Documentation needed

- **Table of contents**
- **Details of manual sheet**
- **Up gradation**
- **Monitoring team**
- **Records and documentation**

CONTROL OF THE MANUAL

- The holder of the copy of this manual is responsible for maintaining it in good and safe condition and in a readily identifiable and retrievable manner.
- The holder of the copy of this Manual shall maintain it in current status by inserting latest amendments as and when the amended versions are received.
- Infection Control Nurse responsible for issuing the amended copies to the copy holders and the copyholder should acknowledge the same and he /she should return the obsolete copies to the Infection Control Nurse.
- The amendment sheet, to be updated (as and when amendments received) and referred for details of amendments issued.
- The manual is reviewed once a year and is updated as relevant to the hospital policies and procedures. Review and amendment can happen also as corrective actions to the non-conformities raised during the self-assessment or assessment audits.

Hospital Infection Control Committee [HICC] Members:

- HICC Chairman
- Infection control officer
- Nursing Superintendent
- Infection Control Nurse
- Pharmacy Incharge
- House Keeping Supervisor
- LabIncharge

Aim of the HICC:

The aim of HICC is to improve hospital infection control practices and to prevent or minimize the potential for nosocomial infections in patients, relatives, and health care providers.

Activities of Infection Control [IC] Team

1. The hospital has an infection control team, which coordinates implementation of all infection prevention and control activities. The team is responsible for day-to-day functioning of infection control program.
2. Periodical training of all category staff about Infection Control Protocols and Policies.
3. Establish standard operational procedures for Infection Control practices.
4. Introduce new policies and protocols on the method of disinfection and sterilization.

5. Maintain and implement biomedical waste management protocols.
6. Regular monitoring of Engineering department and water supply system.
7. Supervision of biomedical waste management activities.

Responsibility of IC Nurse

1. Maintaining records and statistics regarding IC activities and maintains HAI incidents record.
2. Checking by inspection that Infection Control and prescribed disinfectant procedures are being carried out in accordance with hospital policy.
3. Checking of housekeeping activities like the use of Personal Protective Equipments usage of proper disinfectant, mopping plan, and biomedical waste management.
4. Training of all category staff.
5. Liaison between laboratory and ward staff: Informing head of department and giving advice on infection control problems.
6. Notification of communicable diseases and other Notifiable disease through telephone and as well as through email.
7. Arrangements taken to provide hand washing solutions and alcohol based hand rubs.
8. Work as a clinical supervisor by ensuring all the established policies and protocols are practiced like hand washing procedures, use of hand rubs, isolation policies, care of IV and vascular access, urinary catheters, universal precautions, housekeeping, cleaning and disinfection, PPE, equipment cleaning,etc.
9. Ensure health checkup of all employees.
10. Monitoring engineering activities like maintenance of aqua guard registers and cleaning register of Water tanks etc.
11. Immediate attentions in NSI & Post exposure prophylaxis

THE ORGANIZATION IMPLEMENTS POLICIES AND PROCEDURES LAID DOWN IN THE INFECTION CONTROL MANUAL.

Hospital identified various high risk areas and procedures, and has policies to prevent infection in these areas.

High risk areas of the hospital are identified as

1. Minor OT
2. Clinical area
3. Dental chair unit

Concept of Standard Precautions:

There are a number of precautions designed to protect health care workers from exposure to blood borne pathogens. While majority of patients infected with HIV/HBsAg/ HCV are asymptomatic at the time of

presentation, all patients are considered as having potentially infectious blood and body fluids. Precautions may vary based on anticipated exposure.

Features of universal precautions:

1. **Use of Personal Protective Equipment**

a) Mask-Protection from air bone infections or situation which lead any splash or sprays of blood and body fluid.

b) Glove –Use glove when we are touching the hand with blood and body fluids, secretions any wound, or any other contaminated items.

c) Apron-Any Chances of splash or contamination on soiling.

d) Goggles –During positive cases (OT&LR).

e) Boots-If necessary.

f) Caps are worn whenever indicated.

2. Prevention of injury with sharps:

Sharps injuries commonly occur during use of needles and surgical instruments and after use during disposal.

Precautions to be observed:

1. Needles should not be recapped, bent or broken by hand.
2. Disposable needles & other sharps should be discarded into puncture resistant containers at the site of procedure
3. Sharps should not be passed from one HCW (Health Care Worker) to another. The person using the equipment should discard it. If necessary a tray can be used to transport sharps.
4. All sharps containers to be discarded when 3/4thsfull

Hand Washing

Hand washing means vigorous rubbing of hand with soap and water or with any antiseptic agents

Types

1. Social hand wash
2. Procedure hand wash
3. Surgical hand wash

Purpose

1. To remove dirt and debris
2. To decontaminate the hands
3. To prevent cross infection
4. To break the chain of infection

Most common mode of transmission of pathogens is via **HANDS**

"Hand washing is the single most important means of preventing the spread of infection"

When?

- Before and after duty
- Before each invasive procedures.
- Before and after using gloves
- After touching of blood or body fluid
- Before and after touching patients
- Before touching invasive devices
- After toileting ,urination

Indications for Hand Hygiene

- When hands are visibly dirty, contaminated, or soiled, wash with non-antimicrobial or antimicrobial soap and water.
- If hands are not visibly soiled, use an alcohol-based hand rub for routinely decontaminating hands.

Specific Indications for Hand Hygiene

Before:

a) Patient contact
b) Inserting urinary catheters, peripheral vascular catheters, or other invasive devices that don't require surgery

After:

a) Contact with a patient's skin
b) Contact with body fluids or excretions, non-intact skin, wound dressings
c) Removing gloves

1. **Social hand washing (10 -15sec)**

Indications

1. Before handling food
2. After visiting toilet
3. Before and after nursing the patient (Bathing and bed making)
4. It can be used in community and public places

2. **Procedure hand washing or hygienic hand washing (30sec -1mt)**

Indications

1. Before each invasive procedures
2. Before attending Immuno compromised patients
3. Before and between caring for high risk patients
4. Before and after use of gloves

5. After touching of blood or body fluid

Methods of Hand Washing

1. Wet hands with running water.
2. Obtain soap or detergent that contains antimicrobial agents spread all area of the hands.
3. Vigorous rubbing of hands (all area) about 30 sec to 1min.
4. Wash hands thoroughly with running water.
5. Rinse and dry.
6. Turn off water with using paper towel or use elbow to close the tap handle.

Steps of Procedure Hand Washing

1. Palm to Palm
2. Right palm over left dorsum and left over right dorsum.
3. Palm to palm finger interlocked.

4. Back of finger to opposing palms with finger interlocked.
5. Rotational rubbing of right thumb clasped in left palm and vice- versa
6. Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice-versa.
7. Rotational rubbing of right wrist and vice- versa. Dry thoroughly.

3. Surgical Hand Wash (3-5mts)

1. Prior to all operative procedures
2. Prior to treatment of all burns cases
3. Before insertion of all invasive devices (cardiac catheterization, Insertion of all lines especially arterial and central venous Catheterization).

Method

1. Hands are washed up to the elbow freely using disinfectant
2. Scrubbing of fingers, space between fingers and nails ,brush used to scrub the nails
3. wash hands thoroughly with running water .after wash the tap should be closed with elbow
4. Keep the hand finger upright position.
5. Dry the hand with sterile towel

Hand Rub

In Chlorhexidine /alcohol 70% hand rub in all areas

When?

i. Before touching invasive devices
ii. After touching the patient
iii. Before handling the patient
iv. Before preparing any injections

Safe Injection and Infusion Practices

A safe injection, lancet procedure or intravenous device insertion is one that:

A. Does not harm the recipient
B. Does not expose the provider to any avoidable risk
C. Does not result in any waste that is dangerous for other people.

Purpose:

The purpose of SAFE I is to promote implementation of safe practices associated with the following medical procedures:

- Intradermal, subcutaneous and intramuscular needle injections
- Intravenous infusions and injections
- Lancet procedures.

General safety practices

This section describes the following practices that are recommended to ensure the safety of injections and related practices:

- Hand hygiene
- Gloves where appropriate
- Other single-use personal protective equipment
- Skin preparation and disinfection

A. Hand hygiene- Perform hand hygiene **BEFORE:**

- Starting an injection session (i.e. preparing injection and giving injections)
- Coming into direct contact with patients for health-care related procedures
- Putting on gloves (first make sure hands are dry).

A. Hand hygiene- Perform hand hygiene **AFTER:**

- An injection session
- Any direct contact with patients

❖ Removing gloves.

Key Elements	Indications	Precautions
Hand hygiene(hand washing or alcohol-based hand rub)	Hand hygiene before and after contact with every patient is the single most important means of preventing the spread of infection When hands are visibly dirty or contaminated with proteinaceous material, wash them with antibacterial or plain soap and running water, then dry them using single-use paper ,towels When hands appear clean (i.e. are Not visibly soiled), clean them with an alcohol-based hand product for routine decontamination, then dry them using single-use paper towels	DO NOT use alcohol-based hand products when hands are visibly soiled DO NOT use alcohol-based hand products when hands are visibly soiled DO NOT use alcohol- based hand products after exposure of nonimpact skin to blood or body fluids; in such cases,wash hands with antibacterial or plain soap and running water, then dry them using single-use paper towels
Glove use	Wear non-sterile, well-fitting, single-use gloves: •when there is a likelihood of coming into direct contact with a patient's blood or other potentially infectious materials (e.g. body fluids, moist body substances and saliva [in dental procedures]), mucous membranes and nonintact skin •when performing venipuncture or venous access injections, because of the potential for blood exposure at the puncture site •if the health worker's skin is NOT intact (e.g. through eczema, or cracked or dry skin)	When undertaking injections, **DO NOT** use gloves: •for routine Intradermal, subcutaneous and intramuscular injections •if the health worker's skin is intact •if the patient's skin is intact. Gloves DO NOT provide Protection against needle-stick or other puncture wounds caused by sharp objects. Needles, scalpels and other sharps should be handled with extreme caution.

D. Other Single-Use Personal Protective Equipment[PPE]

- ❖ Masks, eye protection and other protective clothing ARE NOT indicated for the injection procedures unless exposure to blood splashes is expected.
- ❖ When using single-use personal protective equipment, dispose of the equipment immediately after use.

E. Skin Preparation & Disinfection

To disinfect the skin, use the following steps

1. Apply a 60–70% alcohol-based solution (isopropyl alcohol or ethanol) on a single-use swab or cotton-wool ball. DO NOT use methanol or methyl-alcohol as these are not safe for human use.
2. Wipe the area from the centre of the injection site working outwards, without going over the same area.
3. Apply the solution for 30 seconds then allow it to dry completely.

F. Injection Devices

The management of SMCH shall ensure that an adequate supply of single-use devices is available, to allow providers to use a new device for each procedure.

G. Practical Guidance on Use of Injection Devices

When using a sterile single-use device

a) Use a new device for each procedure, including for the reconstitution of a unit of medication or vaccine;

b) Inspect the packaging of the device to ensure that the protective barrier has not been reached;

c) Discard the device if the package has been punctured, torn or damaged by exposure to moisture, or if the expiry date has passed.

H. Medication

I. When giving medication:

a) NOT use a single loaded syringe to administer medication to several patients (i.e. ensure one needle, one syringe, one patient!)

Discard a multi dose vial:

I. If sterility of content is compromised
II. If the expiry date or time has passed (even if the vial contains antimicrobial preservatives)
III. If it has not been properly stored after opening
IV. Within 24 hours of opening, or after the time recommended by the manufacturer, if the vial does not contain antimicrobial preservatives
V. If found to be undated, improperly stored, inadvertently contaminated or perceived to be contaminated, regardless of expiry date.

Preparing injections

Injections should be prepared in a designated clean area where contamination by blood and body fluids is unlikely. Practical guidance on preparing injections

Three steps must be followed when preparing injections.

- ❖ Keep the injection preparation area free of clutter so all surfaces can be easily cleaned.
- ❖ Before starting the injection session, and whenever there is contamination with blood or body fluids, clean the preparation surfaces with 70% alcohol (isopropyl alcohol or ethanol) and allow to dry
- ❖ Assemble all equipment needed for the injection
    - Sterile single-use needles and syringes;
    - Reconstitution solution such as sterile water or specific dilutent
    - Alcohol swab or cotton wool;
    - Sharps container.

Labeling

After reconstitution of a multi dose vial, label the final medication container with

- ➢ Date and time of preparation
- ➢ Final concentration
- ➢ Expiry date and time after reconstitution
- ➢ Name and signature of the person reconstituting the drug.

For multi dose medications that DO NOT requires reconstitution, add a label with:

- ➢ Date and time of first piercing the vial
- ➢ Name and signature of the person first piercing the vial.

Administering Injections

Aseptic technique should be followed for all injections.

Practical guidance on administering injections

General

When administering an injection:

- Check the drug char tor prescription forth medication and the corresponding patient's name and dosage
- Perform hand hygiene
- Wipe the top of the vial with 60–70% alcohol using a swab or cotton.
- o p e n the package in front of the patient to reassure them that the syringe and needle have not been used previously
- Using a sterile syringe and needle, withdraw the medication from the ampule or vial.

Reconstitution

- If reconstitution using a sterile syringe and needle is necessary, withdraw the reconstitution solution from the ampules or vial, insert the needle into the rubber septum in the single or multi dose vial and inject the necessary amount of reconstitution fluid.
- Mix the contents of the vial thoroughly until all visible particles have dissolved.
- After reconstituting the contents of a multi dose vial, remove the needle and syringe and discard them immediately as a single unit into a sharps container.

Delay in administration

- If the dose cannot be administered immediately for any reason, cover the needle with the cap using a one-hand scoop technique.
- Store the device safely in a dry kidney dish or similar container.

Important points

- DO NOT allow the needle to touch any contaminated surface.
- DO NOT reuse a syringe, even if the needle is changed.
- DO NOT enter several multi dose vials with the same needle and syringe.
- DO NOT re-enter a vial with a needle or syringe used on a patient if that vial will be used to Withdraw medication again (whether it is for the same patient or for another patient)

Prevention of sharps injuries to health workers

Use of best practices can help to prevent sharps injuries to health workers

Practical guidance on prevention of sharps injuries

To avoid sharps injuries:

1. Ensure that the patient is adequately prepared for the procedure
2. Do not bend, break, manipulate or manually remove needles before disposal
3. Avoid recapping needles, but if a needle must be recapped, use a single-handed scoop technique
4. Discard used sharps and glass ampules immediately after use in the location where they were used, disposing them into a robust sharps container that is leak and puncture resistant
5. Placethesharpscontainerwithinarm'sreach(preferablyinasecuredarea)toallowforeasydisposal of sharps
6. Seal and replace sharps container when the container is three quarters full.

Define infection

Hospital adheres to transmission based precautions at all times. Infection is the invasion and multiplication of microorganisms. Hospital infection control is important for patients, health care workers and public .The Infection control Team plays a major role in the prevention and control of nosocomial infections.

Precautions against Airborne Transmission

- These precautions are designed to reduce the risk of airborne and droplet transmission of infectious agents, and apply to patients known or suspected to be infected with epidemiologically important pathogens that can be transmitted by these routes.
- Components of respiratory isolation:
- Place the patient in a single / private room with closed doors. Patients with same illness (but no other infection) can be covered in one room.
- Masks to be worn by those who enter the patient's room. Susceptible persons should not enter the room of patients known or suspected to have measles or Varicella (chickenpox).
- Gowns are not routinely necessary. Use gowns if soiling is likely.
- Gloves are necessary while handling patients.
- Hand must be washed after touching the patient or potentially contaminated articles and before taking care of another patient.
- Articles contaminated with infective material must be discarded or bagged and labeled before being sent for decontamination and reprocessing.

Precautions against Contact Transmission:

Contact isolation precautions are recommended for specified patients known or suspected to be infected or colonized with epidemiologically important microorganisms that can be transmitted by direct contact with the patient (hand or skin-to-skin contact that occurs when performing patient care) or in direct contact (touching) with contaminated environmental surfaces or patient care items.

Components:

- Gowns are indicated if soiling is likely.
- Gloves are indicated for touching infected material /area
- Hands must be washed after touching the patient or potentially contaminated articles and before taking care of another patient.
- When possible, dedicate the use of non-critical patient - care equipment to a single patient (or cohort of patients infected or colonized with the pathogen requiring precautions) to avoid sharing between patients. If use of common equipment or items is unavoidable, then adequately clean and disinfect them before use for another patient.
- Articles contaminated with infective material must be discarded or bagged and labeled before being sent for decontamination and reprocessing

Precautions against Blood Borne Transmission:

Instruction for wards

Admission: Patients with HIV / HBV / HCV disease but presenting with unrelated illnesses may be admitted in any ward as per existing rules. Confidentiality shall be maintained with appropriate precautions to prevent nosocomial transmission.

Preparation of patient: It is the responsibility of the attending physician to ensure that patients, testing positive are informed about the result and receive counseling.

The nursing staff will explain to patients, attendants and visitors (when necessary), the purpose and methods of hand washing, body substance and excreta precautions, and other relevant precautions.

Red bag (Reusable non-sharp material) : The ward sister must ensure that the prescribed bag is obtained from CSSD when a patient with HIV, HbsAg or HCV infection is admitted. All contaminated items that are to be sent to CSSD for disinfection are placed in the bag and sent for autoclaving. Sharps are not to be discarded in the red bag. Linen and procedure trays to be sterilized separately.

HAI /Nosocomial infection/ Cross infection:

Infection acquired during or as a result of hospitalization generally after 48 hours of admission. It can manifest even after discharge.

2. Mopping plan means cleaning done from clean area to unclean area.
3. It gives special information to cleaning staff about priority of cleaning.
4. Mopping plan contains four
   categories The order of cleaning
   a) Immuno compromised patient's room
   b) Room of the patient with clean case -Clean room
   c) General
   d) Infected

   If there is a patient with communicable disease that room should be cleaned in the last, irrespective of plan (Direction will be given by the Head nurse/ Sr. Staff Nurse on duty
   Housekeeping supervisor/ HIC Nurse)

2. Environment:-

- ❖ Clean the floors with a disinfectant thrice away.
- ❖ Clean with soap solution first and then with Super Shine Solution 3 times a day
- ❖ Wash the floors with soap & water and disinfecting solution using scrubbing machine once in a week.

Do not carry out any cleaning activities while

1. Sterile supplies are being handled.
2. Sterile procedures are in progress.

a. Use 1 % Sodium Hypo chloride solution to clean environment surfaces if contamination with blood and body fluids occur.

b. Use 1 % Sodium Hypo chloride solution for 30 min for disinfecting mops used for cleaning blood.

c. Detach the pads and brushes of scrubbing machine after each use, clean thoroughly and dry.

d. Clean the walls and ceilings weekly and on transfer / discharge/ death of a patient.

3. **High Risk Areas**:-

a. Floors are cleaned with prescribed disinfectant five times a day with Super Shine2%

b. Ventilator parts are cleaned with prescribed disinfectant.

c. All equipment including monitor are cleaned with prescribed disinfectant spray.

d. Some plastic items like ambu bag, ventilator tubing$_2$ mask, Nebulization set are sterilized by formalin gas (generally ETO sterilization recommended - implement the same)

e. Change the HEPA filter (ventilator) every 72hours.
f. Keep a disinfectant hand rub solution in each bedside.
g. Keep separate stethoscope, BP always ready to use with standby.
h. Damp dust bed frames, railings, I/V stands, lockers etc daily with prescribed disinfectant.
i. Floor cleaning done four times in a day with prescribed disinfectant.
j. Cover the mattresses and pillows with water proof covers.
k. Use disposable plastic sheets / Mackintosh to protect the bed linen.
l. Disinfect the patient's unit with prescribed disinfectant solution after the transfer / discharge / death.

Fogging (Fumigation)

- This method of disinfection is used after discharge of a patient with communicable diseases or before admitting a patient after high risk operation.
- action time 45 minutes to 1hr.
- Mode of use:11% Hydrogen Peroxide+0.01 Silver Nitrate in water (800 ml water and 200 ml solution)
- Room should be kept closed for two hours.

Disinfection and cleaning of equipment

S.NO.	Items	Disinfection/Cleaning	Duration and periodicity
1	B.P Apparatus & Stethoscope	Clean properly with sprit	Daily
2	B.P Apparatus-Cuff	Wash thoroughly with Soap and water and dry it properly Wash and dry the B.P cuff if used for an infected patient after the discharge.	Weekly Clean if used for an infected patient after the discharge.
3	Digital Thermometer	Clean properly with Sprit/Ethanol 70%	Daily - After the use of every patient
4	Glucometer	Clean properly with sprit	Daily
5	Dressing Trolley	Clean with Super shine Keep the Store solutions in their original bottles. Avoid refilling to smaller bottles.	Daily
6	Steel Tray	Wash with soap and water	Daily

7	Measuring Tape & Torch	Clean properly with spirit	Daily & SOS
8	Nebulizer	Clean properly with spirit	Daily
9	O2 Flow Meter.	Wash with soap and water	Weekly - After each use of patient-Change sterile water every day
10	Suction Apparatus	Empty the bottles in every week or SOS. Scrub with soap and water. Disinfect with 1% Sodium Hypo chloride solution.	Weekly & after each use
11	Refrigerator	Defrost and Wash with soap and water	Weekly
12	Laryngoscope Blades	Detach the blades ,wash with soap and water, Clean with spirit	Daily - After the use of every patient
13	Weighing Machine	Clean with soap and water	Daily
14	Telephone	Clean with sprit	Daily
15	Patient Trolley & Wheel Chairs	Clean with soap & water	Daily
16	IV Stand	Clean with soap and water	Weekly
17	Pulse Oxymeter	Clean with spirit	Daily
18	Airway	Use disposable airways for eachpatient. Scrub with soap and water daily and SOS Discard after discharge/death of the patient.	After each use
19	Oxygen mask / Nasal Cannula	Use fresh mask / cannula for each patient's use. Clean with alcohol SOS. Don't reuse nasal cannula	After each use
20	Ambu Bag &Mask:-	Detach the parts. Wash with soap and water. Send to CSSD for ETO. Disinfect the Ambu bag with Hypochloride 1% solution for 10 hours for infectious cases and send to CSSD. Clean with soap and water.	After each use

		Send to the CSSD for sterilization	
21	E.C.G. & Transducer Cables	Clean with spirit daily. Wash and dry the B.P cuff if used for an infected patient after the discharge. Wash BP cuff weekly.	After each use

Laundry and Linen Management: All used linen shall be considered contaminated and shall be bagged at the location of use before being taken to laundry.

A. Soiled linen:

- ❖ Soiled linen shall be collected in the designated container and taken to laundry
- ❖ Designated container shall be covered during transport of soiled linen.
- ❖ Cloth liners /containers shall be washed daily
- ❖ Dirty utility room shall be swept daily and washed /Mopped with a detergent/Disinfectant weekly and whenever visibly soiled
- ❖ Soiled linen shall be handled as little as possible and with minimum agitation, in order to prevent gross microbial contamination of the air and of persons handling the linen
- ❖ All soiled linen shall be bagged at the location of use. Soiled linen shall not be sorted in-patient care areas.
- ❖ Bags containing soiled linen shall be tied before being taken to laundry in order prevent spillage
- ❖ All linen that is contaminated with blood, excreta or other body fluids shall be placed in designated laundry bags
- ❖ Personnel shall wear protective clothing, including gloves and gowns/aprons
- ❖ When handling soiled linen. Employees collecting linen at the laundry shall also wear heavy-duty gloves and a gown.
- ❖ Hands shall be washed after gloves are removed.
- ❖ Staff shall be instructed in the principles of personal hygiene, including frequent hand washing

Clean linen:

- ❖ Hand washing for 10-15 seconds, with attention to nails and areas fingers is mandatory before handling clean linen.
- ❖ Clean linen shall not be handled more than necessary in order to
- ❖ Minimize contamination
- ❖ Any linen dropped shall be considered soiled

- ❖ Covered linen carts shall be used to transport clean linen to the units
- ❖ Clean linen shall be stored in a clean, dry area.

Facilities:

- ❖ Hand washing facilities are available to all employees in the linen area
- ❖ Barriers to protect employees from blood, body fluids, secretions and Excretions are located in the laundry area. Employees shall be informed of the location and of barriers at the time of orientation to the unit.
- ❖ Carts must be cleaned before transporting clean linen

Patient linen

- ❖ Bedlinenistobechangeddailyandwheneversoiledwithbloodorbodyfluids.
- ❖ Patient'sgownistobechangedeverydayandwheneversoiledwithbloodorbodyfluids.
- ❖ Dry dirty linen is to be sent to the laundry for regular wash.

Engineering Controls to Prevent Infection:

Hospital adopts appropriate engineering control to prevent infections.

1. The hospital patient care areas are designed in such manner to ensure optimum bed spacing.
2. Operating rooms are provided with HEPA filter, to ensure double filtration of air.
3. Periodical checking of water resources
4. Periodical checking and maintenance of equipment s, AC ducts, AHUs, replacement of filters.
5. Periodical checking, replacement/ repair of plumbing and sewer lines.
6. Machineryandequipmentshouldbechecked,cleanedandrepairedroutinely
7. Urgent repairs should be carried out at the end of the day's list
8. Air conditioners and suction points should be checked, cleaned and repaired on a weekly basis.

Preventive maintenance on all theatre equipment to be carried out weekly and major work to be done at least once every year

Housekeeping in clinical area

A patient admitted to the hospital can develop infection due to bacteria that survive in the environment. Therefore, it is important to clean the environment thoroughly on a regular basis. This will reduce the bacterial load and make the environment unsuitable for growth of micro-organisms.

1. The floor is to be cleaned at least twice in 24 hours. Detergent and copious amounts of water should be used during one cleaning.
2. The walls are to be washed with a brush ,using detergent and water once a week

3. High dusting is to be done with a wet mop
4. Fans and lights are cleaned with soap and water once month.
5. All work surfaces are to be disinfected by wiping with suitable disinfectant (Super Shine-Benzalkonium Chloride) then cleaned with detergent and water twice a day.
6. Cupboards, shelves, beds, lockers, IV stands, stools and other fixtures are to be cleaned with detergent and water once week.
7. Curtains are to be changed once a month or whenever soiled.
8. Patient's cot is to be cleaned every week with detergent and water. 1% hypochloride to be used when soiled with blood or body fluids. In the isolation ward, cleaning is done daily.
9. The floor of bathrooms is to be cleaned with a broom and detergent once a day and then disinfected.
10. Toilets are cleaned with a brush using a detergent twice a day (morning and evening).Disinfection and stain removal solution may be used.
11. Wash basins are to be cleaned every morning
12. Regular AC maintenance is required. The AC section should draw up a protocol for this.

II. Protocol for body fluid splash &spillages

Blood and body fluid spillage

- Prepare 1% hypochloride solution (200 ml 5% hypochloride in 800 ml of water)
- Wear gloves pour 1% hypochloride on the spillage
- Cover it with a piece of paper or cloth
- Keep it there for 10 – 20 minutes
- Wipe the spillage using the covered paper or cloth
- After wiping discard the same in the yellow cover
- If it is a large spillage, after covering the spillage with paper or cloth
- Mop it with Separate mop (mop should be dipped in 1 % hypochloride for 30minutes)

Chemical spill protocol:

The range and quantity of hazardous substances used in work areas require preplanning to respond safely to chemical spills

Minor Chemical spill

A minor chemical spill is one that:

The staff is capable of handling safely without assistance

Staff has knowledge of the chemical

A small quantity has been spilled

Staff knows how to properly clean-up the spilled material

No immediate toxicity to staff exposed.

Procedure:

Alert people in immediate area of spill

Wear appropriate protective equipment, including safety goggles, gloves and long sleeve lab coat

Avoid breathing vapours from spills

Use appropriate spill kit or absorb the spill with tissue paper

Collect residue, place in a waste disposal bag.

Record: staff involved in the clean-up, department, phone number and chemical contaminant

Clean spill area with water.

Major chemical spill (all other spills)

Procedure:

Alert people in the area of spillage to evacuate

If spilled material is flammable, turn off ignition, heat sources and do not switch on any light in the area. Close doors to affected area.

Notify the safety officer

Keep people away

Obtain MSDS on chemical

Have people having knowledge of incident and work area available to assist emergency personnel.

NOTE: if unsure of proper cleanup of any hazardous material spill, contact safety officer/dutymanager on call.

THE ORGANIZATION PERFORMS SURVEILLANCE ACTIVITIES TO CAPTURE AND MONITOR INFECTION PREVENTION AND CONTROL DATA.

Methods of Surveillance

Fumigation and Random Culture from High Risk Areas

- HICC decided that culture swab to be taken from critical areas once in two months or when an infection is suspected. Take the swabs according to the table shown below. The request of sample to be approved by the Infection Control Nurse. The original copy of the culture report to be filed in the infection control department and a copy of the report to be filed in the concerned department also

- The collection of surveillance data is an ongoing process.
- The infection control team verifies the data on a regular basis.

Monitoring activities includes

- ❖ The surveillance activity include monitoring of compliance with hand hygiene guidelines
- ❖ Surveillance activities in hospital also include monitoring of effectiveness of housekeeping service on a regular basis using a checklist.
- ❖ Report regarding HAI rates is informed to all the departments 'monthly wise.
- ❖ Hospital identifies all Notifiable diseases and ensures that this is sent at the specified frequency and in format as required by statutory authorities.

4. The organization takes action to prevent surgical site infections.

Surgical wounds

- ➢ Surgical wounds after an elective surgery are inspected on the third post-operative day,or earlier.
- ➢ All personnel doing dressings should wash their hands before the procedure. Ideally, a two member technique is followed. One to open the wound and one to do the dressing.
- ➢ If two health care workers are not available, then, take off the dressing, wash hands again before applying a new dressing.
- ➢ A clean, dry wound may be left open without any dressing after inspection.
- ➢ If there is any evidence of wound infection, or purulent discharge, then dressings are done daily, using povidone-iodine to clean the wound and applying dry absorbent dressings.
- ➢ If any Surgical site infection occur
    - Surgical site infection reporting format is filled up by surgeons.
    - Records maintained by registrar in charge. Data collected every quarterly by secretary HICC and presented.

NEEDLE STICK INJURY

DO NOT SQUEEZE

(Post exposure prophylaxis)

1. Wash hand in running water with soap
2. Inform Infection Control Nurse.
3. If housekeeping staff injured,
    a. Inform housekeeping supervisor and Housekeeping Supervisor is responsible to inform infection control nurse.

Steps – Protocol/Manual

1. Check status of the injured staff
2. Status of the source:
3. Inform the consultant
4. Inform patient – Check patient's serology

Step-1

1. If patients serology – Hep B +ve /Known case of Hep B+ve

2. Check vaccination status of injured person.

If vaccinated → Check HB3 A3titer

If not vaccinated → Provide Hepatitis B vaccine.

If patient is +ve case → Check HbsAg titer

If HbsAg Titer value < 10 Provide immunoglobin within 24 hour

Step-2

If patient known case of HIV +ve / Unknown and staff is injured

1. Consult concerned physician
2. Start Anti Retro Viral Therapy (ART) as early as possible.
3. If patient is HCV positive: hand washing in running water with soap.
4. Consult concerned physician

After Post exposure of Known case of Hepatitis-B, HIV&HCV/Unknown

- Follow up the serology of staff for 3months,6 months and 12months
- Infection control nurse to monitor, follow up and maintain documents.

BIO-MEDICAL WASTE (BMW) IS HANDLED IN AN APPROPRIATE AND SAFE MANNER.

The organization adheres to statutory provisions with regard to Bio-medical Waste.

Waste management policy has been implemented in accordance with the rules of Biomedical Waste Management Act. The hospital has got the consent to operate under pollution control board.This is monitored by HIC team on daily basis

All waste containers are emptied when they are 3/4ths full

Segregation is done at source. A color code is followed and appropriately coded waste bags are placed in bins in all patient care areas. Segregated biomedical waste is stored and transported to the central waste collection area of the hospital in proper covered containers in secured manner.

- Waste from various patient care areas is removed twice a day or more if necessary. All bags that are being transported to the central waste collection area will have to be tied at the mouth to avoid spillage during transport
- Smaller bags are collected into larger bags and carried by the on-duty housekeeping staff to designated storageareasontrolleys.Bagsshouldbepickedupandthentransportedbeforebecomecompletelyfill.
- AvoidthetransportoftoomanybagsatonetimeandcontactofthebagwiththebodyofpersonnelAvoid mixing of segregated wastes
- The staff is provided with personal protective equipment(PPE)

DISPOSAL OF CONTAMINATED NEEDLES AND SYRINGES

- Contaminated needles are destroyed using a needle destroyer.
- Contaminated syringes are put in puncture proof container(white)
- At segregation, syringes are put in red color coded plastic cover.

Bio Medical Waste treatment facility.

The hospital has tie- up with EBV (Common waste management facility). The waste is collected from the collection area of hospital by EBV workers and transported in a covered vehicle to the treatment facility of EBV.ThehospitalconductingperiodicvisittoOutsourcedfacilitytoensurewastedisposalaccordingtoBMWrules.

Annual report of waste generated is maintained by administration and report submitted to Pollution Control Board.

All categories of staff handling bio medical waste are using appropriate personal protective measures.

Immunization Programmes

Immunization of the dental team before they are placed at risk of exposure remains the most efficient and effective use of vaccines.

Non-patient care staff may also be included in the immunization programme. Immunization will be provided by a pre-arranged qualified health care professional or by the dental workers based on the latest recommendations as well as medical history and risk of occupational exposure.

Hepatitis is a major health hazard for members of all health occupations and is a well-recognized occupational risk for the dental team. Currently two recombinant DNA hepatitis B vaccines are available in India; Recombivax HB and Engerix- B. Both vaccines are considered to be safe and effective towards producing immunity to HBV. The vaccines are administered as 3 injections at the interval of 0, 1, 6 months. Members of the dental team receiving the vaccine should be tested for antibody to HBV surface antigen (HBs Ag) 2 months after completion of the three dose vaccination series. Person who develop a protective antibody response (greater than 10 ml units per ml) after vaccination are considered immune. If there is no antibody response after the second series, a test for HBs Ag should be performed.

Vaccine induced antibodies gradually decline over time and 60% of persons who initially responded to vaccination will lose detectable antibodies over 12 years. However immunity continues to prevent disease. Booster vaccines and periodic serological testing to monitor antibody levels after completion of the vaccine series are not necessary for vaccine responders.

- Immunizations substantially reduce both, the number of dental professionals susceptible to these diseases and the potential for disease transmission to other dental professionals and patients.
- The dental health care professionals are considered to be at substantial risk for acquiring or transmitting Hepatitis B, influenza, measles, mumps, rubella and varicella. All of these diseases are vaccine- preventable.
- Hepatitis B vaccination, serologic testing, follow-up and booster dosing should be monitored.
- Counsel all non-responders to vaccination who are HBs Ag negative regarding their susceptibility to HBV infection and precautions to be taken.
- Provide employees appropriate education regarding the risks of HBV transmission and the availability of the vaccine. Employees who decline the vaccination should sign a declaration form to be kept on records.

Preventing Transmission to Blood Borne Pathogens

Although transmission of blood borne pathogens (e.g. HBV, HCV and HIV) in dental health- care settings can have serious consequences, such transmission is rare. Exposure to infected blood can result in transmission from patient to DHCP, from DHCP to patient and from one patient to another. The opportunity for transmission is greatest from patient to DHCP.

Exposure Prevention Methods

Avoiding occupational exposures to blood is the primary way to prevent transmission of HBV, HCV and HIV, to HCP in health-care settings. Exposures occur through percutaneous injury (e.g. a needle stick or cut with a sharp object), as well as through contact between potentially infectious blood, tissues or other body fluids and mucous membranes of the eye, nose, mouth, or non-intact skin (e.g. exposed skin that is chapped, abraded or shows signs of dermatitis).

Post Exposure Management and Prophylaxis

- After an occupational blood exposure, first aid should be administered at the earliest.
- Puncture wounds and other injuries to the skin should be washed with soap and water; mucous membranes should be flushed with water.
- No evidence exists that using antiseptics for wound care or expressing fluid by squeezing the wound further reduces the risk of blood borne pathogen transmission; however, use of antiseptics is not contraindicated.
- The application of caustic agents (e.g. bleach) or the injection of antiseptics or disinfectants into the wound is not recommended.
- Dental practitioner should provide information about the date, time and all the details of the exposure including the source material, details of the procedure being performed at the time of exposure and severity and type of exposure.
- Dental practitioners who have contact with patients can also be exposed to persons with infectious TB and should have a baseline tuberculin skin test (TST), preferably by using a two-step test, at the beginning of employment. Thus, if an unprotected occupational exposure occurs, TST conversions can be distinguished from positive TST results caused by previous exposures. The facility's level of TB risk will determine the need for routine follow-up TST's.
- Each occupational exposure should be evaluated individually for its potential to transmit HBV, HCV and HIV.

Clinical area

The process of infection control should begin before the patient arrives, during preparation for clinical treatment. This reduces the risk for transmission of infectious agents during patient care, makes the treatment session more efficient and the post treatment infection control process easier and more effective.

Infection Control during the Pretreatment Period (For Operatory)

- Remove unnecessary items and unused equipments from the operatory.
- The operatory should be arranged to facilitate thorough cleaning following each patient.
- Use prearranged tray set-ups for routine or frequently performed procedures whenever possible.
- Preplan the materials needed during treatment. Set out all instruments, medications and impression materials needed. This includes individually sterilized bur blocks with only those burs needed for the procedure. Also put out a rubber dam setup if one will be needed.
- Use disposable items and unit-dose materials whenever possible. The use of disposable items saves time during cleanup and decontamination. Disposables also solve the problem of decontaminating hard-to-clean items such as the saliva ejector.
- Identify equipment and surfaces that will become contaminated during treatment. Use a barrier. to prevent contamination of these surfaces and items or to disinfect them after treatment.
- The decision to use barriers or chemical disinfection should be based on individual circumstances. Barriers are quick and easy to use, and can be readily changed, but may be more expensive than chemical disinfection.
- Disinfectants are generally less expensive and are easy to use on flat surfaces, but they may stain or corrode some materials, may be toxic and are difficult to use effectively on rough and odd-shaped surfaces.
- If barriers are chosen, a number of readily available materials can be used. These include plastic wraps, aluminum foil, impervious backed paper and commercially available polyethylene sheets and tubing.

Some examples of the use of barriers are as follow

1. Cover light handles with plastic wrap or aluminum foil. These are available commercially and some manufacturers offer removable light handle attachments that can be disinfected easily.
2. Cover the back of chair with a polyethylene bag to protect the headrest, protect the control buttons with plastic wrap and the arms of the chair with polyethylene tubing.
3. Cover counter tops with plastic laminated paper.
4. Protect the hoses to the air-water syringe, saliva ejector, high- speed evacuator and hand pieces with polyethylene tubing.

- Set up radiographs for viewing and reviewing patient records before initiating the treatment. Entries into the record should be made before putting the gloves on or after they have been removed and hands have been washed. Do not make computer entries during treatment unless the equipment has been barrier protected.
- Follow manufacturer's directions for care and maintenance of water lines. Patient material (e.g. oral microorganisms, blood, saliva) can enter the dental water system during patient treatment. Dental devices connected to the dental unit water system should be operated to discharge water and air for a minimum of 20-30 seconds between patients. This procedure flushes out any patient material that might have entered the turbine, air and waterlines.
- All personnel involved in patient care should prepare themselves for the incoming patient. This includes the use of personal protective equipment (gown, eyewear, mask, gloves) and hand washing.

Infection Control practices for use during clinical activities will help reduce the exposure to infectious agents.

Infection Control Practices-Chair side

- Use care when receiving, handling or passing sharp instruments. Many dental instruments can easily cut gloves and skin.

- Take special precautions with syringes and needles. Needle stick injuries are a major cause of infection in health care personnel. Needles should not be recapped, bent, broken or otherwise manipulated by hand.
- Never recap a needle using a two-handed technique. Instead, use one of the commercially available sheath holders or the "scoop" technique. In this technique, the cap is scooped up from the tray with the needle tip using only one hand. As an additional protection against needle sticks, do not allow uncovered needles to remain on the instrument tray. It is far safer to dispose of them immediately after use in a puncture- proof container
- Disposable needles should not be bent or broken after use.
- Needles should not be removed manually from disposable syringes or otherwise handled manually.
- Forceps or other appropriate instruments may be used to handle sharp items.
- Disposable syringes, needles, scalpel blades and other sharp items should be discarded into puncture-resistant biohazard (sharps) containers that are easily accessible.
- Use a rubber dam whenever possible. Rubber dams limit the splash and spatter of blood and saliva and should be used whenever possible.
- Avoid touching unprotected switches, handles and other equipment after gloves have become contaminated. If objects are touched or handled, they should be carefully cleaned and disinfected at the end of the procedure.
- Avoid opening drawers or cabinets once gloves have become contaminated.
- If it becomes necessary, you may simply ask another person for assistance; or you may use another barrier, such as prepackaged aluminum foil squares or plastic gloves, to grasp the cabinet or drawer handle.
- However, if these options are not available, you must remove the contaminated gloves, wash hands before opening a drawer or cabinet, and then re-glove before resuming patient treatment.
- Extracted teeth should be considered as potentially infectious material and should be disposed in medical waste containers.

Pre-procedural Mouth Rinses

- Anti-microbial mouth rinses (e.g. Chlorhexidine gluconate, essential oils, or povidone-iodine) used by patients before a dental procedure are intended to reduce the number of microorganisms the patient might release in the form of aerosols or spatter that subsequently can contaminate dental practitioner and equipment operatory surfaces.

The infection control process continues after the patient leaves the office. Although effective Pre-treatment planning will simplify your task, there are a number of tasks that should be done following patient care to further reduce the risk for transmission of infectious agents.

Infection Control Procedures-Post treatment

- Continue to wear personal protective equipment during cleanup. Begin the cleaning and disinfection process by removing contaminated gloves used during treatment.
- Next, wash your hands and put on a pair of utility gloves before beginning clean-up. Continue to wear protective eyewear, mask and gown.
- Remove all disposable barriers. All barriers placed before treatment, including light handle covers, polyethylene tubing and counter-top barriers, should be removed. These should be placed into a leak-proof waste bag inside a trash container.
- Dispose of blood and suctioned fluids that have accumulated in the collection bottles during treatment.
- Identify a utility sink, drain or toilet connected to a sanitary sewer that can be used solely for the disposal of blood, liquid wastes and suctioned fluids.
- After the blood and suctioned fluids are poured into the sink, use a 1: 100 dilution of household bleach (or other appropriate intermediate-level disinfectant) and tap water to disinfect the dental unit collection bottle.
- The bottle should be completely filled and the solution should be kept in the bottle for 10 minutes (or according to manufacturer's instructions) before emptying and rinsing with fresh water.
- Clean and disinfect all items not protected by barriers. All clinical contact surfaces that were not protected by barriers must be cleaned and then disinfected with an intermediate-level

surface disinfectant- for example iodophor, phenolic solution, or diluted household bleach (sodium hypochlorite).

- Remove personal protective equipment. The proper method of removing a mask is to grasp it only by the cloth or elastic strings, not by the mask itself.
- Reusable protective eyewear and face shields should be cleaned with soap and water as necessary and, if visibly soiled, disinfected between patients according to manufacturer's instructions.
- Remember not to touch the eyewear or face shield with ungloved hands, because it may have become contaminated with spatter of blood and saliva during patient care.
- Protective clothing should be changed when it becomes visibly soiled and as soon as feasible if penetrated by blood or OPIM.
- Soiled protective gowns should be placed in a soiled linen container.
- Gowns may be washed using the normal laundry cycle.
- Utility gloves should be washed with soap before removal.
- Finally, thoroughly wash your hands for at least 15 seconds, using soap or anti-microbial hand wash.
- Clean the instruments and prepare them for sterilization. Remove the tray with all instruments to the receiving and clean-up section of the central processing area.
- Instruments should be picked up individually. Never pick up a handful of instruments because this greatly increases the risk of cuts or punctures.
- Special care should be used when handling double-ended instruments. Don't reach into trays or containers holding sharp instruments that are not clearly visible. Use strainer- type baskets to remove them.
- Dental instruments should be scrubbed carefully using a long- handled brush with soap and water and rinsed thoroughly. As an alternative, instruments may be cleaned in an ultrasonic cleaner or washer- disinfector. After drying, the clean instruments are ready for sterilization.
- Sterilize devices connected to the air or waterlines of the dental unit between each patient. Any device connected to the dental unit air or water system that enters the patient's mouth

(e.g., hand pieces, prophylaxis angles, air abrasion devices) should be run to discharge water and/or air for 20-30 seconds after each patient.

- Follow the manufacturer's recommendations for proper flushing of devices and for the use and maintenance of waterlines and check valves as appropriate.
- An ultrasonic cleaner should be used to remove any adherent material, but only if recommended by the device's manufacturer.
- Otherwise, scrub devices thoroughly with a detergent and hot water and dry. Finally, sterilize it according to the manufacturer's instructions.
- Disposal of any general medical waste (e.g. gloves, masks, lightly soiled cotton balls, protective barriers) classified as non-regulated medical waste and can be disposed of along with ordinary waste.
- A single leak-resistant biohazard bag is usually adequate for non-sharp regulated medical waste. Sharp items, such as needles and scalpel blades, should be placed intact into puncture-resistant biohazard containers and disposed.
- Disposal of regulated medical waste. (e.g. solid waste soaked or saturated with blood and saliva, surgically removed hard and soft tissues, and contaminated sharp items). A single leak- resistant biohazard bag is usually adequate for non-sharp regulated medical waste. Sharp items, such as needles and scalpel blades, should be placed intact into puncture-resistant biohazard containers and disposed.

STERLIZATION OF HANDPIECES

- Hand pieces are semi critical instrumentation.
- Autoclave sterilization of hand pieces is one of the most Rapid Method.
- Clean the hand piece by wiping visible debris using suitable disinfectant such as alcohol.
- The hand pieces are lubricated; keep it in plastic bag or the sterilization bag to avoid breathing the vaporized lubricant.
- Chemical vapor pressure sterilization recommended for some type of hand pieces like ceramic bearing hand pieces.
- Ethylene oxide (ETOX) gas is the greatest method of sterilization used for hand pieces.
- Dry that sterilization of hand pieces is generally not recommended.

- Do not exceed temperature of 135 degree C.

BARRIER TECHNIQUE

- Maintain well cleaned surfaces of dental chair by using disinfectants.
- Use protective attire such as surgical gown, head cap, eyewear, mouth mask, and gloves at the time of operating. Take extra precautions such as using double gloves while performing cases related to blood related diseases which can be transmitted.
- Use disposable covers for covering surfaces that will be repeatedly touched.
- Use plastic firm or surgical pack wraps to cover entire tray even edges.
- Use large clear plastic bags to cover chair arms.
- Use plastic, silver ware bags for suction handles and air /water syringe handles.
- Sterilize the instruments and burs before procedure and do not touch them with bare hands after sterilization.
- Dispose of the barriers after each appointment as these are one time usable.

Instruments sterilization

- Wear protective puncture resistant gloves to handle used instruments.
- Keep instruments wet in an antibacterial solution before cleaning.
- Use ultrasonic cleaning devices.
- Use good quality sterilizer equipment.
- Use proper water [or] chemicals to operate, clean and maintain sterilizer.
- Read the operator`s manual and follow operation instruments for sterilizer.
- Place only dry instruments in the sterilizer.
- Use a wrap that will be penetrated by steam [or] gas used.
- Load the sterilizer loosely; leave air space between large packs.
- Read sterilizer temperature and pressure gauges daily.
- Use complete sterilizer monitoring system outlined, use indicators daily and spore tests weekly.
- Keep a record of daily indications and spore tests.

RISKS/HAZARDS OF MERCURY

- Mercury vaporized rooms cause biological, neurological & systemic toxic effects. allergic reactions, multiple sclerosis, kidney dysfunction
- **Eradication**: Sealed amalgam capsules with low mercury levels - water irrigation high suction - Proper discarding of amalgam

- **Low Risk Conditions** - Allergic reactions, skin irritation Sources: use of latex gloves ray processing chemicals, dental materials - Physical hazards such as musculoskeletal complications
- **Risk of losing hear capacity** - TINNITUS first complication sources: low speed & high speed turbines - trimmers, vibrators, mixing devices - ultrasonic instruments
- **Risk of ionizing radiation** - Occurs due to x ray machines in the dental office Risk of non - ionizing radiation - use of composites resins next to lasers Psychological risks - stress, emotional exhaustion, anxious patients.

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HIGH RISK AREAS IN DENTAL PRACTICE THE WORK AREA

- The work environment highly transmits pathological microbes from biological matrices such as - gingival fluids - saliva, blood - water used in dental unit - water emitted by patients *Both patients and dental workers are equally exposed to these hazards
- Eradication: - Strict maintenance of infection control - Sterilization of reusable tools Use of protective equipment like gloves etc.
- Risks/Hazards Through Infections - Needles &other sharp objects - spatter; aerosols; etc. these are extremely capable to transmit viral infections HIV, AIDS, HBV - bacterial infections Syphilis,TB.
- Disinfection, Sterilization, Skilled & Efficient Handling Will Eradicate Infectious Hazards.

Protection against Dental Aerosols

- Use protective barriers such as gloves, masks and eyewear.
- Do Pre-procedural rinsing with Chlorhexidine; reduces bacterial count in aerosols.
- Proper position of a patient during dental treatment is important.
- Use saliva ejectors and high volume suctions.
- Ventilation and air conditioning system should be used to avoid contamination.
- Immunization against biological hazards.

Personal Protective Equipment

Purpose

The purpose of this Standard is to describe the requirements of Personal Protective Equipment (PPE) for the on-site operations. PPEs are intended to be worn or held by a person at work which protects them against one or more risks to their health and safety.

Scope

This Standard is mandatory and applies to EESL operations and managed sites including its contractors.

Tools and Equipment used for personal protection

Safety requires proper planning of work, proper usage of safety tools, exercise of good judgment and intelligent supervision. Experience proves that majority of the accidents are preventable.

Working unsafely such as throwing materials or tools, at another worker should be prohibited. The following are the minimum requirements of safety devices and special tools:

- Safety Helmets
- Gloves
- Safety Belts
- Well supported Ladders
- Hand Tools kit
- First aid box containing Dettol, bandage, burnol, cotton, painkiller pills.

Different Levels of Protection

The following are guidelines which an employer can use to begin the selection of the appropriate PPEs. The site information may suggest the use of combinations of PPE selected from the different protection levels (i.e., A, B, C, or D) as being more suitable to the hazards of the work. PPE is divided into four categories based on the degree of protection afforded:

1. **Level A** – Level 'A' PPEs are selected when the greatest level of skin, respiratory, and eye protection is required

Positive pressure, full face-piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH).

- Totally-encapsulating chemical-protective suit.
- Coveralls.
- Long underwear
- Gloves, outer, chemical-resistant.
- Gloves, inner, chemical-resistant.
- Boots, chemical-resistant, steel toe and shank.
- Hard hat (under suit)
- Disposable protective suit, gloves and boots (depending on suit construction, may be worn over totally-encapsulating suit)

2. **Level B –** Level B PPE are used when highest level of respiratory protection is necessary but a lesser level of skin protection is needed.
   - Positive pressure, full-face piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH approved).
   - Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two- piece chemical-splash suit; disposable chemical-resistant overalls).
   - Coveralls.
   - Gloves, outer, chemical-resistant.
   - Gloves, inner, chemical-resistant.
   - Boots, outer, chemical-resistant steel toe and shank.
   - Boot-covers, outer, chemical-resistant (disposable).
   - Hard hat.
   - Face shield

3. **Level C -** The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air purifying respirators are met
   - Full-face or half-mask, air purifying respirators (NIOSH approved).
   - Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls).
   - Coveralls.
   - Gloves, outer, chemical-resistant.
   - Gloves, inner, chemical-resistant.
   - Boots (outer), chemical-resistant steel toe and shank.
   - Boot-covers, outer, chemical-resistant (disposable).
   - Hard hat.
   - Escape mask.
     - Face shield.

4. **Level D** - A work uniform affording minimal protection: used for nuisance contamination only
   - Coveralls.
   - Gloves.
   - Boots/shoes, chemical-resistant steel toe and shank.
   - Boots, outer, chemical-resistant (disposable).
   - Safety glasses or chemical splash goggles.
   - Hard hat.
   - Escape mask.
   - Face shield.

Types of PPE

Personal protective equipment are available for different purposes and to protect various functions of the human body. It is essential to pick the appropriate PPE for the hazard type. The following PPE have been suggested keeping EESL's operations in mind.

Hearing protection

There are three main types of hearing protection:

- earmuffs/defenders, which completely cover the ear
- earplugs, which are inserted into the ear canal
- Semi-inserts (also called canal-caps), which cover the entrance to the ear canal.

Hearing protection must be worn by anyone who is likely to be exposed to noise at or above the Exposure Action Level set by The Control of Noise at Work Regulations 2005.

Head protection

There are three widely used types of head protection:

- industrial safety helmets (hard hats), which are designed to protect against materials falling from height and swinging objects
- industrial scalp protectors (bump caps), which are designed to protect from knocking against stationary objects
- caps/hair nets, which protect against entanglement

Tasks where head protection may be required include:

- construction
- building repair
- work in excavations and tunnels
- work with bolt driving tools
- driving motorcycles and all-terrain vehicles, etc.

Turban-wearing Sikhs are exempt from the requirement to wear hard hats on construction sites by virtue of The Employment Act 1989.

Eye protection

There are several types of eye protection:

- Safety spectacles: these are similar to regular glasses but have a tougher lens. They can include side shields for additional protection.
- eye shields: a frame-less one piece moulded lens, often worn over normal prescription glasses
- safety goggles: these are made with flexible plastic frames and an elastic headband
- Face shields: heavier and bulkier than other type of eye protector, face shields protect the face, but do not fully enclose the eyes so do not protect against dusts, mists or gases.

Tasks where eye protection may be required include:

- handling hazardous substances where there is a risk of splashing
- work with power driven tools where materials are likely to be propelled
- welding operations
- work with lasers
- Using any gas or vapour under pressure.

Foot protection

There are a number of types of safety footwear:

- Safety boots or shoes. Normally have steel toe-caps but can have other safety features (e.g. steel mid-soles, slip resistant soles, insulation against heat and cold)
- Wellington boots, which can be supplied with steel toe-caps
- Anti-static and conductive footwear. These protect against the build-up of static electricity.

Tasks where foot protection may be required include: construction, demolition, building repair, manual handling where there is a risk of heavy objects falling on the feet, work in extremely hot or cold environments, work with chemicals and forestry. If there is a risk of slipping that cannot be avoided or controlled by other measures, attention must be given to the slip resistance of soles and replacement before the tread pattern is overly worn.

Hand and arm protection

Hand and arm protection comes in a variety of forms, including:

- Gloves and gauntlets (leather, nitrile, latex, plastic coated, chain mail, etc.)
- wrist cuffs and armlets, e.g. used in glass cutting and handling
- Barrier cream may sometimes be used, where gloves cannot practicably be used.

Tasks where hand and arm protection may be required include: the manual handling of abrasive, sharp or pointed objects, work with vibrating equipment such as pneumatic drills and chainsaws, construction and outdoor work, work with chemicals and other hazardous substances (e.g. bodily fluids) and work with hot or cold materials.

Body protection

Types of body protection include:

- overalls, aprons and coveralls (protection against hazardous substances)
- clothing for cold, heat and bad weather
- high visibility clothing (e.g. jackets, vests)
- harnesses
- back supports
- Life jackets.

Tasks where body protection may be required include: work with hazardous substances, work next to the highway or other areas with moving transport or vehicles, outdoor work, forestry and grounds maintenance work.

Respiratory protection

There are two main types of respiratory protective equipment:

- respirators that filter contaminated air or clean it as it is breathed in
- respirators that supply clean air from an independent source.

Work with harmful dusts, fumes, vapors can require respiratory protective equipment. Tasks where respiratory protection may be required include; work with harmful substances, work in areas where large amounts of nuisance dust is present, work that creates dust (e.g. disc cutters)

Suitability of PPE

To be able to choose the right type of PPE, the hazards involved in the task or work environment shall be carefully considered by EESL. PPE must also meet the needs of the individual.

The following factors should be considered when assessing the suitability of PPE:

- Is the PPE appropriate for the risk involved and conditions at the place where exposure may occur? e.g. goggles are not suitable when full-face protection is required
- Does the PPE prevent or adequately control the risks involved without increasing the overall risk? e.g. gloves should not be worn when using a pillar drill, due to the increased risk of entanglement
- Can the PPE be adjusted to fit the wearer correctly? e.g. if a person wears glasses, ear defenders may not provide a proper seal to protect against noise hazards
- Has the state of health of those using it been taken into account?
- What are the needs of the job and the demands it places on the wearer? How long will the PPE need to be worn? What are the requirements for visibility and communication?
- If more than one item of PPE is being worn, are they compatible? For example, does a particular type of respirator make it difficult for eye protection to fit properly?

Information, instruction and training on PPE use

Where PPE is provided, employees must be provided with adequate information, instruction and/or training on its use. The extent of information, instruction and/or training will vary with the complexity and performance of the kit. Information and instruction should cover:

- the risk(s) present and why the PPE is needed
- the operation (including demonstration), performance and limitations of the equipment
- use and storage (including how to put it on, how to adjust and remove it)
- any testing requirements before use
- any user maintenance that can be carried out (e.g. hygiene/cleaning procedures)
- factors that can affect the performance of the equipment (e.g. working conditions, personal factors, defects and damage)
- how to recognise defects in PPE, and arrangements for reporting them
- where to obtain replacement PPE

- In addition to initial training, refresher training may be required from time to time. Supervisor checks on the use of PPE may help determine when refresher training is required.

Maintenance of PPE

An effective system of maintenance of PPE is essential to make sure the equipment continues to provide the degree of protection for which it is designed. Therefore, the manufacturer's maintenance schedule (including recommended replacement periods and shelf lives) must always be followed.

Maintenance may include; cleaning, examination, replacement, repair and testing. The wearer may be able carry out simple maintenance (e.g. cleaning), but more intricate repairs must only be carried out by competent personnel.

The costs associated with the maintenance of PPE are the responsibility of the EESL/ contractor.

Storage for PPE

It is very important to appropriately store PPE to ensure they can be used for a long time

- Where PPE is provided, adequate storage facilities for PPE must be provided for when it is not in use, unless the employee may take PPE away from the workplace (e.g. footwear or clothing).
- Accommodation may be simple (e.g. pegs for safety helmets) and it need not be fixed (e.g. a case for safety glasses or a container in a vehicle).
- Storage should be adequate to protect the PPE from contamination, loss, damage, damp or sunlight.

Responsibility of implementing the procedure on PPE

While the responsibility of implementing the procedure lies on all EESL personnel, employees of the vendor, contractor and their supply chain actors, specific responsibilities have been allotted, keeping the significance of the standard in mind.

Duties of workers regarding PPE

The workers shall ensure that PPE provided is properly used.

- PPE must be worn and used in accordance with the instructions provided to them
- workers must take all reasonable steps to ensure that PPE is returned to the accommodation provided for it after it has been used (unless the employee may take PPE away from the workplace e.g. footwear or clothing)
- PPE must be examined before use
- any loss or obvious defect must be immediately reported to their supervisor
- Employees must take reasonable care for any PPE provided to them and not carry out any maintenance unless trained and authorize.

FACE SHIELD

Before you start cleaning the shield, it is important to protect yourself. Use gloves, a facemask and if possible another face shield. **For safety reasons, consider the shield you are about to clean contaminated at every possible surface and take appropriate measures!**

In case the shield was contaminated directly by aerosol (e.g. cough) and you have another face shield(s) at your disposal, consider throwing this one into hazardous waste. If this is your only face shield, wash it thoroughly under running water first and make sure you have properly disinfected the sink, otherwise consider it contaminated and alert your colleagues.

Prepare your workplace, where you will clean the shield(s). **Disinfect the surface of the desk** properly before you start.

Don't clean multiple shields at once, separate them into several batches, and avoid cross-contamination.

To ensure the shield is cleaned properly, we recommend disassembling it first:

- remove the elastic band
- remove the lower part, the "chin" - gently pull the part down from the visor
- remove the upper part, the "headband" - carefully straighten the side(s) first, then remove the visor

METHOD	CONDITIONS	EFFECTIVE AGAINST
Hot Air Dryer	65 °C (149 °F), 60 mins	bacteria, viruses
WHO Handrub disinfection*	75% IPA, 5 mins	bacteria, viruses
Isopropanol (IPA)	96%, 5 mins	bacteria, viruses
Isopropanol (IPA)	75%, 5 mins	bacteria, viruses
Sodium Hypochlorite (household bleach)	min. 0.01 % of hypochlorite (e.g. SAVO 1:10), 2 mins+	bacteria, viruses
UV-C	radiation, 30W, wavelength below 280 nm, 15 mins	bacteria, viruses
Ethanol	70-80% max**, 5 mins	bacteria, viruses
Hydrogen Peroxide	25%, 5 mins	bacteria, viruses

Managing Patients with Covid 19 Cases:

PRE-VIEWING AND TRIAGE AREA

1. Pre-viewing and triage dental team should wear adequate personal protective equipment.
2. Prepare thermometers/thermal scanners (forehead or ear thermometer) for temperature measurement, and ask patients regarding their epidemiological contact history, fever, and respiratory symptoms.
3. If the following conditions are encountered during triage, advise patients to leave and instruct them to go to the government hospital or designated hospital, and clean and disinfect the pre-screening triage area as soon as possible.
4. Maintain at least a 1 metre (3 feet) distance between yourself and anyone who is coughing or sneezing.
5. Patients with body temperature ≥37.3 ℃, with symptoms of a cough, runny nose, fatigue, etc may be referred to fever clinic and follow protocol.
6. A history of travel or local contact with somebody who has a fever may be identified, referred to fever clinic and follow protocol.
7. The patient's living or working area has confirmed cluster cases of SARS-CoV-2 infection may be identified, referred to fever clinic and follow protocol.

COMPREHENSIVE DENTAL CLINIC: GENERAL CONSIDERATIONS AND DENTAL TREATMENT CONSIDERATION

1. All emergency dental treatment should be carried out after detailed dental and medical history of the patient.
2. All members of the dental team should be trained and minimum exposure of members should be planned.
3. All members of the dental team should follow a rotatory roster to avoid unnecessary exposure.
4. All dental equipments should be in proper condition along with adequate power back up for managing dental procedures.
5. Personal Protection for Doctor and Staff:

a. Hand hygiene is already well emphasised and stated for all concerned by alcohol based hand rub or use of soap and water for washing with standard steps recommended by WHO.

b. Personal protective equipment is mandatory now and would comprise of the following:

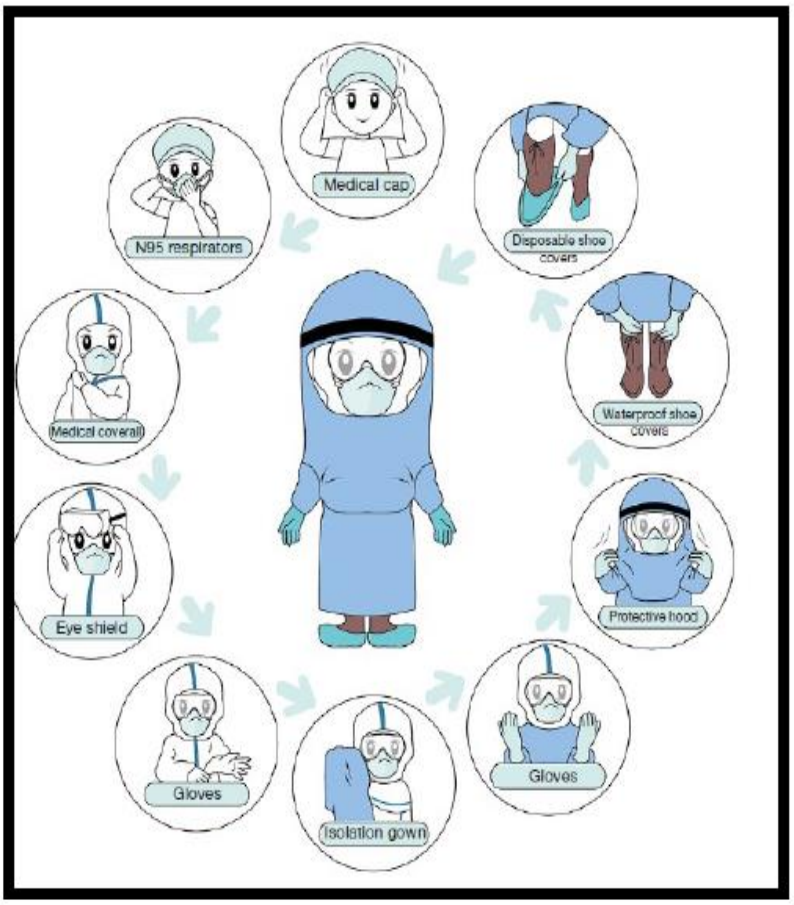
- Goggles / face shield (Both to be used , fitting goggles with a soft tissue seal)
- Triple layer surgical mask
- N95 respirator during routine dental procedures
- FFP3 – Standard mask should be used during treatment of COVID19 positive patients.
- Surgical gloves
- Disposable coverall / gown with hood /waterproof lining (to be changed daily).
- Coverall / gown outer; maybe improvised but will need to be changed after each patient
- Shoe covers

c. PPE should be judiciously used and appropriately disposed as per protocol.

d. PPE protocol of wearing and removal should be followed and clearly designated rooms should be assigned.

e. Change the surgical mask after every dental procedure after every dental procedure.
f. All instruments pertaining to dental procedures to be disinfected, cleaned and sterilized as per standard infection control (CDC, 2003)
6. All instruments should be mandatorily disinfected, cleaned, packaged in colour changing sterilization autoclave pouches and proper storage to be done.
7. All biomedical waste pertaining to patient care should be carefully disposed as per the Bio-Medical Waste (Management and Handling) Rules, 1998 amended from time to time through an authorised biomedical disposal agency by the State Pollution Control Board.

List of Personal



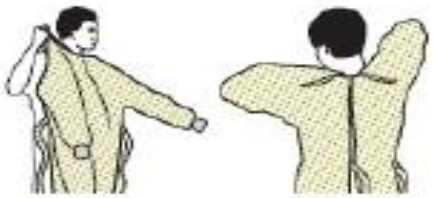
Protective Equipment

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

1. GOWN

- Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
- Fasten in back of neck and waist



2. MASK OR RESPIRATOR

- Secure ties or elastic bands at middle of head and neck
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator

3. GOGGLES OR FACE SHIELD

- Place over face and eyes and adjust to fit

4. GLOVES

- Extend to cover wrist of isolation gown

USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

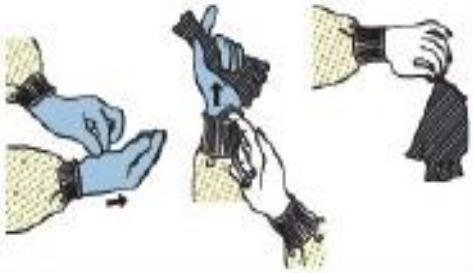
- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene

HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE)
EXAMPLE 1

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

1. GLOVES

- Outside of gloves are contaminated!
- If your hands get contaminated during glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Using a gloved hand, grasp the palm area of the other gloved hand and peel off first glove
- Hold removed glove in gloved hand
- Slide fingers of ungloved hand under remaining glove at wrist and peel off second glove over first glove
- Discard gloves in a waste container



2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band or ear pieces
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container

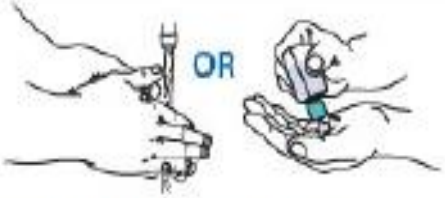
3. GOWN

- Gown front and sleeves are contaminated!
- If your hands get contaminated during gown removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Unfasten gown ties, taking care that sleeves don't contact your body when reaching for ties
- Pull gown away from neck and shoulders, touching inside of gown only
- Turn gown inside out
- Fold or roll into a bundle and discard in a waste container

4. MASK OR RESPIRATOR

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

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



PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE

CDC

DENTAL TREATMENT CONSIDERATIONS:

1. Carry out only emergency dental treatments in a single treatment room. Preferably designate separate clinical areas for Aerosol and Non-aerosol Control dental treatments.
2. Use 1.5% hydrogen peroxide or 0.2% povidine as a pre-procedural mouth rinse.
3. Wherever warranted, use extra oral dental radiographs such as panoramic radiographs as alternatives to intra oral radiographs during the outbreak of COVID-19, as the latter can stimulate saliva secretion and coughing.
4. Reduce aerosol production as much as possible, as the transmission of COVID-19 occurs via droplets or aerosols, and dentists should prioritize the use of hand instrumentation.
5. Dental teams should use rubber dams if an aerosol-producing procedure is being performed to help minimize aerosol or spatter.
6. Dentist may use a 4-handed technique for controlling infection.
7. Most of the Dental care should be performed with the use of high-volume suction or saliva ejectors mainly aerosol based procedures.
8. Dental care teams should “minimize the use of a 3-in-1 syringe as this may create droplets due to forcible ejection of water/air.”
9. Restrict the number of para-dental staff and patients who enter the clinical as well as waiting area of the clinics.
10. Pre-operative and Post-operative Infection Control protocols should be followed and regular fumigation of clinics should be carried out.

Broadly, there are three different types of masks usable for infection control:

- Surgical Masks
- Elastomeric Respirators .
- N95 Type Respirator Masks

Of these three types, only some Elastomeric Respirators are designed for steam sterilization in an autoclave – neither Surgical Masks nor N95 Masks are designed for steam sterilization.

Surgical masks are loose, single use cloth masks designed to provide protection against large droplets, splashes or sprays of bodily or other hazardous fluids. These types of masks experience leakage around the edges when the user inhales, and do not provide a reliable level of respiratory protection against smaller airborne particles. The primary recommended medical function of these types of disposable masks is for infected individuals who want to decrease the risk of transmitting the disease to others in their vicinity, and they are not a substitute for a respirator mask and their primary function is not to protect the wearer of the mask.

In professional healthcare settings, these masks are generally treated as single-use disposable items. As of this writing, we found **no published literature regarding decontamination processes of used surgical face masks.** It is possible that since they are not meant to protect the user against transmission of air-borne diseases and that are inexpensive enough to be treated as single use disposable items, no studies have been performed on their decontamination for reuse.

Elastomeric Respirators

Elastomeric Respirator masks are larger, full or partial face-covering masks with removable filter elements designed to be re-usable. Some types of removable filters can be sterilized in an autoclave, however, most studies recommend that other decontamination methods are faster, damage the mask elements less, and are sufficient in eliminating influenza-like agents such as Coronavirus .

The standard reprocessing procedure recommended by OSHA and the manufacturers of these elastomeric respirator mask elements is: Cleaning followed by disinfection. Filter cartridges should be removed from the masks, and the filter cover, straps and any other surfaces should be subjected to the full reprocessing procedure. OSHA's cleaning guideline recommends the use of a mild detergent at 110°F maximum followed by rinsing and draining with cold water. For disinfection, immersion in a solution of water and 0.1% household bleach for 2 minutes, then rinsing and drying is recommended. To disinfect cartridges, wiping all external surfaces with an alcohol quaternary microbial cloth and allowing to dry is recommended. When properly implemented, a reprocessing procedure for elastomeric respirator masks can take 7-8 minutes per mask.

Cleaning and disinfecting elastomeric respirator surfaces was shown to result in a 4.66 log reduction in a viable influenza-like virus. Any bleach concentration over 1,000ppm has been shown to inactivate influenza viruses. Other studies have shown the importance of standardized, easy to read and implement SOP procedures for disinfection of elastomeric respirators, since they may be unfamiliar devices to the healthcare professionals required to reprocess used masks, such as the one below.

Respirator Cleaning Procedure:

FOLLOW INSTRUCTIONS EXACTLY. Do not don PPE until instructed.

ASSEMBLE THE FOLLOWING EQUIPMENT ON A WORK SURFACE NEAR A SINK WITH A WARM WATER SOURCE:

Protective equipment: Nitrile gloves- 2 pairs, 1 mask with eye shield, and 1 liquid-resistant gown

1 canister of hospital-approved bleach disinfectant wipes

1 bottle of mild dishwashing liquid such as Dawn, etc.

1 container of chlorine bleach (___% hypochlorite)

1 soft bristle brush

2 plastic medication cups or other graduated container to measure ml and/or ounces

Clock or timer

2-2 gallon buckets

1 pair of metal tongs

2 Chux pads 24″x16″

1 clean plastic container large enough to hold mask and components after cleaning

Hospital air and hose if available or clean, soft cloth

TO CLEAN AND DISINFECT THE RESPIRATOR, FOLLOW THESE STEPS:

1. Place unopened bag containing the contaminated respirator mask. near sink by instructions.
2. On the other side of the sink, place opened Chux pad and lay tongs on top. Place the second opened Chux by the clean bin.
3. Place the 2 buckets in the sink and run 1 gallon (4 quarts) of comfortably warm (not hot) water into the first bucket and 2 gallons (8 quarts) of warm water into the second bucket.
4. Perform hand hygiene and then don protective equipment–gloves, gown, and mask with eye shield.
5. Pour 15 ccs (1/2 oz) of DISHWASHING LIQUID in the first bucket containing 1 gallon of water.
6. Pour ___ ccs (___ oz) of BLEACH in the second bucket containing 2 gallons of water. Mix bleach solution with tongs, and lay the back on the Chux.
7. Open biohazard bag, remove the respirator and place it on the top of the bag.
8. Pop off the splash guards (if equipped) on each side of the mask and immerse them in the soapy water.
9. Remove the filters by unscrewing or turning them to the left.
10. Wipe the filters with disinfectant wipes and place them in a clean bin.
11. Without removing the straps, immerse the mask in the soapy water.
12. Clean mask and splash guards (if equipped) with the brush and soapy water gently on the inside of the mask to avoid damaging the valves. Then rinse them well in running water.
13. Place rinsed splash guards and mask (face up) into bleach disinfecting solution.
14. Submerge mask completely into the solution; then while the mask is submerged, use the tongs to turn the mask over until it is facedown. This will avoid air pockets.
15. Place the end of the tongs gently inside the maks to keep it submerged. Then lean the tong handles against the side of the bucket. Leave the tong handles submerged in the disinfectant solution.

16. Set timer for 2 minutes.
17. Discard biohazard bag. Wipe faucet handles with bleach wipe.
18. Discard gloves and perform hand hygiene. Don a new set of gloves.
19. After the 2 minute immersion (TIMED), remove mask and splashguards from the disinfecting solution with the tongs and set them on the Chux by the side of the sink, along with the tongs.
20. Rinse mask and splashguard (if equipped) completely in running water and place them on the second Chux by the clean bin.
21. Dry mask and splashguards with hospital air hose if available; if not available, dry with. clean cloth or allow to air dry.
22. When dry, reassemble mask, filters, and splashguards. Check the integrity of the respirator and store in a plastic bag.
23. Empty and rinse buckets, clean sink area with bleach wipes. Then remove PPE and perform hand hygiene.

Elastomeric Respirators would appear to be ideal for healthcare workers during a widespread pandemic, however their size, operational restrictions such as visibility and audible communication difficulty and price have lead to many organizations relying on the smaller disposable N95 type masks (4).

N95 Type Respirator Masks

N95 Respirator masks (see Image 3) are sealed, tight-fitting masks that force all air through a filter designed to block 95% or more of 0.3 micron test particles. Within the USA, N95 masks should be certified by and bear the appropriate markings required by NIOSH. They must be properly fitted and tested for leaks before they can be considered safe, and traditionally, have been considered to be single use. However, airborne disease outbreaks like SARS, MERS, H1N1 and various other viruses caused regional shortages of these masks, which led many researchers to look into possible disinfection procedures that might allow the masks to be reused (5). Unfortunately, many common decontamination methods such as high temperature steam sterilization (6)(8), alcohol washing, and bleach washing (12) have been shown to degrade these types of respirator masks.

On the bright side, disinfection through warm humid heat and UVGI was found to be effective at inactivating the H1N1 influenza virus and caused the least degradation of mask integrity. The use of hydrogen peroxide vapor (HPV) was found to maintain mask integrity while achieving sterilization.

When examining a decontamination process to permit N95 mask reuse, there are a number of key factors to consider. At the completion of any process, the mask must:

1. Retain filtration efficiency of >95% (ie. capture at least 95% of test particles greater than 0.3 microns)
2. Maintain breathability as the filter element may be damaged. Breathability must not be substantially reduced as determined by measuring the pressure drop across the mask.
3. Not have visible damage or deformation to the filter, straps or sealing members. The mask must retain shape, fit and seal integrity. Straps must retain elasticity.
4. Be successfully decontaminated of the desired organism(s), for example the virus SARS-CoV-2 that causes COVID-19. An ideal process would eliminate all organisms and pathogens rendering the mask sterile.
5. Be safe to use for the wearer (no harmful chemical residues or toxic off-gassing).

If these 5 requirements can been repeatably achieved, then consider how many processing cycles the mask can withstand before all these conditions can no longer be met. It is important to consider that differences in mask construction and materials among various models and manufacturers can significantly impact test results. The ability of **each** make and model to achieve these requirements must be validated for whatever process will be employed.

Methods of Potential Viral Inactivation for N95 Masks

It is important to note that since SAR-CoV-2 is so new, much of the research has been performed on surrogate viruses, such as other types of coronaviruses as well as various strains of influenza. As of this writing, it is unknown whether inactivation of these surrogate viruses are indeed representative of inactivation of SARS-CoV-2. As such, available research and guidance must be interpreted with caution. Further, some methodologies achieve sterilization whereas others aim only for inactivation of the targeted virus. In the latter situation, other potentially harmful microbial life may remain active on the mask. All available regulatory guidance suggests that any mask that has undergone one of these procedures should be handled as if it was an infected mask, only touched wearing gloves, **used by the same individual who initially wore it,** and stored in a container or bag to avoid the mask being touched by any other individual.

Hydrogen Peroxide Vapor (HPV):

Hydrogen peroxide (H2O2) vapor has long been used as an industrial decontaminant and recent studies performed by the Dutch national institute of health have shown that this method is effective at inactivating similar viruses and does not damage N95 masks (16). Battelle has recently received approval from the FDA (14) for the use of their H2O2 vapor

generator and system in decontaminating N95 masks. Similar approaches and technology have been validated by Duke University (15).

The Duke University facility contains a Bioquell™ Clarus™ C system with a 35% concentration hydrogen peroxide solution and distribution system that is used to achieve a uniform concentration of 480ppm+ throughout the decontamination room. The HPV cycle included a 10 minute conditioning phase, 30–40 min gassing phase at 16 g/min, 25 min dwell phase, and a 150 min aeration phase (15). 100 N95 masks were hung from a metal rack in the center of the decontamination chamber while the cycle was run.

Biological indicators loaded with Geobacillus Stearothermophilus spores were used to validate this method, and a 6-log reduction was found, and no significant degradation of the respirator's filter was found until 50 cycles were performed, making this an extremely robust method where available to be implemented. However, degradation of the straps was found after 20 cycles.

A major concern with H2O2 vapor decontamination is off-gassing of hydrogen peroxide from the inner layers of the mask following the completion of the decontamination cycle. The Duke university study also performed a qualitative and quantitative off-gassing study of the masks run through the procedure, and after four hours the level of detectable hydrogen peroxide emanating from the masks dropped below the detection level of the sensor used.

Heat & Moisture

There is a growing body of evidence that supports potential viral inactivation of SARS-CoV-2 through the use of heat, relative humidity and time.

Research performed autoclaving masks at typical sterilization temperatures of 121C showed inconsistent results. One study (9) found that a particular mask was able to be processed up to 5 times without loss of filtration efficiency or fit. Viral inactivation studies were not performed because tests were performed with commonly accepted steam sterilization parameters. However, when tests under similar parameters were performed on different masks (8), results showed unacceptable physical deformation preventing proper fit as well as degradation of filter efficiency below acceptable limits.

In a recent article (10), Peter Tsia, inventor of the electrostatic charging technology that makes the filter media of N95 face masks, discussed acceptable temperature ranges for the electret. Test data provided shows acceptable filter integrity after subjecting it to steam at 125C for 5 minutes; however, there is no experimental data provided on fit performance.

Tests performed at lower temperatures of 65C with humid (85% RH) (8) or moist air (11) for 30 minutes, showed at least a Log 4.8 viral inactivation of two influenza strains. The CDC highlights the use of 60°C and 80% RH as well as 65°C and 85% RH. There are

many potential ways to achieve this temperature and humidity range through the use of an incubator, environmental chamber or proofing oven. **Research is currently ongoing on methodologies to use existing autoclave infrastructure to achieve these conditions.**

Other moist heat methods found in literature are discussed below.

Microwave Generated Steam (MGS):

Plastic reservoirs with perforated tops as shown are filled with about 50 mL of tap water at room temperature, the contaminated N95 mask is placed atop the center of the assembly and loaded into a commercially available microwave oven and exposed to radiation for two minutes (one minute each side of mask). Use of this method resulted in an average log reduction of 5.06 of viable virus. Note that many designs of N95 mask feature metallic nosebands which when exposed to microwave radiation will melt the surrounding area of the mask, rendering it unusable . However, average aerosol penetration and airflow resistance was not shown to have changed significantly for masks subjected to this disinfection method that **did not contain any metallic components**. It is important to note significant potential issues with this approach. As noted, the metal noseband can damage the mask and can also create a fire hazard. Microwaves are available in a variety of wattages both with and without rotating carousels. This study also did not identify whether any of these are important parameters in order to achieve viral inactivation while maintaining filter integrity.

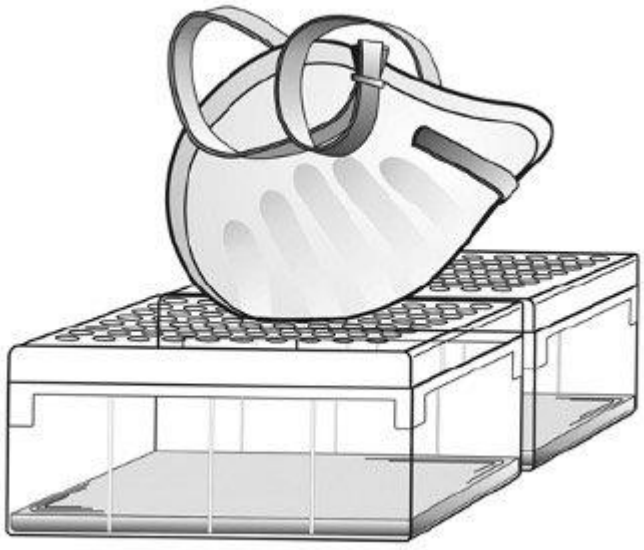
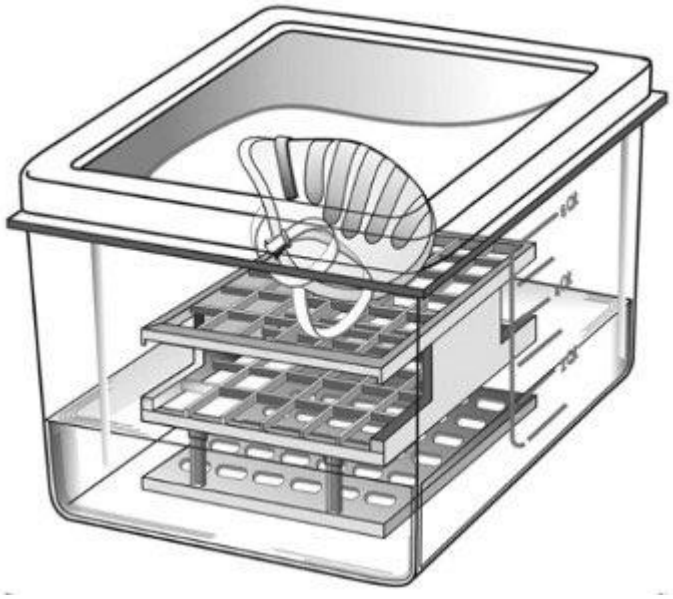


Image 4: MGS Disinfection Setup

Warm Moist Heat (WMH):

A sealable container is filled with about one liter of tap water. A plastic support rack is placed in the container and this assembly is to be heated to 65℃ for 3 hours in an oven after which the mask is placed onto the support rack and returned to the oven for another

30 minutes. Use of this method resulted in an average log reduction of 4.81 of viable virus (5).



WMH Disinfection Setup

UVGI:

A UV-C lamp (80W, 254 nm) is used to expose the contaminated FFRs to UV radiation (≥1 J/cm^2 total dosage) for 15 minutes on each side of the mask (outer and inner). Use of this method resulted in an average log reduction of 4.81 of viable virus. Both dosage and wavelength of UV light are critical for inactivation, and when designing a procedure users must bear in mind that UV light is based on line-of-sight, and any part of the mask in shadow will not be disinfected. Further, it is vital to ensure that UV-C dosage is measured at the mask as dosage can be significantly reduced with increased distance from the source(s). One potential problem with implementing UVGI disinfection is penetration to the inner layers of some mask designs, which may not be exposed to the same dosage. Certain strap designs prone to twisting may also inhibit UVGI disinfection and a secondary disinfection step only applied to the straps of the mask may be necessary to counteract this.

While testing has shown that exposure to UVGI does not reduce the aerosol penetration to above 5%, statistically significant increases in penetration do occur meaning that repeated use of this method of disinfection will degrade masks over time (7). However, anecdotal evidence from facilities like the University of Nebraska where mask reuse has been fully implemented using UVGI light disinfection protocols suggests that the repeated usage of the mask leads to degradation far faster than the disinfection protocol does. At that facility the average number of times masks have been able to be reused is 3 times before fit testing failures are observed, whereas masks were run through the UVGI disinfection protocol 50 times before significant degradation of seal integrity was observed (13).

The HICC Team of GSL Dental College

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Disposable or other barrier techniques:

Disposable items like surgical gloves, mouth masks are stored separately. After use, separate bins are kept for their disposal. Disposable syringes and needles, scalpel blades and other sharp items must be placed into puncture resistant chambers and disposed off.

Surgical and other instruments that penetrate soft tissue and/or bone should be sterilized after each use.

Instruments that are not intended to penetrate oral soft tissues or bone(eg amalgam condensers, burs etc) but that may come into contact with oral tissues should also be sterilized after each use, if possible, however, if sterilization is not feasible, these instruments should receive high level disinfection.

The dental chairs with ultrasonic scalers are provided with a hi-vaccum suction system to prevent aerosol contamination.

Blood, suctioned fluids or other liquid waste may be carefully poured into a drain connected to a sanitary sewer system.

Other solid waste contaminated with blood or other body fluids should be placed in sealed, sturdy bags to prevent leakage of the contained items. These can be then disposed off according to the guidelines.

After the completion of work, surfaces that may have become contaminated with blood or saliva should be wiped with absorbent towel to remove extraneous organic material, and then disinfected with a suitable chemical germicide.

Detachable hand pieces of ultrasonic scalers should be washed and cleaned before autoclaving them.

The drapes and laundry are sent to the wash after each day followed by autoclaving on the next day.

Surveillance activities of high risk areas by microbiologist

The institution monitors surgical site infections by sending pus/swab for culture every fortnight.

Handwash and scrubbing in patient care areas

The washing area in every department has liquid soaps and disinfectants for hand washing.

Sterilization room has adequate space

All the sterilization rooms have ample space to hold the equipment.

Regular validation tests for sterilization are carried out and documented

The chemical strips are provided to all departments to check the efficacy of sterilization procedures.