free cloth, wipe off the disinfectant.
- Allow to dry or facilitate drying by using another fresh dry lint free cloth.
- Use a clean mop wetted with the same disinfectant again to wipe the floor.
- Disinfect the door handles / knobs.
- Replace filters in suction apparatus and ventilators.
- Decontaminate the cautery with alcohol wipe.
- Discard all used cloth and mop in red bag.
- Empty the waste bins and replace waste bags
- Fogging / fumigation is recommended only in situations when the ventilation in OT is ineffective in removing infectious aerosols such as while operating on active lesions of tuberculosis, varicella (chicken pox) or measles. Fogging is not essential following surgery on patients with other infectious diseases not transmitted by the airborne route. Following surgery on TB lesions, provide a time of at least 4 hours before taking the next patient to dilute the numbers of infectious aerosols. Contact AE (M & E) to understand the appropriate time post -surgery when the air in the operating room would be cleaner.

5.3.4.2.2 Terminal cleaning [Weekly]

- In the presence of construction activity nearby, the AHU should be vacuum cleaned and the filters should be cleaned. Send a call to AE (M & E) for the same, 2 days in advance.
- On a routine basis, AHU, filters and ducting should be cleaned at least quarterly. Record of the same should be available.
- Clean all horizontal surfaces with soap and water.
- Clean the walls with soap and water up to 2 metres.
- Clean the sink and hand washing area well.
- Clean the drains.
- Follow measures enlisted in 1A and1D
- Before fogging
    - AHU - reduce the air exchange rate / shut down as required (otherwise, if the AHU / AC is on, all the disinfectant vapours will be released into the external environment due to air exchange and sufficient contact with disinfectant will not be available)
- Fog the OT with a non-aldehyde-based disinfectant (schedule V)

  - Know the volume of the OT complex.
  - Follow label instructions for fogging
- Ensure that the OT is sealed well during fogging
- OT can be opened after a contact time as mentioned in the product label (usually 1-2 hrs)
- The wet surfaces should be dried using a lint free sterile / clean absorbable cloth.
- Collect material for surveillance.
- Wait for report.
- The next morning, if the surveillance results are satisfactory, the OT can be used. Before using the OT, allow the AHU/AC to be full on for at least an hour.

5.3.4.2.3 Surveillance

A. Routine

Collect material for surveillance under supervision of staff nurse / sister in charge as per policy of hospital

This includes –

- exposure plates (2 per OT room, exposed near the table at table height for one hour and under air supply grill) or air samplers. Exposure plates are agar plates to be provided by the microbiology department.
- Swabs collected from a 9 sq. cm area of OT table, anaesthetic trolley, instrument trolley (use sterile pre-wetted swabs, use sterile normal saline for wetting) and OT lights
- Swab collected from OT wash basin tap inlet and outlet
- Water supplied to OT (once a month)
- Water quality testing by MCGM approved laboratory twice a year.
- Spore strips of autoclaves in use (once a month, the 1st week of every month)

Samples should be sent to the microbiology department.

Turnaround time for report – 18 to 24 hrs

Acceptable values: No growth in all swabs

Water quality as per potable water standards for bacteria.

Not more than one cfu in settle plates / not more than 30 cfu / m3 in air samplers in an empty theatre.

B. Following construction and / renovation involving civil and / or electrical work

- Collect material for surveillance, thrice after 3 successive washing, disinfection and fogging.
- Collect exposure plates daily.
- Collect 2 swabs from each sample site.

Turnaround time for report – 5 days (to rule out fungal growth)

5.3.4.2.4. Monthly

(A) Check engineering controls – Monitor and record the engineering parameters. This includes

Number of air changes per hour
Pressure differential
Temperature
Humidity

Send a call to AE (M & E) for the same, 2 days in advance.

(B) Pest control – a regular schedule should be decided. Procedure should be carried out with AHU shut down. Following the required contact time, aeration of at least one hour should be provided before using the operating room.

(C) Water tank cleaning and disinfection with bleaching powder and should be documented. Level of chlorination should also be checked.

Appendix I - Fogging / Fumigation of Operation Theatre

Fogging is not recommended (2016, WHO Global Guidelines for the Prevention of Surgical Site Infections) if operation theatre ventilation standards are met and is a modular theatre. Evidence is available for the same and documented. These include

a. The operation theatre has a HVAC unit consisting of air inlets, filter beds, humidity modification mechanisms, heating and cooling equipment, fans, ducts and air exhausts.

b. It provides –filtered air through at least two filter beds in series.

c. HEPA filters are present in operating rooms performing high risk surgeries such as ophthalmology, cardiovascular, prosthetic implants etc.

d. Operating room is under positive pressure to its surroundings.

e. There should be at least 20 air changes per hour of which at least four are of fresh air.

f. Air should flow from the ceiling and should be exhausted at the floor.

g. Temp should be 22 – 25° C

h. Relative humidity should be 20-60%

i. HVAC system can be reduced / shut down

j. Following fogging and after the required closure time, the HVAC system should be switched on and running for an hour before the first case is taken up for surgery.

k. Appropriate maintenance of the HVAC system should be documented. This should include regular inspection of filter systems (weekly), pressure differentials across the filters (weekly), testing of filters and pressure gradient (monthly), DOP tests where HEPA filters are present (every six months), measurement of particle counts (monthly) and periodic duct cleaning (weekly)

Weekly fogging is recommended for operation theatres where implant procedures are carried out.

Procedure – Fogging

- **Fumigation with formaldehyde is not recommended since it is a known carcinogen.**
- Use non-aldehyde based fogging agents (schedule V)
- Seal all the crevices in the doors and windows.
- Know the volume of the operating room to be fogged.
- Before fogging
  Do not shut down the AHU but reduce the air exchange rate. (Otherwise, if the AHU / AC is on, all the disinfectant vapours will be released into the external environment due to air exchange and sufficient contact with disinfectant will not be available).
- Follow label instruction for the in-use concentration.
- Use a fogging machine.
- While using a fogging machine, 500 ml of the diluted disinfectant usually suffices for 1000 c ft volume.

Window AC / Split AC should be replaced with HVAC. Until then,

-clean filters every week

-servicing every month

6. Sterilization of Instruments:

- Preferably autoclave and for heat sensitive equipment low temperature plasma sterilizers / ETO
- The instrument should be cleaned thoroughly prior to sterilization
- Cleaning should be done by a trained person.
- Cleaning of equipment and their accessories such as the phaco machine should be done only by doctors
- Instruments sterilized by flash process should be used immediately.
- As many sterile sets as the number of surgeries to be performed should be available.
- DO NOT use instruments that have not been sterilized. In between cases- autoclaving to be done in case of shortage.
- Chemical sterilant, glutaraldehyde, OPA etc are not preferred

Monitoring of Sterilization

- Prior to using the instruments, the sister in charge / staff nurse of OT should confirm that the item has been sterilised.
- A log book should be available which is recorded by a person sterilizing and supervised by a sister in charge of OT. *
- Ensure that the apertures on individual drums and trays are left in open position to facilitate steam penetration during autoclave cycle and are closed immediately on taking out from the machine.
- Unwrapped autoclaved items should be used the same day and immediately.
- Wrapped autoclaved items can be stored hygienically for a maximum of 48 hrs provided standard quality wrapping material is used.
- Items wrapped in newspaper / brown paper should be used within 24 hrs.
- **Chemical indicators – Each drum and tray should have 2 indicator tapes -** One on the outside and one on the inside.
- Microbiological indicators (Geobacillus stearothermophilus spore strips / ampoules) should be used weekly initially and monthly thereafter.

***The log book should capture the following information at least.**

Sr No	Date of run	Cycle no	Temp	Pressure	Holding time (not less than 20 mins)	Drum no	Content of drum	Tray no	Content of tray	Record of indicator tapes including biological when used	Sign

7. Training-

- Periodic assessment and training of OT personnel through seminars and educational videos and records to be maintained

8. Records to be maintained-

- Autoclave-Calibration annually
- Logbook
- Capture temperature of OT and humidity
- Chemical indicators for every drum or tray- By sister in charge. staff nurse to be signed every day
- Biological indicators every week - By sister in charge staff nurse to be signed every day
- Terminal cleaning once a week and sampling every time with settle plates (for quality fair) and swabs
- AC filter to be cleaned every week and AC every month. Records should be available.
- Fogging after every septic case in ophthalmic OT.
- Swabs to be collected –
    - OT table head end
    - Overhead lamp of microscope
    - Instrument trolley
    - Anaesthetic trolley

- AC duct (where possible and periodically)
- Microscope handle

9. What to do in case of infection?

- Dialogue with patients and relatives
- Explain-
  - Mechanics of infection
  - It is still treatable
  - Need for cooperation and referral
- Document all findings
- Review all sterility factors
- Have peer review
- Refer to higher centre
- Treat energetically with antimicrobials and supportive therapy
- Seal and take cultures from OT
- Seal and keep all solutions used in safe custody

10. What to do - In cluster infection /outbreak

- A cluster infection is defined as the occurrence of two or more than two infections at a time, or the occurrence of repeated post-operative infections.
- Inform authorities (CMO, MS, Senior authority) and Institute infection control committee. Take a meeting and perform root cause analysis.
- Collect appropriate samples from patients and patient care items.
- Treat early and vigorously.
- Engage and seek help of lawyer
- Handle press carefully (prevent pandemonium from spreading)

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K.E.M HOSPITAL INFECTION CONTROL COMMITTEE

CHECK LIST FOR INFECTION PREVENTION MEASURES TO MINIMIZE THE RISK OF SURGICAL SITE INFECTIONS

MINIMUM RECOMMENDATIONS - OPERATING ROOM

[Put a tick in the respective cell if task completed and a X if not completed]

- For disinfection of environmental surfaces use Ecoshield / Fumiclenz available from stores [For in-use concentration, check the instructions on the bottle]
- Use a clean cloth to mop / wipe these surfaces
- Allow to dry before use
- If dirty, cleaning should precede disinfection
- Do not dry dust [do not use jhaadoo in the OT]. Vacuum cleaning is recommended.
- * Engineering parameters to be confirmed include Temperature [18-22°C], Humidity [40-60%], Positive pressure in the OT and > 15 air changes per hour.

Date				
Beginning of the day				
Engineering parameters *				
Temperature 18-22°C				
Other engineering parameters were confirmed within the past week				
Environmental surfaces				
The operating table / s have been disinfected				
Instrument trolley/ s have been disinfected				
Anaesthetic trolley / s has been disinfected,				
OT lights have been disinfected				
Monitors have been disinfected				
Cautery has been disinfected				
Other surfaces which will be touched by the surgical team have been disinfected				
The floor is disinfected				
Door handle if any has been disinfected				
Sterile drapes are placed over all these surfaces prior to surgery				

Surgical instruments				
Sterile instruments are used				
The sterility has been confirmed with chemical tape and is recorded				
Autoclave log book is complete				
The instruments and linen have been sterilized within the last 24 hours				
Sterile items used in the theatre are stored in a clean and hygienic manner				
Other patient care items				
Suction bottles have been cleaned and disinfected				
Each patient has received a new sterile suction tubing				
Other items used on the patient have either undergone high level disinfection [if semi-critical] or sterilization [if critical item]				
Preparation of surgical team				
Theatre slippers used were clean				
Caps are available				
Sterile masks [surgical] were used				
Surgical scrub was practiced appropriately by the entire surgical team				
Sterile gowns were used				
Sterile new pair of gloves were used				

SECTION 13 – POST EXPOSURE PROPHYLAXIS

Post Exposure Prophylaxis (PEP) in HIV

Rationale for PEP:

Post exposure prophylaxis refers to the comprehensive management given to minimize the risk of infection following potential exposure to blood borne pathogens (HIV, HBV, HCV). In human studies, AZT reduces MTCT by 67% and AZT + 3TC before delivery reduces MTCT by 50% and at labour by 37%. Tenofovir was administered 48 hrs before, 4 hrs after & at 24 hrs in SIV inoculated macaque & continued for 4 weeks. None of the animals turned positive when drug was administered 48 hrs before, 4 hrs after exposure. All animals turned positive when drug was not given or started after 24 hrs. Few animals turned positive when drug was given for 3- 10 days only.

This includes: First aid, Counselling, Risk assessment, Relevant laboratory investigations based on informed consent of the source and exposed person, depending on the risk assessment, the provision of short term (4 weeks) of antiretroviral drugs and Follow up and support

The following text explains which "exposures" are risky-

1. Per cutaneous injury (e.g., needle-stick or cut with a sharp instrument)

2. Contact with the mucous membranes of the eye or mouth

3. Contact with non-intact skin (particularly when the exposed skin is chapped, abraded, or afflicted with dermatitis)

4. Contact with intact skin when the duration of contact is prolonged (e.g., several minutes or more) with blood or other potentially infectious body fluids.

Risk of HIV transmission through needle stick injury is considered as 0.3% while a mucous membrane exposure has a risk of 0.09%.

Assess Risk for HIV Infection:

A. **Type of exposure:**
   1. Less severe: solid needle or superficial injury
   2. More severe: large-bore hollow needle, deep puncture, visible blood on device, needle used in patient's artery or vein
B. **Infection status of source**:
   Class 1: asymptomatic HIV infection or known low viral load (<1,500 copies/mL)
   Class 2: symptomatic HIV/AIDS, acute seroconversion, or known positive pt. with high viral load

Type of Exposure:

High viral load	Low viral load
• Frank blood • Bloody fluid • Semen • Vaginal secretion • CSF • Amniotic fluid	• Stool • Saliva • Milk • Sweats • Tears • Urine

PEP is not required in:

- Exposure to low viral load secretions
- Exposure to intact skin from any source - positive or negative or unknown status
- Mosquito bite
- Barbers

Indications for PEP:

- Needle stick injury
- Scalpel injury
- Mucus membrane exposure
- Skin contact (hands & face)
- Sexual exposure

Assessing the nature of exposure and risk of transmission

Exposure category	**Definition and examples**
Mild	**Mucous membrane / non intact skin with small volumes** e.g.: erosion of the epidermis with a plain or low calibre needle contact with eyes or mucous membranes subcutaneous injections following small bore needles
Moderate	**Mucous membrane / non intact skin with large volumes OR** **Percutaneous superficial exposure with solid needle** e.g. A cut or needle stick injury penetrating gloves
Severe	**Percutaneous with large volume e.g.** ● An accident with a high calibre needle (>/= 18G) visibly contaminated with blood ● a deep wound ● transmission of large volume of blood ● an accident with a material that has previously been used intravascularly

PEP for Percutaneous Injuries from HIV + Source

Exposure Type	Infection Status of Source		
	HIV+, asymptomatic	HIV+, symptomatic	Status not known
Less severe	Recommend basic 2-drug PEP	Start 2 drug	Usually, no PEP or consider 2 drug PEP
Moderate	Start 2 drug PEP	Start 3-drug PEP	
More severe	Start 3-drug PEP	Start 3-drug PEP	

HIV status of the source patient should not delay initiation of PEP.
PEP must be initiated as soon as possible preferably within two hours of exposure.

Action to be taken by HCWs:

1. Wash the area with soap and water
2. Avoid squeezing or milking the wound
3. Do not use caustic agents, such as bleach
4. Determine risk i.e., Type of exposure and Infection Status of Source
5. Decide on treatment
6. Get lab investigations and follow up in 3-6 months

If PEP has been started and source later determined to be HIV negative, PEP should be discontinued. Initiate PEP as early as possible and within 72 hours. 2-3 drug regimen is advised based on risk. PEP should be given for 28 days,

Dosages of the drugs for PEP for adults	**Recommendation for PEP**	**Duration**
Tenofovir (TDF) 300 mg + Lamivudine(3TC) 300 mg One Tab (FDC) once daily (1-OD)	One tab immediately within 2 hours of accidental exposure, either at day time or at night time	Next day one tab once OD, continue for 4 weeks

Lopinavir (200 mg) + Ritonavir (50 mg) Two Tab (FDC) twice daily (2-BD)	Two Tab Immediately within 2 hours of accidental exposure, either at day time or at night time	Next day two-tab BD, continue for 4 weeks
If LPV/r is not available / cannot be used, Tenofovir(300mg) + Lamivudine (300 mg) + Efavirenz (600 mg), One Tab OD may be given for 4 weeks.		

Post Exposure Prophylaxis - Hepatitis B

All health staff should be vaccinated against Hepatitis B. The vaccination for Hepatitis B consists of 3 doses- initial (zero) dose, 2nd at 1 month and 3rd dose at 6 months. Seroconversion after completing the full course is 99%. If the exposed person is unvaccinated or unclear vaccination status, give complete Hepatitis B vaccine series.

Follow-up of an Exposed Person:

Whether or not PEP prophylaxis has been started, follow-up is indicated to monitor possible infections and to provide psychological support.

Clinical follow-up: In addition, in the weeks following an AEB, the exposed person must be monitored for the eventual appearance of signs indicating an HIV seroconversion: acute fever, generalised lymphadenopathy, cutaneous eruption, pharyngitis, non-specific flu symptoms and ulcers of the mouth or genital area. These symptoms appear in 50-70% of individuals with a primary (acute) HIV infection, almost always within 3 to 6 weeks after exposure. When a primary (acute) infection is suspected, referral to an ART centre for an expert opinion should be arranged immediately.

An exposed person should be advised to use precautions (e.g., avoid blood or tissue donations, breastfeeding, unprotected sexual relations or pregnancy) in order to prevent secondary transmission, especially during the first 3 months following exposure. Condom use is essential. Counselling regarding adherence and side-effects should be provided and reinforced at every follow-up visit. If PEP is prescribed, the exposed health care provider should be followed up every week with laboratory tests recommended below; psychological support and mental health counselling is often required.

Minimum Laboratory Follow-up recommended for PEP for HIV*

Timing	**In person taking PEP (standard regimen)**
Weeks 2 and 4	Complete blood count (For patients on AZT, this is useful)
Week 6	HIV-Ab
Week 12 (Month 3)	HIV-Ab
Week 24 (Month 6)	HIV-Ab

At all times, address need for assessing HBV and HCV status.

SECTION 14 – INFECTION CONTROL AT AUTOPSY

INTRODUCTION

An autopsy is a very valuable tool for identification of the cause of death and for understanding the nature of the disease and effect of treatment. However, the autopsy room is a potential source of blood borne as well as aerosol-induced infection of health care workers involved in conducting post-mortems and also those attending autopsies.

It is mandatory that all persons entering into the autopsy room during the course of an autopsy for performing or attending autopsies (including medical students, residents, observers or other hospital staff), photographing bodies as well as all mortuary staff handling &/or transporting bodies strictly adhere to the standard precautions and practices in the autopsy section at all times.

While no safety precautions can completely eliminate exposure, strictly following the safety guidelines have been shown to significantly reduce the level of exposure to infections.

ROUTES OF TRANSMISSION:

Infections in autopsy room may be acquired by one or more of the following routes:

(a) Wounds due to needles, other **sharp** instruments or objects contaminated with blood or body fluids.
(b) **Splash** of blood or other body fluids onto an open wound or area of dermatitis.
(c) Contact of blood or other body fluids with **mucous membranes** of the eyes, nose or mouth.
(d) **Inhalation and ingestion** of aerosolized particles.

The principal biological risks faced by autopsy/mortuary workers are infections caused by *Mycobacterium tuberculosis,* blood borne viruses (HBV, HCV, HIV), rabies, tetanus, plague, meningococcal meningitis, haemorrhagic fever viruses, respiratory viruses, anthrax, and agents responsible for transmissible spongiform encephalopathies (TSE), such as variant Creutzfeldt-Jakob disease. All these pathogens retain their infectivity after death.

PURPOSE

The objective of autopsy biosafety policy is to provide autopsy staff and any visiting personnel with an environment as free as possible from the risk of exposure to infective agents and practices that minimize the risk of exposure to biohazards.

Some infections may be asymptomatic, undiagnosed or undisclosed. Hence all dead bodies should be considered to be potential carriers of infection and **Standard Precautions should always be strictly followed** while conducting autopsies or handling dead bodies (refer to section 3).

The below-mentioned safety guidelines are minimum measures intended to minimize the risks of contracting an infectious disease during the performance of an autopsy.

The basic biosafety principles for the autopsy section are intended for:

- Prevention of puncture wounds, cuts, abrasions by safe handling of needles and sharp instruments
- Protection of existing wounds, skin lesions, conjunctiva, and mucous membranes with appropriate barriers
- Prevention of contamination of workers' skin and clothing with appropriate barriers and hand washing
- Prevention of infections that can be potentially transmitted through aerosols
- Control of work surface contamination by containment and decontamination
- Safe disposal of contaminated waste
- Prevention of infections by vaccination wherever possible as well as early detection and appropriate management of infections by prompt reporting of occupational exposure and periodic employee health assessments

RESPONSIBILITIES

- **Heads of Departments of Pathology & Forensic Medicine** are responsible for the operational implementation of this policy and for ensuring that all the staff members working under their supervision are aware of the potential for transmission of various infections including emerging and re-emerging infections, be cognizant of standard precautions and that it is their responsibility to adhere to the measures stated in the hospital infection committee policy. An initial HIC organized orientation and subsequent periodic training and education in safe post-mortem procedures, prevention of sharp injuries and other kinds of exposures should be imparted to the autopsy personnel.
- **All faculty posted in the autopsy section and autopsy surgeons** are responsible for ensuring that their junior colleagues, autopsy servants & sweepers as well as students, trainees and observers under their supervision adhere to autopsy section related safe working practices.
- **Lecturer(s) posted in the autopsy section** will be responsible for ensuring regular maintenance of the "Autopsy Waste Disposal" log book which records daily autopsy waste disposal & disposal of stored tissues.
- **Resident pathologists posted in the autopsy section** will be responsible for supervision of the daily disposal of autopsy waste by the autopsy servants and prompt recording of the same in the "Autopsy Waste Disposal" log book which is to be stored in the autopsy surgeon's room.
- **All employees working in the autopsy section** are responsible for ensuring that the principles of Standard Precautions are strictly adhered to for their own safety, the safety of employees working with and around them as also the general public. It is also their

duty to report any breach of this policy immediately to the Head of their section/department.

- **All autopsy surgeons and other autopsy section employees** are strongly urged to report occupational exposures immediately.

PROCEDURES OF AUTOPSY BIOSAFETY PRACTICES

These will be categorized under the following sections:

1. General Rules
2. Autopsy Room infrastructure
3. Isolation Room
4. Attire – Personal Protective Equipment (PPE)
5. Safe Sharp Practices
6. Limiting aerosols
7. Cleaning and decontamination of work surfaces, equipment, floors, walls & laundry
8. Handling of spills
9. Hand washing
10. Remains
11. Storage & transportation of tissues
12. Biowaste disposal
13. Photography
14. Employee health

1. General Rules

- All autopsies and fresh autopsy tissues must be handled as if they contain an infective agent (**Standard Precautions** should be mandatorily and stringently employed).
- The entire autopsy area and its contents are **designated a biohazard area** and posted with appropriate warning signs.
- Entry to post-mortem examination room should be restricted to the experts and workers who are trained in handling the infected material.
- **Eating, drinking, smoking, storage of food, applying cosmetics or handling contact lenses** is strictly **NOT PERMITTED** in the autopsy room and areas where specimens are either processed or stored. Appropriate instructions should be posted for the same. These activities shall be confined to designated staff rooms or other specified areas.
- Whenever possible, post-mortem examinations are carried out during normal working hours by adequate, well-trained staff because it has been shown that the risk of accidental exposure is greater among the inexperienced and when autopsies are performed under conditions of physical fatigue.
- If multiple autopsies are to be performed sequentially, those with the greatest infective risk should be done first, before the staff becomes fatigued.
- It is helpful to have a **"clean" circulating assistant / circulator** who avoids direct contact with potentially infected or contaminated tissues, fluids, and surfaces and so remains

"clean" to record weights, measurements, and other observations, label specimens or containers, fetch any needed supplies, adjust overhead lighting, liaison between the prosector, clinicians and administrators (including making / taking phone calls) etc.

- Immunodeficient individuals and individuals who have uncovered wounds, weeping skin lesions or dermatitis should not perform the autopsy. Hand cuts, abrasions etc., of autopsy staff should be covered with a water-impermeable occlusive bandage.
- All procedures are carried out in a way that reduces the risk of splashes, spills, droplets, or aerosols.
- All contaminated equipment, instruments, containers, swabs, clothing etc. should be confined to designated areas (autopsy tables, instrument tables, dissection areas, sinks and discard bins).
- Paperwork leaving the autopsy area must not be contaminated with blood or body fluids. Paperwork that is contaminated by blood or fluid should be discarded into appropriate garbage bag lined bins and replaced by uncontaminated copies of the paperwork before the paperwork leaves the autopsy room.
- Telephone calls should not be taken by the autopsy surgeon or assistants during the autopsy.

2. Autopsy Room Infrastructure

- The autopsy room should be well ventilated with a good drainage system and preferably a negative airflow exhaust system.
- A separate low-traffic isolation room should be available for high-risk cases.
- Autopsy tables should be preferably made of stainless steel, be adequately long and wide with a raised edge all around to prevent spillage and should have a sufficient tilt to allow free drainage of water from top to bottom. A large sink with water supply should be provided at the foot.
- The room should be well lighted with illumination that is independent of daylight. Adequate overhead fluorescent lamps plus at least one lamp with a flexible metal neck that can shine at an angle into the base of the skull and into the thorax and abdomen should be provided.
- Walls should be tiled at least to shoulder height. Smooth flooring is important to avoid the collection of dirt in innumerable cracks. The floor should incline towards the drainage point.
- Cracks in the floor and plumbing related leakages should be promptly repaired.
- The door(s) to the autopsy room should be provided with a door closure and a locking system to control entry of persons into the room. Appropriate warning signs should be posted on the door(s).
- A separate corner should preferably be delineated for specimen photography
- A separate toilet, shower, changing room and linen room should be available for autopsy servants / morgue attendants.

- A separate room should be provided to the autopsy surgeons and this should contain an office desk, hand basin with liquid hand-wash, alcohol-based hand-sanitizers (e.g., Sterilium), antiseptics, waterproof bandages, first aid supplies and adequate storage facilities for keeping stationary and equipment required for performing autopsies.
- In cases in which facilities are inadequate, it is advisable to identify alternative, better-designed, safer sites for postmortem examinations.

3. Isolation Room for specific types of high-risk autopsies

- Although all autopsies are performed in a manner that reduces the risk of contamination, autopsies of bodies that harbour a known pathogenic microorganism are best performed in a separate specially designed room to isolate and contain any infective material (Box 1).
- While performing these autopsies, personnel are limited to only those necessary — generally three staff members, including at least one experienced pathologist and an "clean" assistant who avoids direct contact with the deceased but assists with handling of stationary, specimen containers.
- The isolation room should have all the infrastructural aspects mentioned for the above-mentioned general autopsy room.
- As usual, Standard Precautions are strictly enforced.
- A separate set of instruments should be dedicated for high-risk autopsies.
- Special safety and decontamination procedures are instituted as required.
- With proper precautions, ultraviolet lights may be used for secondary decontamination.
- If an isolation room is non-existent /not available /not usable and there is more than one autopsy table available in the autopsy room, the table with the least traffic should be used for the infective case.
- Infections for which post mortem examinations should be performed in a separate or "isolation" room
    - Hepatitis
    - HIV
    - Influenza
    - Leprosy
    - Meningococcal meningitis
    - Plague
    - Prion disease
    - Rabies
    - Tuberculosis

If an ante mortem diagnosis has been obtained for the above, refrain from autopsies.

4. Attire – Personal Protective Equipment (PPE)

- For all autopsies, personal protective equipment (PPE) includes double sets of properly-fitting rubber gloves (double-gloving), gowns, plastic disposable aprons, caps and N-95 particulate masks/respirators and face shields.
- Finger rings, watches, bangles, bracelets or other items worn on the fingers/hands/wrists should be removed before wearing gloves as multiple perforations are often found in the gloves when these are not removed.
- Plastic aprons are not to be used as a sole source for protection.
- In all suspected / confirmed high-risk autopsies, in addition to the above-mentioned PPE eye protection goggles with solid side shields or chin-length face shields (to protect the mucous membranes of the eyes, nose, and mouth from exposure to splashes), elbow-length gloves, shoe covers or gumboots shall be worn – where splashes, spray, splatter, or droplets of blood or other potentially infectious materials may be generated and eye, nose, mouth or skin contamination can be reasonably anticipated.
- Frequent changing of the outer gloves and preferably other PPE is recommended when the same personnel is performing multiple consecutive autopsies.
- Dispose of PPE in designated containers before leaving the autopsy room.
- When removing gloves, the following technique limits the risk of exposure to potentially infected material: -
  - Grasp the palm of the first glove just below the wrist
  - Roll the glove towards the fingertips so that it turns inside out
  - Place two fingers of the bare hand inside the cuff of the remaining glove
  - Roll the second glove towards the fingertips with the bare hand until the first glove is inside the second glove
  - Continue to remove until both gloves are inside out
  - Dispose of used gloves in the appropriate waste bin
  - Wash and dry hands.

5. Safe Sharp Practices

Hazards are posed both by equipment used to perform the necropsy (scalpels, scissors, needles, and saws) as well as hidden sharp objects in the body itself (bone fragments and unsuspected objects within the body e.g., fragments of needles in the subcutaneous tissues & even myocardium of intravenous drug-users etc.) Care should also be exercised to minimize the risk of injury from sharp instruments during dissection or trimming of tissues for microscopy.

The frequency of injuries sustained while performing autopsy procedures can be reduced by several simple practices.

- Equipment used to perform the necropsy should be kept to a minimum. Place all scalpels & other sharp instruments in clear view on an instrument shelf/table and not haphazardly on the dissection table.

- Minimize the use of scalpels for tissue dissection. Wherever possible use a pair of scissors instead of a scalpel during autopsy procedures, including evisceration. Use of blunt-tipped, rather than pointed, scissors for autopsy tissue dissection is advisable.
- Remove scalpel blades only with a special safety scalpel blade remover.
- Never pass on scalpels/knives directly from hand to hand; place the instrument on a flat surface for transfer.
- Announce in advance any movements that involve repositioning of a sharp instrument.
- When making slices of large organs with a long knife, use a thick (3-inch) gauze / sponge to stabilize the organ with the noncutting hand.
- When cutting the coronary arteries, a thick pad of gauze or cotton should be kept between the heart and the noncutting hand.
- When dissecting with a sharp implement in one hand do not hold tissues with the fingers of the noncutting hand, instead use a long-handled tissue forceps in the opposite hand one to apply counter-traction on tissues.
- For high-risk cases, steel-link gloves or some other scalpel-resistant material can be used.
- Obtaining sections for histopathology, which requires the use of a scalpel, should preferably be done the day or two after an autopsy, after the tissue intended for sectioning has been fixed adequately.
- As far as possible, the use of needles should be avoided to prevent needle-stick injuries.
- When suturing the body wall at the end of the autopsy, hold skin flaps with a large toothed forceps or toothed clamp and handle suture needles with forceps rather than with a hand.
- Blunt needles and bulb syringes should be used to aspirate fluids in most situations.
- Needles, syringes, scalpel blades and any other sharps should be disposed, immediately after use/detection, directly into puncture-resistant ‘Sharps Bin’ within easy reach; they should not be left lying around the work area.
- Because many needle stick accidents occur during disposal of needles, needles should ***never*** be recapped, removed from syringes purposely bent, clipped, or otherwise manipulated by hand after use.

Should a needlestick or scalpel injury involving exposure to blood or body fluid occur, the procedure mentioned in section 13 should be followed.

6. Limiting Aerosols

While tuberculosis is the most common aerosol-transmitted infection in India other infections including rabies, plague, meningococcaemia, viral haemorrhagic fevers, legionellosis, rickettsioses, coccidiomycosis, and anthrax may also be acquired by aerosols generated during an autopsy.

Tuberculosis can be transmitted via aerosolized respiratory droplets either from opening the chest cavity during autopsy or from initial severe trauma or even from compression of the chest while moving the body. It has been shown that cutting of infected lung with a knife can generate small particle aerosols. Hence careful procedure is recommended in every case. Immunosuppressed cases with disseminated tuberculosis are likely to have numerous tubercle bacilli and thus pose a greater risk of acquisition of tuberculosis at autopsy.

The hazards for the formation of aerosols also relate to the use of saws (especially power saws) and opening of the stomach and intestines.

Strategies that reduce aerosol generation are outlined in Box 3.

Box 2: STRATEGIES THAT REDUCE INJURY FROM SCALPELS AND OTHER SHARP AUTOPSY INSTRUMENTS

In general, prosectors should limit their activities to the autopsy table and dissecting area and shut out distractions while using sharp instruments.

Equipment used to perform the necropsy should be kept to a minimum. Place all scalpels & other sharp instruments in clear view on an instrument shelf/table and not haphazardly on the dissection table.

Minimize the use of scalpels for tissue dissection. Wherever possible use a pair of scissors instead of a scalpel during autopsy procedures, including evisceration. Use of blunt-tipped, rather than pointed, scissors for autopsy tissue dissection are advisable.

Remove scalpel blades only with a special safety scalpel blade remover.

Never pass on scalpels/knives directly from hand to hand; place the instrument on a flat surface for transfer.

Announce in advance any movements that involve repositioning of a sharp instrument.

When making slices of large organs with a long knife, the prosector should use a thick (3-inch) gauze / sponge to stabilize the organ with the noncutting hand.

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When dissecting with a sharp implement in one hand do not hold tissues with the fingers of the noncutting hand, instead use a long-handled tissue forceps in the opposite hand one to apply counter-traction on tissues.

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Needles, syringes, scalpel blades and any other sharps should be disposed, immediately after use/detection, directly into puncture-resistant ‘Sharps Bin’ within easy reach of the prosector; they should not be left lying around the work area.

Because many needlestick accidents occur during disposal of needles, needles should ***never*** be recapped, removed from syringes purposely bent, clipped, or otherwise manipulated by hand after use.

Additional measures enhance safety in the autopsy room even further:

- A plastic bag or tent may be placed around the mechanical saw while it is being used to cut the skull and spine.
- Surgical towels may be placed over the cut edges of the rib cage while the chest is being eviscerated and the thoracic spine and spinal cord cut.
- For autopsies on patients where a transmissible spongiform encephalopathy (TSE) / slow virus infection is suspected, disposable instruments should be used.

Box 3: STRATEGIES THAT REDUCE AEROSOL GENERATION

- Aerosolization of bone dust while cutting the skull or vertebral bodies can be reduced with a plastic cover on the saw. Bone surfaces should be moistened before sawing to cut down the dispersal of bone dust. Bones should be cut with a hand saw and under plastic covering rather than with electric saw.
- To avoid spattering, do not sear (burn) tissue to sterilize it before obtaining a culture.
- Instead, swab the organ surface centrifugally with an iodine solution and incise centrally before a sample is removed.
- Specimen handling - All specimens are to be handled gently to avoid splashing and aerosolization of infectious material while removing, washing or otherwise handling organs. High pressure water sprays should not be used.
- Some authors have recommended eviscerating the infected body organ by organ, rather than with the more traditional technique, in which the organs are removed en bloc.
- Clear plastic bags can be placed over the head while eviscerating the brain.
- The stomach and intestines should be opened under water.
- If the presence of pulmonary tuberculosis has already been documented, the lungs may be insufflated with formalin before sectioning.
- Screw cap containers are preferable to snap-top, rubber-stoppered, or cork-stoppered containers for storing samples of blood or body fluids. When opening capped containers, cover the opening with a plastic bag to contain aerosols and splashes.
- Down draught ventilation tables reduce the particle transmission of microorganisms (and have the added advantage of reducing odours).

Sections 7, 8, 9 below will be edited according to the respective HIC sections on these procedures

7. Cleaning And Decontamination of Work Surfaces, Equipment, Floors, Walls and Laundry

* *The disinfectant – a 1:10 dilution of sodium hypochlorite should be prepared daily.*

* *Contaminated disposables are discarded into red/yellow-bag lined bio-waste disposal bin.*

- **Work surfaces**: should be rinsed with hot water followed by a 1:10 solution of bleach. Splashing should be avoided. Contaminated work surfaces should be decontaminated:
  - *After completion of procedures;*
  - *Immediately after any spill of blood or other potentially infectious materials*
  - *At the end of the shift if the surface may have become contaminated since the last cleaning.*

- **Instruments and autopsy devices**: should be immersed in a detergent solution for at least 10 minutes, then rinsed with water and decontaminated by soaking with disinfectant such as sodium hypochlorite (1:10 solution of household bleach in water) or 2% aqueous glutaraldehyde for another 30 minutes. Glutaraldehyde is advantageous because, unlike bleach, it doesn't damage aluminium and steel.
  * *Equipment that has been contaminated with blood or other fluids should be disinfected before being repaired in the department or transported to engineering section or the manufacturer*

- **Floors** & **walls** in the autopsy work area should be cleaned with a detergent solution, decontaminated with 1:10 solution of sodium hypochlorite and lastly mopped with water. This should be done:
  - *After completion of procedures;*
  - *Immediately after any spill of blood or other potentially infectious materials*
  - *At the end of the shift if these may have become contaminated since the last cleaning.*

  A cleaning log book should be maintained to document cleaning of the autopsy room and equipment. The log book is maintained by the autopsy resident & lecturer and is stored in the autopsy surgeon's (doctor's) room.

  If available, **ultraviolet light** provides a secondary source for decontaminating room surfaces and air.

- **Fumigation:**
  Fogging is to be done with 20% **Ecoshield / Virkon** fog using Fog spraying machine.

  Ecoshield is a complex formulation of stabilised hydrogen peroxide 11% w/v with 0.01% w/v silver nitrate. In the sterilization process the vapor breaks down into non-toxic oxygen and water.

  Vaporized hydrogen peroxide has been successfully used as a non-destructive sterilant for the decontamination of laboratory equipment and materials (e.g., telephones, cameras, computers, pipettes, and even electric drills) from a containment laboratory.

  The autopsy room should be adequately sealable for vapor-phase decontamination.

  Equipment: Fog spraying machine generated aerosol should release droplets of 7–20 μm.

Procedure:

1. Thoroughly clean windows, doors, walls and all washable equipment.
2. Close windows, doors and ventilators tightly. If any opening is found seal it with tape.
3. Switch off all lights and other electrical equipment.
4. Calculate the room size (L x B x H) and calculate the amount of Ecoshield required.
5. Fumigating employee(s) must be protected with PPE.
6. Because of the potential for exposure to the hazardous chemicals used, gaseous decontamination of rooms should only be carried out by trained personnel – preferably two persons should carry out the procedure.
7. The fogging machine is run for 90 min and thereafter the room is kept closed.

- **Laundry:** All laundry should be treated as contaminated and disinfected in a routine fashion. Any wet clothing, towels, or other reusable laundry should be placed into leakproof biohazard bags before transport.

8. Cadavers

All bodies should be handled with caution.

Before the autopsy:

All bandages are removed and put into the yellow-bag lined garbage bin. A 2% bleach solution is then used to wash off visible blood on body surfaces

After autopsy:

The cadaver should be stitched properly so that no fluid can come out. It should then be washed with a detergent solution followed by an antiseptic such as a 1:10 solution of sodium hypochlorite. The nose and mouth should be plugged with cotton swabs soaked with the Sodium hypochlorite solution. The body should then be rinsed with water and placed in a disposable leak-proof plastic body bag especially in known HIV seropositive cases but preferably for all cadavers. If necessary, place a warning on the outside of the body bag, alerting others to the possibility of leaking fluids.

9. Storage And Transportation Of Tissues

- Fresh tissues/specimens to be preserved should be immediately placed in 10% formalin fixative in non-breakable plastic containers with water-tight lids.
- Specimen for storage in refrigerators/cold rooms must be covered with a leak-proof lid and clearly labelled for that purpose.
- The outside of the container should be free of blood and body fluids from the autopsy. Before transporting tissue outside the autopsy suite, the container should be placed in an impermeable plastic bag and securely tied.
- Uncovered fixed tissue of any kind should <u>not</u> be stored in morgue coolers or left out on counters. No tissue containers should be stored out on the floor at any time

Adequate fixation in 10% formalin requires an amount that is at least 10 times the tissue volume; this kills or inactivates all important infective agents except prions and mycobacteria.

Mycobacteria remain viable in tissues for days, and these organisms are even difficult to kill with standard formalin fixatives or embalming fluids. Mycobacterium are killed in a fixative of 10% formalin in 50% ethyl alcohol.

Fixation of HIV seropositive tissue: the entire organ block and the brain are immersed in adequate quantity of 10% formalin for at least one week before dissection of the organs/viscera.

Demonstration of Organs at Gross Meetings

Fresh organs are not to be shown at gross meetings. All organs must be formalin-fixed for at least 24 hours, and then washed before the meeting. In order to minimize formalin exposure at autopsy meetings, all organs must be washed thoroughly.

Washing of organs before the gross meeting

1. Formalin is discarded into the waste containers, and the organs are rinsed for 30 minutes in a large bucket of water.
2. Two such buckets will be prepared and used/shared for ALL the cases before each conference. This “first rinse” water (2 buckets/conference) will be discarded as formalin waste after all cases have been rinsed.
3. After the initial “bucket rinse”, the organs will be rinsed in running water from the tap.
4. There is NO specific formalin sink, but drain formalin levels should be kept to a minimum by NEVER dumping formalin directly into the sink and pre-rinsing the organs in the bucket.

Preparation of Blocks for Microscopic Slides

Adequate time (at least 24 hours) must be allowed for fixatives to penetrate tissues before trimming blocks for histology.

Fixed specimens from autopsies are to be cut into blocks only in the autopsy section room. Appropriate attire includes gloves and apron at a minimum

10. Bio-waste Disposal

Waste for disposal should be discarded in specially designated biohazard (red/yellow) waste bags, secured, and stored in metal or plastic canisters until removal.

The resident pathologists posted in the autopsy section should supervise the daily disposal of autopsy waste by the autopsy servants and promptly record the same in the “Autopsy Waste Disposal” log book which is to be stored in the autopsy surgeon’s (doctor’s) room.

The lecturer posted in the autopsy section will be responsible for ensuring regular maintenance of the "Autopsy Waste Disposal" log book which records daily autopsy waste disposal & periodic disposal of stored tissues.

Discarding Fixed Specimens

It is the responsibility of lecturer and residents posted in the autopsy section to discard tissues promptly; only specimens from medico-legal or potential medical-legal cases will be saved indefinitely; specimens from other cases will be discarded after histopathology diagnosis is completed, unless the faculty pathologist specifically asks that the save period be extended.

11. Photography

- Photography of fresh specimens requires the same precautions employed for doing the autopsy.
- In situ photographs involve the additional risk of moving fresh possibly infected tissue around the room. Photography of fixed specimens is cleaner and, in this respect, preferable, especially when an infective agent is known to be present.
- A separate photography corner should be delineated.
- Whether the specimen is fresh or fixed, a pan should be used for transport of the organ to the photographic stand.
- The camera must be kept clean and should be handled with fresh pair of clean gloves or preferably by a person who stays clean e.g. a "clean" circulating assistant.
- After photographs have been taken, the photo-stand should be cleaned with disinfectant.
- Cameras, lenses, and other photographic equipment may be disinfected with a variety of germicidal substances without compromising their functionality.[10] A hands-free camera system would also reduce contamination risk.

12. Employee Health

- Employees are strongly urged to get themselves vaccinated against hepatitis B and tetanus.
- If exposure as defined by the Centers for Disease Control and Prevention (i.e., potential introduction of virus through skin puncture or contact with mucous membranes) occurs, post-exposure prophylaxis (PEP) should be undertaken.
- All employees should have yearly purified protein derivative (PPD) skin tests & chest X-rays.
- **Cuts or needlestick injuries involving exposure to blood or body fluid:** the injured person should stop dissecting immediately, allow the wound to bleed freely, *immediately* wash the cuts or needle-stick injuries with soap and water and then apply disinfectant to the wound.

- **If conjunctival splashes occur**: the eyes should be washed immediately at the nearest eye wash station in the autopsy suite.
- Injured employees should then immediately go to the emergency department.
- Persons with uncovered wounds or dermatitis should not assist in autopsy procedures unless the injured skin can be completely covered with a waterproof dressing or other acceptable barrier.

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SECTION 15 – INFECTION PREVENTION AND CONTROL IN COVID-19

Policy on Infection prevention and control against the backdrop of COVID-19

Introduction:

COVID -19 is one of the newer strains of the coronavirus family reported in Dec 2019. Coronaviruses are known to cause mild disease such as common cold and more severe diseases which were pandemic prone such as Severe Acute Respiratory Distress Syndrome (SARS-CoV) in 2009 and Middle East Respiratory Syndrome (MERS-CoV) in 2012.

Mode of transmission: Droplets, Contact

Primarily transmitted through respiratory droplets and contact routes. Contaminated surfaces can serve as reservoirs of potential pathogens which is possible when a positive patient is admitted. Transfer of microorganisms from contaminated surfaces to patients/staff can happen via hand contact with the surface

There are three types of transmission:

- **Symptomatic transmission:** Symptomatic Covid-19 case is
  - A case who has developed signs and symptoms of Covid-19 virus infection
  - Refers to transmission from a person while they are experiencing symptoms
  - Primarily transmitted to others in close contact (within 1 metre) through
    - Respiratory droplets
    - Direct contact with infected persons
    - Contact with contaminated objects and surface
  - Shedding of covid 19 virus is highest in the inner respiratory tract(nose and throat) early in the course of disease i.e. in the first 3 days from the onset of symptoms
  - People may be more contagious around the time of symptoms onset than later
- **Pre-symptomatic transmission:**
  - Incubation period – average 5-6 days up to 14 days
  - This is the pre-symptomatic period
  - Some persons can be contagious
  - Transmission can occur during pre-symptomatic phase
  - Some persons can test positive, 1-3 days, prior to onset of symptoms
  - Requires the virus to spread via respiratory droplets or by touching contaminated surfaces
- Asymptomatic transmission:
  - Person who does not develop symptoms
  - To date there has been no documented asymptomatic transmission

Respiratory droplets are released while coughing/sneezing. The transmission via droplets is by indirect contact with eyes, nose and mouth or sometimes by inhalation. Some droplets can fall onto inanimate surfaces. Touching these surfaces contaminated by droplets and passing them onto the mucous membrane of the face can also lead to transmission.

To prevent the spread of infection it is necessary to follow and monitor standard precautions, contact precautions and airborne precautions.

Guidelines for triage of COVID suspected cases:

1	➢ Gate no 7 will be closed for patients ➢ All the patients should enter only from gate no.2 ➢ At the gate, all the patients will be asked about fever and respiratory complaint ➢ All such patients will be asked to move to the porch counter. All the patients and their one relative will be given triple layer mask ➢ At the porch counter, all walk-in-patients will be directed to Fever, cough, cold OPD
2	➢ Patients coming in Ambulance/vehicle will be moved to triage area near porch. Patients will be asked about fever with any respiratory complaint
3	➢ At the porch all the patients with suspected/confirmed COVID who are clinically stable must be referred to CCC/DCHC/DCH as the case may be. ➢ Those patients with SARI with suspected COVID who are unstable will be moved directly to EMS ward 20 through EPR side back door ➢ Unstable confirmed COVID positive patients who cannot be transferred to other designated CCC/DCHC/DCH should be moved directly to ward 4 which is ward for confirmed cases ➢ All the patients and their one relative will be given triple layer mask immediately at the porch
4	➢ At the fever, Cough, Cold OPD for patients who are stable: o Patient who does not fit into the criteria for being tested for COVID-19 will be provided with symptomatic treatment at OPD only and sent home with proper advice o Those who fit into COVID-19 suspects will be referred to CCC/DCHC/DCH as the case may be o Certificate of any kind will not be issued from this OPD
5	➢ At EMS ward 20, suspect patients of SARI will be received here
6	➢ Patients to be segregated locally in ward 20, based on risk and exposure ➢ Provision of masks to all the patients admitted to be ensured ➢ Nasopharyngeal/throat swab will be collected with precautions ➢ Positive patients will be immediately shifted to ward 4 which is ward for confirmed cases

	➢ Any patients with positive COVID-19 report and not critically ill will be transferred out to isolation facilities with resident accompanying and wearing complete PPE ➢ For SARI patients with 1st negative and high suspicion to be shifted in ward 4A and repeat swab sample after 5 days. ➢ If swab on Day 5 is negative, patient to be shifted to non-isolation facility if further hospitalization required. If stable, patient can be discharged from 4A with advice for 14 days home quarantine ➢ If swab on day 5 positive and patient is not critically ill, the patient will be transferred to designated isolation facility CCC/DCHC/DCH as the case may be. ➢ No mixing of suspect cases, positive cases and negative cases should be done in any ward ➢ No relatives to be allowed inside ward 20,4A, 4. If unavoidable to be given PPE before entering and discarded with care in yellow bag
7	➢ Other non-respiratory medical emergencies will be directed to ESR area and 20A
8	➢ All other patients will be directed to casualty officer near gift shop to be directed as advised
9	➢ All trolleys, wheelchairs used for transport of suspected or confirmed cases should be immediately cleaned with disinfectant before using them for next patient

*CCC(Covid care centre): Asymptomatic positive patients without comorbidities
DCHC(Designated COVID Health centre): For symptomatic patients with mild symptoms
DCH (Designated COVID Hospital): For patients with severe symptoms

Principles of Infection Prevention and Control and policy at KEM Hospital:

A. Early recognition and source control: (Entry gates, Registration area, Casualty, GOPD, Med OPD)

Early identification of the suspected / infected patients with COVID-19 is necessary. This will be carried out as follows:

a. A distance of three feet to be maintained in all the queues within the hospital premises. This responsibility will be taken by security guards posted in different places.
b. Interns from Community Medicine department will be deputed to registration area, casualty Chest OPD, GOPD and Med OPD to check for patients with fever and cough. These patients will be fast tracked. Thermal scanners at these areas will be carried out.
c. All patients with respiratory symptoms will be provided with two plier masks.
d. A separate OPD for patients with signs of respiratory symptoms will be identified for preventing mixing of these patients with others with provision of medication facility next to the OPD area.

e. Suspected patients will be immediately transported to Kasturba hospital in a dedicated ambulance.

B. Standard precautions for all patients:

Hand hygiene:

Hand hygiene is the most important step to break the chain of transmission. Technique of hand hygiene is more important than the disinfectant/liquid soap solution used.

The six steps to be followed by all the HCWs are as follows:

The five moments of hand hygiene to be stringently implemented are as follows:

C. Rational use of personal protective equipment (PPE):

PPE alone is not sufficient to provide protection against respiratory illness. Hence more dependence on PPE will provide false sense of security. It will also lead to unnecessary increase in cost and procurement burden.

Table 1: Distribution and use of PPE as per areas:

HCW/Pt	Activity	No PPE	Medical mask	Respirator	Gown	Gloves	Eye shield	Other

Admin area and Wards / corridors								
Both	No contact with COVID-19 patients	**√**						
Both								
Health desk at airport								
HCWs	Registration or information gathering		**√**					1m distance
Travellers			**√**					
Temperature recording station								
HCWs	Record temp with hand held thermal recorder		**√**					
Holding area/ Isolation facility of APHO/ PHO								
HCWs	Interview and clinical examination			**√**		**√**		
Isolation facility of APHO								
HCWs	Clinical Management			**√**		**√**		
HCWs	Attending to severely ill passenger			**√**	**√**	**√**	**√**	
Sanitary staff	Cleaning of room/toilet			**√**		**√**		
Quarantine areas								
Persons quarantined	Any		**√**					
HCW	health monitoring and temp recording		**√**		**√**			
HCWs	Clinical examination			**√**	**√**			
Support staff	Any		**√**		**√**			
Waiting area in hospitals								
Patients with respiratory symptoms	Any		**√**					

e/o resp. symptoms not known	Any	**√**						
OPD								
HCW	Examination of pts with resp. symptoms		**√**					
HCW	Examination of pts without resp. symptoms		**√**					
pts with resp. symptoms	Any		**√**					
e/o resp. symptoms not known	Any	**√**						
HCW/Pt	**Activity**	**No PPE**	**Medical mask**	**Respirator**	**Gown**	**Gloves**	**Eye shield**	**Other**
Triage								
HCW	For screening		**√**					Maintain distance
pts with resp. symptoms	Any		**√**					
e/o resp. symptoms not known	Any	**√**						
Fever /Screening OPD								
HCWs	Clinical examination			**√**		**√**		
Pts with respiratory symptoms	Any		**√**					
Emergency dept								
HCWs	Attending emergency cases			**√**		**√**		
HCWs	Attending severely ill patients			**√**	**√**	**√**	**√**	
Isolation room								

HCW	Direct care of COVID-19 pt.		√		√	√	√	
	Aerosol generating procedures			√	√	√	√	
Cleaner	For cleaning		√		√	√	√	Heavy duty gloves
Visitors	Entering room		√		√	√		
ICU for COVID-19 patients								
HCWs	Critical care management			√	√	√	√	
Labour staff	Dead body packing			√	√	√	√	
Laboratory								
HCWs	Sample collection and transport			√	√	√	√	
Lab tech	COVID lab			√	√	√	√	
	Other lab for manipulation of resp. specimen		√		√	√	√	
Wards								
HCWs	Examination of pts		√					
Pts with respiratory symptoms			√					Isolate in a separate corner of ward
HCW/Pt	**Activity**	**No PPE**	**Medical mask**	**Respirator**	**Gown**	**Gloves**	**Eye shield**	**Other**
Mortuary								
Labour staff	Transportation of dead body		√			√		
Labour staff	Dead body handling			√	√	√	√	
HCWs	Performing autopsy			√	√	√	√	

Transport team								
HCW	Transport without assisted ventilation			**√**		**√**		
	Transport with ventilator assistance			**√**	**√**	**√**	**√**	
Driver	Separate compartment	**√**						
	No Separate compartment		**√**					
	Assisting patients loading/ unloading		**√**			**√**		

Table 2: Simplified area wise distribution of PPEs:

Area	Cap	Goggles	Face shield	Surgical mask	N95	Gown	Gloves	Shoe cover
Screening area/ FOPD	Y	Y/FS	Y/ Goggles	N	Y	Y	Y	N
Casualty	N	N	N	N	Y	N	Y	N
EMS	N	N	Y	N	Y	Y	Y	N
EMS ICU	Y	Y	N	Y	Y	Y	Y	Y
ESR	N	N	Y	N	Y	Y	Y	N
EPR/ EPR ICU	N	N	Y	N	Y	Y	Y	N
COVID WARD	Y	Y	Y	Y	Y	Y HOODED	Y DOUBLE	Y DOUBLE
Other Adult ICU	N	N	Y	N	Y	Y	Y	N
MICU	Y	Y	Y	Y	Y	Y HOODED	Y DOUBLE	Y DOUBLE
IRCU	Y	Y	Y	Y	Y	Y	Y	Y
Paed ICU	Y	Y	Y	Y	Y	Y	Y	Y

all other wards	N	N	N	Y	N	N	Y	N
COVID LAB	Y	Y	Y	Y	Y	Y	Y	Y
Other Labs	N	N	N	Y	N	Plastic apron	Y	N
Ambulance	N	N	N	N	Y	N	Y	N
Radiology	N	N	Y	N	FFP-1	N	Y	N
Admin	N	N	N	Y	N	N	N	N

Respirators:

Respirators are not recommended to be used routinely. It is to be used only during aaerosol generating procedures such as:

- Tracheal intubations
- Non-invasive ventilation
- Tracheostomy
- Cardiopulmonary resuscitation
- Manual ventilation before intubation
- Bronchoscopy

Disposable apron/gown:

- Disposable gowns should be full length, full sleeves, tied at the back or side, cuffed wrist, water proof, made of non-woven cloth/plastic.
- Disposable aprons are worn to prevent contamination of clothes when providing patient care. It is recommended to be used during aerosol generating procedures, in emergency room, cleaning procedure or screening the patients where the crowd of patients is more.

Eye protection:

- Eye protection can be achieved either by use of surgical mask with integrated visor or full-face shield or spectacles. It is recommended to be used during risk of splash, aerosol generating procedures and also entering the isolation ward.

Medical mask:

Medical mask are sufficient to prevent from splash or droplets. Use of medical mask is not a substitute for hand hygiene. Three plier medical mask are recommended for HCWs when in

direct contact with patients with respiratory symptoms. Two plier masks can be provided to patients with respiratory symptoms. Medical mask needs to be changed after every 4 hours.

Order of wearing PPE:

1. Gown
2. Mask/respirator
3. Goggles/face shield
4. Gloves (double)

Order of removing PPE:

1. Outer gloves
2. Goggles or face shield
3. Gown
4. Mask/Respirator
5. Inner gloves

D. Precautions for designated Covid-19 isolation wards:

- Patient beds should be at least 1m apart
- Adequately ventilated room (160L/sec/person)
- Designated HCWs with preferably six-hour roster
- Mattresses to be covered with impermeable covers- clean and disinfect daily
- Limited number of persons entering the room
- Dedicated equipment. Clean and disinfect between each patient (BP apparatus, stethoscopes, thermometers)
- Refrain from touching eyes, nose or mouth
- For aerosol generating procedures- use respirators
- Avoid movement and transport of patients outside the room unless needed
- Provide mask to patient during transport
- Use predetermined transport routes to minimize exposure to staff, other patients and visitors
- Notify receiving area about patient arrival
- Use designated portable X-ray equipment
- Maintain record of all persons entering the isolation room

E. Biomedical Waste Management:

- Follow colour coding as per BMW Management rules 2016 except for isolation wards/ coronavirus testing laboratory.

Additional requirement for biomedical waste disposal in Coronavirus testing lab and isolation wards:

- Dedicated sanitation workers for BMW and general waste
- General waste to be discarded as per SWM rules.
- Use double bags to prevent leakage (autoclavable)
- All bags/sharp cans to be labelled as “COVID-19 waste”
- Maintain separate record for BMW from isolation wards/lab
- Use dedicated trolley or collection bins for internal transport
- Inner and outer surface of bins/trolleys used for storage should be disinfected with 1% (1:5) dilution of sodium hypochlorite solution

- Weighing to be done and records for the same to be maintained
- Additional payment for the BMW
- Dedicated vehicle to carry this waste by CBMWTF which will be collected from COVID testing laboratory/ isolation ward.

F. Respiratory hygiene and cough etiquette:

All wards/OPDs display posters on respiratory hygiene and cough etiquette and encourage cough etiquette.

Good respiratory hygiene needs to be maintained to prevent transmission of respiratory illness.

Patients should be encouraged not to cough/sneeze on their hands. Cover the mouth or nose while coughing/sneezing by using tissue or handkerchief or folded elbow. Discard the tissue immediately in the waste bin. All patients who are coughing/sneezing in any area (OPD/IPD/lab collection) should be provided with a 2ply medical mask.

Hands should be cleaned immediately after contact with the surrounding area or coughing on hands.

Do not touch the hands/mouth/nose as the risk of transmission of coronavirus is increased through mucous membranes.

In the waiting area or during transportation, encourage patients or HCWs suffering from respiratory illness to use medical masks. These masks have to be changed every four hourly.

G. Safe handling of linen:

Do not shake sheets when removing them from bed to prevent aerosol formation. All soiled clothing and linen should be disinfected with 0.5%(5000ppm) sodium hypochlorite for 30 min before transporting to the laundry in a tightly sealed and labelled bag.

H. Infection prevention and control for HCWs providing direct care for patients suspected with COVID-19 infection:

Health care workers and housekeeping staff should be monitored daily for any signs/symptoms of respiratory illness. Document their temperature chart twice daily for 14 days after last exposure. In case, if symptoms develop, follow management as per suspected COVID-19 case. The sick HCW should be labelled with red flag and isolated immediately and tested for COVID-19 infection.

I. Environmental cleaning:

Environmental cleaning plays a major role in breaking the chain of transmission. Cleaning and disinfecting environmental surfaces is fundamental in reducing healthcare-associated

transmission. COVID-19 virus can potentially survive in the environment for several hours/days. Premises and areas potentially contaminated with the virus are to be cleaned before their re-use. Established cleaning strategies if used will remove the majority of bioburden. No curtains should be used

Disinfectant used:

The disinfectant used for environmental cleaning can be freshly prepared 0.5%(5000ppm) sodium hypochlorite. (0.5% solution is prepared by adding 1part of sodium hypochlorite to 9 parts of water. Thorough cleaning is necessary prior to disinfection. A minimum of 2 to 10 minutes contact time is required with the disinfectant.

Procedure of environmental cleaning

Which areas to clean?

- Frequently touched surfaces of the ward including the area surrounding the positive patient (the floor, wall, bed, bed rail, bed frame, side table, nurses' station, door handle, light switches, toilets) and the area housing the patient should be thoroughly cleaned.

How to clean?

- With soap solution (preferable prepared in hot water) followed by a clean water wipe and disinfection with 0.5 % to 1% sodium hypochlorite which is freshly prepared (1 part of sodium hypochlorite and 4 parts or 9 parts of fresh clean water for a 1% or 0.5% sodium hypochlorite respectively). The surface on which the disinfectant is applied should be wet enough with a contact time of at least ten minutes. Small surface areas / small equipment can be decontaminated using 70 % ethyl or isopropyl alcohol. Bathrooms and basins should be cleaned carefully avoiding splashes.

Who should clean and What PPE to be used?

- The person appointed for cleaning should be provided with head cover, goggles / face shield, full arm double gloves or full elbow length heavy duty gloves, N 95 masks, full length, full sleeve impermeable gown and shoe cover (in short, the full PPE)
- After performing the task, the full PPE should be carefully removed and discarded in a separate bag (yellow) followed by thorough hand washing.
- The cleaning mop / cloth should be thoroughly cleaned in soap water and allowed to dry.

When should cleaning / disinfection happen?

- During every shift when the patient is admitted
- Whenever there is spillage
- After the patient is discharged / transferred

Should the activity be supervised?

- Yes. Every ward should identify a supervisor who will also document the cleaning/disinfection activity.

What is required for cleaning?

- 1. Full PPE 2. Labour staff 3. Clean mops / wipes 4. Discard bags 5. Soap and hot water (preferable) 6. 0.5-1% freshly sodium hypochlorite 7. Two / Three bucket system with fresh / clean, mops / cleaning wipes

For linen requiring reuse

- Soak in hot water with soap/detergent in a large drum for 30 minutes
- Use a stick to stir and avoid splashing
- Empty the drum and soak linen in 0.1% chlorine for approx. 30 minutes
- Rinse with clean water and let linens dry fully in the sunlight

When a patient is discharged or transferred

Clean and disinfect all surfaces that were in contact with patients or may have become contaminated during patient care as mentioned in procedure above.
Routine fogging of patient care areas is not recommended unless the area has been emptied.

Rooms where aerosol generating procedures (AGP) have been performed (bag-valve ventilation, intubation, administration of nebulised medicines, bronchoscopy, etc.) need to be ventilated with fresh air for 1–3 hours, if they are not functioning under negative pressure, before cleaning and admitting new patient(s).

Care of labour staff: It is necessary for the labour staff to be trained about use of PPE and hand hygiene practices before and after the cleaning process. The following PPE is recommended for labour staff i.e., heavy duty gloves, disposable long sleeves gown, eye goggles and medical mask. Hand washing to be carried out before and after completion of procedure. The PPE should be discarded in appropriately colour coded bins.

Spraying and cleaning guidelines of campus premises:

Spraying of the surrounding with disinfectant (0.5% Sodium hypochlorite) as per hospital policy.

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SECTION 16 – BMW MANAGEMENT IN COVID-19 PANDEMIC

(Guidelines for Handling, Treatment, and Disposal of Waste Generated during Treatment/Diagnosis/ Quarantine of COVID-19 Patients – Rev. 3
Central Pollution Control Board, Delhi)

INTRODUCTION

In order to deal with COVID-19 pandemic, State and Central Governments have initiated various steps, which include setting up of quarantine centers/camps, Isolation wards, sample collection centers and laboratories.
Following specific guidelines for management of waste generated during diagnostics and treatment of COVID-19 suspected / confirmed patients, are required to be followed by all the stakeholders including isolation wards, quarantine centers, sample collection centers, laboratories, ULBs and common biomedical waste treatment and disposal facilities, in addition to existing practices under BMW Management Rules, 2016.

These guidelines are based on current knowledge on COVID-19 and existing practices in management of infectious waste generated in hospitals while treating viral and other contagious diseases like HIV, H1N1, etc. These guidelines will be updated if need arises. This revision-3 of guidelines issued to incorporate guidance on segregation of general solid waste and biomedical waste. Further, this revision also addresses safety of waste handlers / sanitation workers associated with healthcare facilities, local bodies (ULBs) and CBWTFs in handling of biomedical waste and solid waste generated from quarantine centers/home-care/healthcare facilities treating COVID-19 patients. Guidelines brought out by WHO, MoH&FW, ICMR, CDC and other concerned agencies from time to time may also be referred for understanding other aspects related to COVID-19.

Guidelines for handling, treatment and disposal of COVID-19 waste at Healthcare Facilities is given below;
(a) COVID-19 Isolation wards: (isolation wards are those where COVID-19 positive patients are being kept for treatment / diagnosis)
Healthcare Facilities having isolation wards for COVID-19 patients need to follow these steps to ensure safe handling and disposal of biomedical waste generated during treatment;
- Keep separate color coded bins (with foot operated lids)/bags/containers in wards and maintain proper segregation of waste as per BMWM Rules, 2016 as amended and CPCB guidelines for implementation of BMW Management Rules.
- As precaution double layered bags (using 2 bags) should be used for collection of waste from COVID-19 isolation wards so as to ensure adequate strength and no-leaks;
- Collect and store biomedical waste separately prior to handing over the same CBWTF. Use a dedicated collection bin labelled as “COVID-19” to store COVID-19 waste and keep it separately in a temporary storage room prior to handing over to authorize staff of CBWTF.

Biomedical waste collected in such isolation wards can also be lifted directly from ward into CBWTF collection van.
- In addition to mandatory labelling, bags/containers used for collecting biomedical waste from COVID-19 wards, should be labelled as “COVID-19 Waste”. This marking would enable CBWTFs to identify the waste easily for priority treatment and disposal immediately upon the receipt.

- General solid waste like wrappers of medicine/syringes etc., fruit peel offs, empty juice bottles or tetra packs, empty water bottles, discarded papers, carton boxes of medicines, empty bottles for of disinfectants and any other items which were not contaminated by the patients’ secretions, body fluids should be collected separately as per SWM Rules, 2016. In order to minimize waste generation, as far as possible, non-disposable items must be used, which are to be handle with appropriate precautions and cleaned and disinfected as per hospital guidelines.
The wet and dry solid waste bags to be securely tied and handed over to authorized waste collector of ULB’s on daily basis.
- Maintain separate records of waste generated from COVID-19 isolation wards.
- Use dedicated trolleys and collection bins in COVID-19 isolation wards. A label “COVID-19 Waste” to be pasted on these items also.
- The (inner and outer) surface of containers/bins/trolleys used for storage of COVID-19 waste should be disinfected with 1% sodium hypochlorite solution daily.
- Report opening or operation of COVID-19 ward and COVID-19 ICU ward to SPCBs/PCCs and respective CBWTF located in the area.
- Register in CPCB mobile application namely ‘COVID19BWM’ to update the details of COVID-19 biomedical waste generation.
- Depute dedicated sanitation workers separately for biomedical waste and general solid waste so that waste can be collected and transferred timely to temporary waste storage area.
- Feces from COVID-19 confirmed patient, who is unable to use toilets and excreta is collected in diaper, must be treated as biomedical waste and should be placed in yellow bag/container.
However, if a bedpan is used, then faeces to be washed into toilet and cleaned with a neutral detergent and water, disinfected with a 0.5% chlorine solution, then rinsed with clean water.
- Collect used PPEs such as goggles, face-shield, splash proof apron, Plastic Coverall, Hazmat suit, nitrile gloves into red bag;
- Collect used mask (including Triple layer mask, N95 mask etc.), head cover/cap, shoe-cover, disposable linen Gown, non-plastic or semi-plastic coverall in yellow bags.
- Items like left over food, disposable plates, glass, used masks, used tissues, used toiletries, etc. used by COVID-19 patient shall become biomedical waste and shall be segregated in yellow bag.

Used gloves and plastic bottle from patients will be disposed of in red bag.
- Provide training to Waste handlers about infection prevention measures such as Hand hygiene,
Respiratory etiquettes, social distancing, use of appropriate PPE, etc. via videos and demonstration in local language. Designated nodal officer for biomedical waste management in hospital shall provide training. Nodal officers, in turn, need to be trained by Health
Departments / professional agencies in association with SPCB/ PCC of the States/ UTs.

(b) Sample Collection Centers and Laboratories for COVID-19 suspected patients
Guidelines given at section (a) for isolation wards should be applied suitably in in case of test centers and laboratories. Pre-treat viral transport media, plastic vials, vacutainers, eppendorf tubes, plastic cryovials, pipette tips as per BMWM Rules, 2016 and collect in red bags.

SECTION 17 – HAI SURVEILLANCE AND AUDIT CHECKLISTS

K.E.M HOSPITAL INFECTION CONTROL COMMITTEE

AUDIT FORM - Catheter associated Urinary tract Infection (CAUTI)

Date of audit:	
Ward No:	Unit:
Specialty:	

Number of catheterized patients with comorbidities: (DM/ HT/ Steroid therapy/ ICU stay/ other immunosuppressive therapy/ stone disease/ urinary tract obstruction/ any other)	

Urinary catheter status: -

1	Numbers of following types of catheters:	Urethral -	Suprapubic -	CSIC* -
2	All aseptic precautions followed for insertion of catheter for all patients? Yes/No If no, number of inappropriate actions -			
3	If duration > 1-day, daily need for catheterization assessed for all patients? Yes/No If no, number of inappropriate actions -			
4	Is the urine bag placed at the level below the waist (but not on the floor) for all patients? Yes/No If no, number of inappropriate actions -			
5	Is unobstructed flow maintained for all patients? Yes/No If no, number of inappropriate actions -			
6	Hand hygiene performed before patient contact by healthcare workers for all patients? Yes/No If no, number of inappropriate actions -			
7	Is daily meatal hygiene performed with soap and water for all patients? Yes/No If no, number of inappropriate actions -			
8	Is regular emptying of bags carried out for all patients? Yes/No If no, number of inappropriate actions -			

Event UTI Detail – Number of patients with:	
Symptomatic UTI -	Asymptomatic UTI -
Signs and symptoms – Number of patients with	
Fever (>38^{0}C)	
Urgency (if applicable)	
Frequency (if applicable)	
Dysuria (if applicable)	
Flank pain	
Turbid urine / purulent drainage	
Foul smell Urine	
Supra-pubic tenderness	
Signs of shock	

Laboratory and Diagnostic testing:		
Urine Routine: Number of specimens tested - Number of patients with high WBC count - Number of patients with organisms on gram's stain -		
Number of patients with Urine Culture	Significant growth	No growth
Number of patients with blood Culture	Growth	No growth
Number of patients with imaging evidence for infection -		
Outcome: Number of patients with		
Deterioration of renal function		
Death		
UTI contributed to death		
Antibiotic treatment received		
Improved		
Discharged		
Signature of auditor with date		

***Clean intermittent self-catheterization**

K.E.M HOSPITAL INFECTION CONTROL COMMITTEE

AUDIT FORM - CENTRAL LINE ASSOCIATED BLOODSTREAM INFECTION (CLABSI)

Date of audit		
Ward / Unit		
Whether 'The Bundle' was followed during insertion for all patients a) Hand Hygiene performed before insertion? b) Mask and Cap worn? c) Sterile Gown worn? d) Large Sterile Drape used? e) Appropriate skin prep used? g) Hand Hygiene performed after insertion?	Yes / No Yes / No Yes / No Yes / No Yes / No Yes / No	
If answer to above is 'NO", Number of inappropriate actions? Which point was not complied with and why?		
Number of patients with the following placement of catheter	Subclavian Jugular Femoral	
Is hand hygiene practiced before touching the port for all patients? If No, Number of inappropriate actions?	Yes / No	
Number of patients with the following type of dressings	Transparent Sterile non-transparent	
Is there a continued need for IVC for all patients? If not, for how many patients?	Yes / No	
Is there evidence of CLABSI in any patient?	Yes / No	
Number of patients with:	Fever Tenderness Redness at site	
If the answer to above is Yes, has any sample been sent for microbiology (culture) for these patients?	Yes / No	

Microbiology Results		
Number of patients with Central line Blood Culture/ tip showing	Growth	No growth
Number of patients with peripheral blood culture showing	Correlating growth	No growth
Organisms grown (numbers)	Enterobacterales Non-fermenting GNB *Staphylococcus aureus* CoNS *Enterococcus* spp. Others	

Outcome: Number of patients with	
Deterioration of vitals	
Death	
CLABSI contributed to death	
Antibiotic treatment received	
Improved	
Discharged	

Signature of auditor with date

K.E.M HOSPITAL INFECTION CONTROL COMMITTEE

AUDIT FORM – VENTILATOR-ASSOCIATED EVENTS (VAE)

Date of audit		
Ward / Unit		
Whether 'The VAE prevention - insertion bundle' was followed for all patients a) Hand Hygiene performed before intubation? b) Aseptic techniques followed? c) Maximal barrier precautions followed? (Mask, gloves, gown) d) Oral suction done before insertion? e) ET tube gently inserted? f) Checked pressure cuff and dislocation of ET? g) Used sterile catheter for suctioning?	Yes / No Yes / No Yes / No Yes / No Yes / No Yes / No Yes / No	
If answer to above is 'NO", Number of inappropriate actions? Which point was not complied with and why?		
Whether 'The VAE prevention - maintenance Bundle' is being followed for all patients a. Head elevation (30-45 degrees)? b. Oral care followed? c. Daily sedation vacation done? d. DVT prophylaxis given? e. Assessment of readiness to extubate done?	Yes / No Yes / No Yes / No Yes / No Yes / No	
If answer to above is 'NO", Number of inappropriate actions? Which point was not complied with and why		
Number of patients with evidence of VAE?		
Number of specimens sent for microbiology (culture) for these patients?	ET secretions BAL Others	

Microbiology Results

Number of patients with Culture	Growth	No growth
Organisms grown (numbers)	Enterobacterales Non-fermenting GNB *Staphylococcus aureus* Others	

Outcome: Number of patients with	
Deterioration of vitals	
Death	
VAE contributed to death	
Antibiotic treatment received	
Improved	
Discharged	

Signature of auditor with date

K.E.M HOSPITAL INFECTION CONTROL COMMITTEE

AUDIT FORM – SURGICAL SITE INFECTIONS (SSI)

Date of audit	
Ward / Unit	
Number of post-op patients	
Number of patients with SSI	Superficial Deep Organ-space
Whether 'pre-op SSI prevention bundle' was followed for all patients a) Pre-operative bath? b) Hair removed with depilatory or clippers? c) Antimicrobial prophylaxis performed? d) Surgical hand scrub performed? e) Patient covered with a drape? f) Appropriate PPE donned (surgical scrubs, gown, gloves, mask, cap)? f) Surgical instruments properly sterilized? g) Surfaces and environment cleaned prior to surgery? h) Appropriate patient skin prep prior to surgery?	Yes / No Yes / No Yes / No Yes / No Yes / No Yes / No Yes / No Yes / No Yes / No
If answer to above is 'NO", Number of inappropriate actions? Which point was not complied with and why	
Whether 'Operative SSI prevention Bundle' is being followed for all patients a) Blood glucose levels monitored and maintained (<200 mg/dL)? b) Normothermia maintained	Yes / No Yes / No
If answer to above is 'NO", Number of inappropriate actions? Which point was not complied with and why	
Whether 'Postoperative SSI prevention Bundle' is being followed for all patients a) Regular changing of soiled dressing done? b) Surgical site assessed regularly for signs of SSI? c) Drain output measured regularly?	Yes / No Yes / No Yes / No
If answer to above is 'NO", Number of inappropriate actions? Which point was not complied with and why	
Number of patients with evidence of SSI?	
Number of specimens sent for microbiology (culture) for these patients?	Pus/Tissue wound swab |

Microbiology Results

Number of patients with Culture	Growth	No growth
Organisms grown (numbers)	Enterobacterales Non-fermenting GNB *Staphylococcus aureus* Others	

Outcome: Number of patients with	
Deterioration of vitals	
Death	
VAE contributed to death	
Antibiotic treatment received	
Improved	
Discharged	

Signature of auditor with date