Dept. of Public Health Dentistry

Infection Control

By. Dr. Janki Shah

Infection control

- Infection is the process of invasion of the tissue by organisms characterized by their multiplication in the body of the host to produce disease.
- Infectious disease: is disease that can be transmitted by any mode of transmission

Definitions

- **Sterilization:** the process by which an article, surface or medium is freed of ALL living micro organisms either in the ***vegetative or spore state***
- **Disinfection:** is the destruction or removal of all pathogenic organisms or organisms capable of giving rise to infection.
- **Antisepsis**: is the prevention of infection, usually by inhibiting the growth of bacteria in wounds or tissues.

Definitions

- **Antiseptics:** chemical disinfectants which can be applied to skin or mucous membrane for asepsis
- **Bactericidal agents**: are able to kill the bacteria
- **Bacteriostatic agents**: are able to prevent the multiplication of bacteria which may however remain alive
- **Cleaning:** removes soil, other dirt & reduces the microbial burden making sterilization more effective.

Transmission of infection in clinic

- Direct contact with blood, oral fluids or other secretions
- Indirect contact with contaminated instruments, operatory equipment or environmental surfaces
- Contact with air borne contaminants present in airborne contaminants present in either droplet splatter or aerosals of oral & respiratory fluids.

Occupational safety & health Act (OSHA) regulations

1. Provide Hepatitis B immunization
2. Universal precautions
3. Engineering controls to reduce production of contaminated splatter, mists & aerosols.
4. Work practice control precautions
5. Washing hands after removing gloves.
6. Safe handling of needles & sharps
7. Use disposable items, dispose them in hard walled leak proof ‘biohazard label’ container.
8. Prohibit eating, drinking, handling contact lenses in contaminated environment.

Occupational safety & health Act (OSHA) regulations (continued)

Blood & contaminated specimens to be transported or stored into suitable leak proof containers.

10. Use necessary personal protective equipment… gloves, gowns etc.

11. House keeping requirements.

12.Reusable contaminated sharp instruments to be transferred in a hard walled container to clean up area.

13. Laundering of protective garments.

Barrier techniques

- Medical gloves: latex or vinyl.
- Sterile gloves for surgical procedures.
- Wash hands before & after removing gloves.
- Washing of gloves may cause ‘wicking’ (penetration of liquids through undetected holes in the gloves)
- Disinfecting agents, oils, heat treatment such as autoclave may cause deterioration of gloves.
- Chin length plastic face shields/ surgical mask (mask should be changed between patients or during patient treatment if it becomes wet.)
- Aluminium Foil

Infection control procedures

1. Medical history
2. Universal precautions
3. Personnel health elements

A] education & training
B] immunization programmes
C] exposure prevention & post exposure management
D] personal protective equipment
E] Barrier techniques: masks, protective eye wear, face shields, protective clothing, gloves & gloving, rubber dam, high velocity air evacuation.

4. Sterilization & disinfection of patient care items
5. Dental unit waterline (DUWL) contamination
6. Environmental infection control

Medical history

- Thorough history at the first visit, update at subsequent visits
- Alerts us to premedicate or refer the patient for special medical or dental care.
- Warns us of infectious disease status i.e. to identify high risk patients
- Recommended to treat all patients as potentially infectious & routinely use universal precautions in ALL patients.

Universal precautions

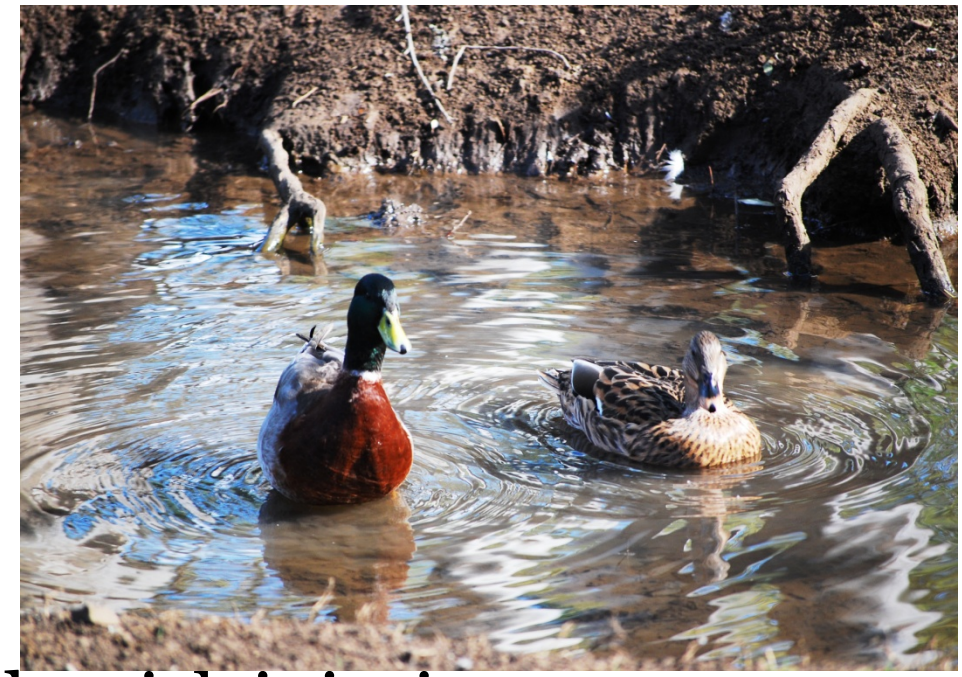
- Vaccines
- Barrier techniques
- Sterilization & disinfection
- Waste disposal

Vaccines

- Health care personnel are considered to be at substantial risk for acquiring or transmitting Hepatitis B, Influenza, Measles, Mumps, Rubella & Varicella.
- OSHA regulation rule requires that all dental workers must take Hepatitis B vaccine.
- Engerix B 20µg (1 ml)
- Recombivax HB 10µg (1 ml)
- Dose: 0,1,6 months; booster dose 5- 7 years according to manufacturer’ s instruction.

Personal protection

- Gloves
- Hand washing
- Masks
- Protective eye wear
- Protective clothing
- Immunization
- Protection against needle stick injuries



WHAT CONSTITUTES PPE?

Gloves

- Sterile latex gloves: surgeons/ examination
- Glove permeability: natural porosities in latex (15µm) are hundreds of times greater than the viral capsid diameters of HBV(.042µm) & HIV (.10µm)
- Gloves come with numerous (2%-36%) holes in form of manufacturing defects

Gloves

- Limitations:
- Degenerate quickly in air & with use
- Do not protect against needle sticks, the greatest cause of blood borne occupational viral infections

Personnel health elements

- Education & training: includes description of their exposure risks, prevention strategies & infection control policies & procedures, work related illnesses & injuries including personal exposure potential & review of work restrictions for the exposure or infection.

Exposure prevention & post exposure management

- Avoiding occupational exposures to blood.
- Exposures include Percutaneous injury, through contact between potentially infectious blood, tissues, or other body fluids & mucous membranes of the eye, nose, mouth or non intact skin.
- Personal protective equipment

Hand washing & care of hands

- Hands must be washed BEFORE & AFTER each patient because gloves may become perforated during use & DHW' s hands may become contaminated through contact with patient material.
- Soap & water removes transient microorganisms acquired directly or indirectly from patient contact
- Antimicrobial surgical hand scrub used for surgical procedures

Masks

- Use: to act as barrier against potential air borne pathogens
- Should cover mouth & nose; able to filter particles 3-5μm in diameter; be replaced with each new patient/ every hour
- When mask becomes moist, resistance to air flow through mask increases, causing more unfiltered air to pass by the edges of the mask

Types of mask

- Rigid precontoured/ preformed cups
- Soft pleated rectangular masks

Paper masks: limited physical protection

Theatre type masks: better fit but not a good barrier when wet

Dome type: made of corrugated/ laminated stiff cardboard; tend to close mouth, nose completely; hot to wear

Protective eye wear

- Prevents physical injury from flying debris
- Types: goggles, glasses with/without shield, face shield
- Face shield: should be chin length, provide top protection & be curved to provide side protection
- Mask reduces inhalation of aerosols & dust particles

Protective clothing

- Should be fluid resistant
- Maybe reusable or disposable
- High neck, long sleeve, knee length
- Should be removed when leaving clinical areas
- Should be sent to a laundry & not be taken home

Prevention of needle stick injuries

- Use of needle guard- basically guide the needle into the sheath
- Bayonet technique- needle is introduced into the sheath one handed
- Use needle cutters before disposal

Use & care of sharps

- Needles, blades, wires potentially infective.
- Used needles should never be recapped or otherwise manipulated using both hands; one handed scoop technique or mechanical device designed for holding needle sheath to be employed.
- Used sharps to be disposed in a puncture resistant container
- Bending & breaking needles before disposal involves unnecessary manipulation & should not be done

After an exposure injury

- Wound should be washed thoroughly under running water and squeezed to encourage bleeding
- Site of injury should be wiped with alcohol impregnated swab
- And covered with a waterproof dressing

Pre-exposure prophylaxis with hepatitis B vaccine (children ½ dose same interval)

1st dose	**20mcg**	**At elected date**
2nd dose	20mcg	1 month later
3rd dose	20mcg	6 months after 1st dose

Guidelines for post-exposure Hepatitis B immunoprophylaxis of unvaccinated persons

Cause of exposure		Suggested action
Discrete exposure to an HBsAg positive source	Percutaneous (e.g. bite or needles tick) or mucosal exposure to HBsAg positive blood or body fluids that contain blood	Administer hepatitis B vaccine and hepatitis B immunoglobulin (HBIG)*
	Sexual or needle sharing contact of an HBsAg positive person	Administer hepatitis B vaccine and HBIG*
	Victim of sexual abuse/assault by a perpetrator who is HBsAg positive	Administer hepatitis B vaccine
Discrete exposure to a source with unknown HBsAg status	Victim of sexual abuse/assault by a perpetrator with unknown HBsAg status	Administer hepatitis B vaccine
	Percutaneous (e.g. bite or needlestick) or mucosal exposure to blood or body fluids that contain blood from a source with unknown HBsAg status	Administer hepatitis B vaccine

*Immunoprophylaxis should be administered as soon as possible, preferably within 24 hours. Dose of HBIG is 0.05-0.07 ml/kg. The hepatits B vaccine series should be completed.

HBsAg – Hepatits B surface antigen

Dental aerosols

- Composition: saliva, nasopharyngeal secretions, plaque, blood, tooth components, abrasives used in polishing
- Sources: instruments, water lines, plaque, hand pieces, ultrasonic scalers, air polishers, air abrasion units
- Diseases known to spread: pneumonia, TB, influenza, Legionnaires diseases, SARS

Aerosols	Splatter
Particles less than 50μm in diameter	Air borne particles larger than 50μm in diameter
Particles stay airborne for an extended period before they settle on environmental surfaces or enter the respiratory tract	Particles behave in a ballistic manner i.e. they are ejected forcibly from the site & arc like a bullet until they contact a surface
Smaller particles of aerosol(0.5-10μm) have the potential to penetrate & lodge in smaller passages of lungs & carry greatest potential for transmitting infection	Large to become suspended in the air & are airborne only briefly

Methods of reducing air borne contamination

- Use of personal protection: mask, gloves, eye wear
- Use of pre-procedural mouth rinse: .01% Chlorhexidine/ essential oil- containing mouth wash for 1 minute
- Use of rubber dam
- Use of high efficiency air (HEPA) filter/ UV chambers in the ventilation system
- Use of high volume evacuator

Sterilization/ disinfection

- Before sterilization, instruments should be cleaned with detergents or a mechanical device (ultrasonic cleaner)
- Sterilization can be done by: autoclave, unsaturated chemical vapor sterilizer, dry heat ovens; ethylene oxide gas, boiling water, ionizing radiation.

Sterilization

- Autoclave: 121° C temp, 15 lbs pressure 15 minutes.
- Unsaturated chemical vapor sterilizer: solution containing formaldehyde & alcohol- greatly reduced corrosion
- Dry heat sterilizer: 320°F 60-120 minutes.
- Rapid heat transfer: 375° F 6-12 minutes
- Steel ball/ glass bead sterilization: 10-30 sec; 210-230°C

Storage of sterilized instruments

- Instruments should be wrapped or bagged before sterilization ; suitable wrap material such as muslin, clear pouches, paper
- Pins, staples or paper clips should not be used as they make holes in the wrap that permit entry of microorganisms

Cleaning & disinfection of dental unit & environmental surfaces

- Contaminated surfaces should be cleaned with disposable toweling, using an appropriate cleaning agent & water; disinfected with suitable germicide
- Hospital disinfectant labeled for tuberculocidal
- Phenols, iodophors, & chlorine containing compounds
- Fresh solution of NaOCl [bleach 1:100 dilution of bleach: water]

Surface asepsis

- Use surface covers: clear plastic wraps, plastic backed paper, Aluminum foil
- Surface covers used on head rests, handpieces shafts & hoses, instrument table, counter tops, handles, switches, controls

- Precleaning: dental staff should wear reusable, heavy rubber work gloves, contaminated instruments or use an ultrasonic cleanser along with detergent iodophor solution for 5 minutes
- Cleaning agents: soap & water, detergents
- Disinfection: spray disinfectant on precleaned surface & let it be moist for 10 minutes (tuberculocidal time)

લોહી ઢોળાયું હોય ત્યારે અનુસરવાના સ્ટેપ્સ

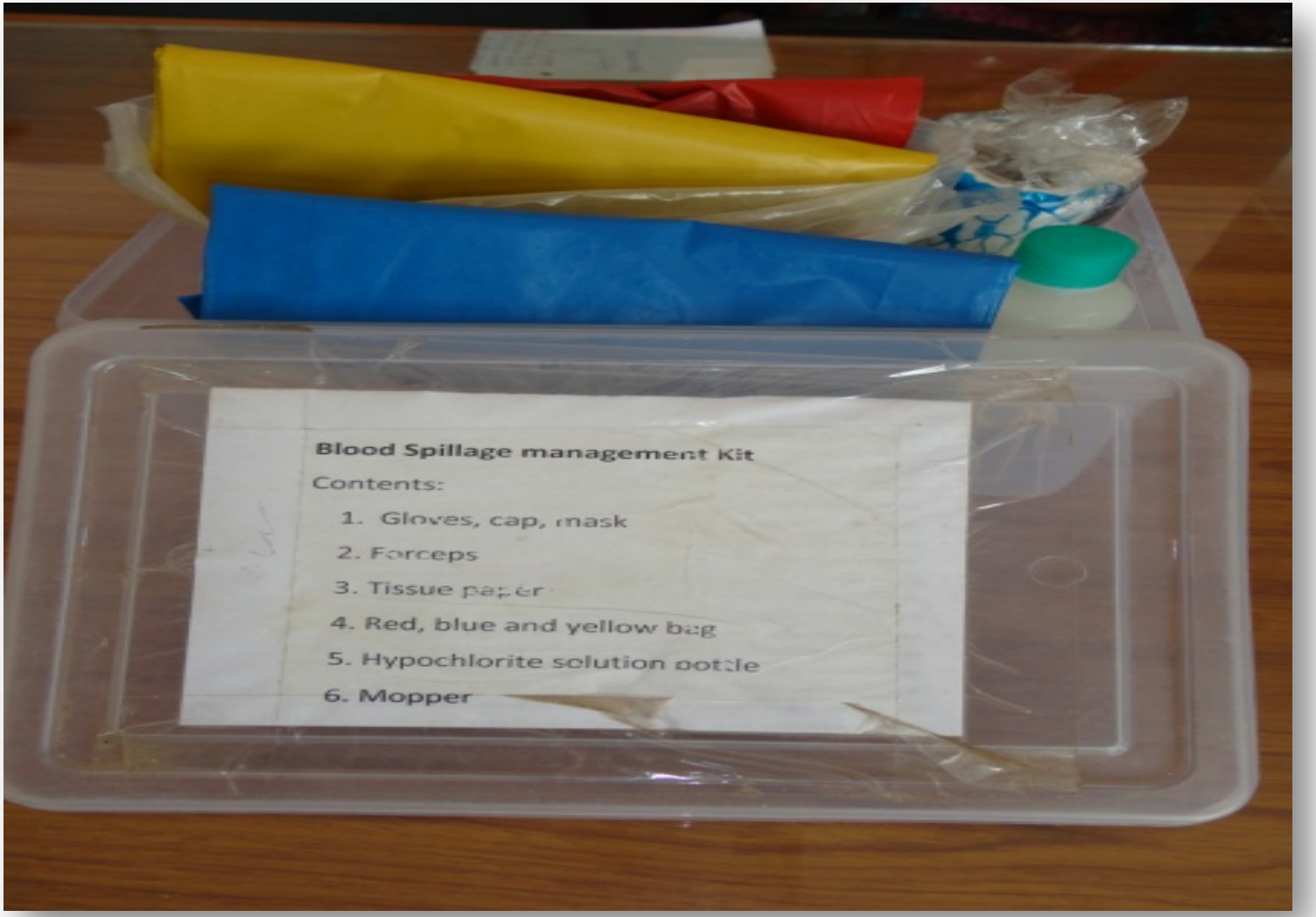
1 પહેલાજ Servant અથવા Clener ને personal protective equipment પહેરાવવા, જેવાકે mask, gloves, gown, gum shoes પહેરાવવું
2 જ્યાં આગળ લોહી ઢોળાયુ છે ત્યા towel, gauze, tissue paper નાખવુ અને તેના વડે તે area cover કરવો.
3 તેના પર 5% sodium hypochlorite solution નાખવું.
4 તેને ૩૦ minute સુધી રહેવા દેવું.
5 ત્યારબાદ બધુંજ શોષાઈ જાય પછી તેને પીળી થેલીમાં નાખવું.
6 તે જગ્યા ફરીથી થી hypochlorite solution નાખી સાફ કરાવવી.
7 અને છેલ્લે રુટીન પોતા થી પોતુ કરાવવું.
8 Gloves કાઢીને કાપીને લાલ થેલી માં નાખવા .
9 Hand wash કરવું.

BLOOD SPILLAGE MANAGMENT - STEPS

1 Wear personal protective equipments.
2 COVER the site with the tissue paper or any absorbent (news paper).
3 Pour the pure hypochlorite solution (5%) on and around the site.
4 Leave it for 30 min.
5 Take it and dispose in yellow bag.
6 Clean the site with pure hypo chlorite solution.
7 Lastly clean with the routine mop.
8 Hand wash.

નિયામક શ્રી
મા.અને બા. કુટુંબ કલ્યાણ, ગાંધીનગર.

Management of blood spill



Management of blood spill

Disinfectants used in dentistry

- Chlorines: NaOCl, Chlorine Dioxide
- Iodophor: Povidone Iodine
- Phenols
- Alcohols: ethyl or isopropyl alcohol
- Gluteraldehyde
- Quaternary ammonium compounds: Benzalkonium chloride
- Peroxygenated compounds: Hydrogen peroxide

Hand pieces, anti retraction valves

- Autoclaving/ dry heat as per manufacturer' s recommendation is mandatory
- Surface disinfection by wiping with a surface disinfectant is **not** acceptable.
- Antiretraction valves should be fitted in dental unit water lines to prevent fluid aspiration & to reduce risk of cross infection
- **High speed hand pieces should be run to discharge water & air for minimum 20-30 sec after use on each patient.**

- High velocity evacuation to be used to minimize the spread of spray, spatter & aerosols generated during discharge procedures.
- Sterile saline/ sterile water to be used as an coolant during surgical procedures.
- Items like handles, dental unit attachments of air/ water syringes should be covered with impervious barriers that are changed after each use/ cleaned with a chemical germicide
- Water lines to all instruments should be flushed after each patient & at the beginning of each day

WASTE DISPOSAL

- HOSPITAL WASTE: REFERS TO ALL WASTES GENERATED, DISCARDED AND NOT INTENDED FOR FURTHER USE IN THE HOSPITAL.
- BIOMEDICAL WASTE: ANY WASTE WHICH IS GENERATED DURING DIAGNOSIS, TREATMENT OR IMMUNIZATION OF HUMAN BEINGS/ ANIMALS OR IN RESEARCH ACTIVITIES.
- CBWTF: COMMON BIOMEDICAL WASTE TREATMENT FACILITY.

Waste disposal

- Health care waste is defined as all the waste generated by health care establishments, research facilities & laboratories.
- Types:

1. Infectious waste[lab cultures, equipment]
2. Pathological waste [body parts, blood]
3. Sharps [needles, blade]
4. Pharmaceutical waste[expired drugs]
5. Genotoxic waste [substances containing carcinogenic properties]
6. Chemical waste [lab reagents, disinfectants, solvents]
7. Wastes with high metal content e.g. mercury
8. Pressurized containers[gas cylinders, aerosol cans]
9. Radio active waste

Categories of Bio-Medical Waste in India

Option	Waste Category	Treatment and disposal
Category No. 1	Human Anatomical Waste (human tissues, organs, body parts)	incineration[2] / deep burial
Category No. 2	Animal Waste (animal tissues, organs, body parts carcasses, bleeding parts, fluids, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospital, animal house)	incineration[2] / deep burial
Category No. 3	Microbiology and Biotechnology Waste (waste from laboratory cultures, stocks or specimens of micro-organisms, live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, waste from production of biologicals, toxins, dishes and devices and for transfer of cultures)	local autoclaving / microwaving / incineration[2]
Category No. 4	Waste sharps (needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps)	disinfection (chemical treatment@/autoclaving/ microwaving and mutilation / shredding)
Category No. 5	Discarded medicines and Cytotoxic drugs (wastes comprising of outdated, contaminated and discarded medicines)	incineration@ destruction and drugs disposal in secured landfills
Category No. 6	Solid waste (Items contaminated with blood, and fluids including cotton, dressings, soiled plaster casts, linen, beddings, other material contaminated with blood)	incineration@ autoclaving / microwaving
Category No. 7	Solid waste (wastes generated from disposable items other than the waste sharps such as tubings, catheters, intravenous sets etc.)	disinfection by chemical treatment@@ autoclaving/ microwaving and mutilation / shredding ##
Category No. 8	Liquid waste (waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities)	disinfection by chemical treatment @@ and discharge into drains
Category No. 9	Incineration ash (ash from incineration of any bio-medical waste)	disposal in municipal landfill
Category No. 10	Chemicals used in production of biologicals, chemicals used in disinfection, as insecticitdes, etc.	chemical treatment@@ and discharge into drains for liquids and secured landfill for solids

Colour coding and type of container for disposal of bio-medical wastes

Colour coding	Type of container	Waste category	Treatment options as per Schedule I
Yellow	Plastic bag	Cat. 1, Cat. 2, and Cat. 3, Cat. 6	Incineration/deep burial
Red	Disinfected container/ plastic bag	Cat. 3, Cat. 6, Cat. 7	Autoclaving/Microwaving/Chemical Treatment
Blue / White translucent	Plastic bag/puncture proof container	Cat. 4, Cat. 7.	Autoclaving/Microwaving/Chemical Treatment and Destruction/Shredding
Black	Plastic bag	Cat. 5 and Cat. 9 and Cat. 10 (solid)	Disposal in secured landfill

Waste disposal

- Collection
- Storage
- Transportation
- Treatment
- Final disposal

Handling, storage & transportation of waste

- Sharps should be collected together in puncture proof, rigid, impermeable tamper proof container
- Bags should be marked with international infectious substance symbol
- highly infectious waste should be packed in red bags & immediately autoclaved.
- Return expired drugs to the pharmacy
- Label waste clearly.
- Heavy metal & radioactive waste [yellow] collected separately

Collection

- Waste bags should be tightly closed or sealed when ¾ full by tying/ sealing.
- Waste should not be allowed to accumulate at the point of production.
- Label bags
- Replace bags/ containers immediately.

Mercury Spill થવું હોય ત્યારે અનુસરવા ના ૧૨ સ્ટેપ્સ

૧. જ્યાં મરક્યુરી ઢોળાયું હોય ત્યાંથી બીજી વસ્તુઓ દુર કરવી અને જો એકઝોસ્ટ ફેન ચાલુ હોય, તો બંધ કરવો.

૨. ફેસ માસ્ક પહેરવું.

૩. જુના કપડાં અને શુઝ પહેરવા, જો તે કન્ટામીનેટ થાય તો ડીસ્કાર્ડ કરવાં.

૪. ઘરેણાં પહેર્યાં હોય તો કાઢી નાંખવા.

૫. હાથમાં ગ્લોવ્ઝ પહેરવા જો તૂટેલા કાચનો ટુકડો કે અણીદાર વસ્તુ હોય, તો તેને ઉપાડીને પેપર ટોવલ (ટીશ્યુ પેપર) માંવીટી ને ઝીપલોક બેગમાં નાંખવું બેગને સંભાળી ને મુકવી તેના પર કન્ટામીનેટ વીથ મરક્યુરી નું લેબલ મારવું.

૬. જો લાકડા કે ટાઈલ્સ પર મરક્યુરી ઢોળાયો હોય તો તે સહેલાઈથી ક્લીન થઈ શકે છે, પરંતુ જો કાર્પેટ કે કર્ટેન (પડદા) જેવી વસ્તુ પર ઢોળાયો હોય તો તેટલો ભાગ કાપીને દુર કરવો.

૭. મરક્યુરી ઢોળાયો હોય ત્યાં કાર્ડબોર્ડ સ્ટ્રીપ્સ ની મદદથી મરક્યુરી ના અલગ કણ ને ભેગા કરવા નાના મરક્યુરીના કણો ન દેખાય તો તેને ટોર્ચ થી જોઈ શકાશે તે માટે રૂમમાં અંધારુ કરીને જમીનને અડીને ટોર્ચ કે લાઈટ ફેકવી જેથી જ્યાં પારા ના કણ હશે, ત્યાં તે દેખાઈ આવશે. ફ્લેટ સરફેસ હોય તો મરક્યુરી દુર ગમે ત્યાં ખુણામાં જઈ શકે છે. આથી ચોકસાઈ થી રૂમનું નિરીક્ષણ કરવું.

૮. ડ્રોપર અથવા સીરીજ થી પારાના કણ ને ખેંચી લેવા તેમજ ઘીમેથી પારાને પાણી સાથેના પ્લાસ્ટીક કન્ટેનરમાં નાંખવો અને એર ટાઈટ ઢાંકણું ઢાંકી દેવું કન્ટેનરને ઝીપલોક બેગમાં મુકવું બેગ પર કન્ટામીનેટ વીથ મરક્યુરી નું લેબલ લગાડવું. મોટા મોટા મરક્યુરીના કણલેવાઈ ગયા પછી નાના કણ જોઈ શકાતા ન હોય તો ઘોડો સલ્ફર પાવડર ફ્લોર પર છાંટવો, જેથી મરક્યુરી નો કલર ડાર્ક થઈને સારી રીતે દેખાઈ આવશે. પછી નાના કણ એકઠા કરી સીરીજ વડે ખેંચી લેવા એને પ્લાસ્ટીક કન્ટેનરમાં નાખવા. પાઉડર શ્વાસમાં ન જાય તે ધ્યાન રાખવું તે માઈલ્ડ ટોકસીન હોય છે.

૯. ગ્લોવ્ઝ સહીત જે મટીરીયલ ક્લીન કરવામાં વપરાયેલું હોય તેને ઝીપલોક પ્લાસ્ટીક બેગમાં મુકી દેવું. અને લેબલ કરવું.

૧૦. ઝીપલોક બેગને સેનીટરી ઇન્સપેક્ટર ની ઓફીસમાં જમા કરાવી દેવી. જે બાયોમેડીકલ વેસ્ટના રુલ્સ પ્રમાણે નિકાલ કરશે.

૧૧. જે જગ્યાએ પારો ઢોળાયો હોય ત્યાં અને તે રૂમમાં Sodium hypochlorite solution વડે પોતું કરાવવું.

૧૨. જે જગ્યા પાસે ઢોળાયો હોય તે રૂમને સારી રીતે વેન્ટીલેટ કરવા ચોવીસ કલાક બારી બારણા ખુલ્લા રાખવા, જો પારાની કોઇ આડ અસર થઇ હોય તો તાત્કાલીક તબીબી સારવાર લેવી.

Management of mercury spill

Collection of Mercury Beads

લોહી ઢોળાયું હોય ત્યારે અનુસરવાના સ્ટેપ્સ

1. પહેલાજ Servant અથવા Cleaner ને Personal Protective Equipment પહેરાવવા, જેવાકે Mask, Gloves, Gown, Gum shoes પહેરાવવું.
2. જ્યાં આગળ લોહી ઢોળાયુ છે ત્યાં Towel, Gauze, Tissue paper નાખવું અને તેના વડે તે area cover કરવો.
3. તેના પર Sodium hypochlorite solution નાખવું.
4. તેને 30 minute સુધી રહેવા દેવું.
5. ત્યાર બાદ બધુંજ શોષાઇ જાય પછી તેને પીળી થેલીમાં નાખવું.
6. તે જગ્યા ફરીથી hypochlorite solution નાખી સાફ કરાવવી.
7. અને છેલ્લે સ્ટીન પોતાથી પોતુ કરાવવું.
8. Gloves કાઢીને કાપીને લાલ થેલીમાં નાખવા.
9. Hand wash કરવું.

BLOOD SPILLAGE MANAGMENT- STEPS

1. Wear personal protective equipments.
2. COVER the site with the tissue paper or any absorbent (News paper).
3. Pour the pure hypochlorite solution on and around
4. the site.
5. Leave it for 30 minute.
6. Take it and dispose in yellow bag.
7. Clean the site with pure hypochlorite solution.
8. Lastly clean with the routine mop.
9. Hand wash.

Color coded bags for waste disposal

- Black: left out eatables, waste paper, dry waste, cytotoxic / expired drugs
- Yellow: dressing material, parts of human body, plaster cast
- Blue/ white translucent: needle, sharp instruments, blades
- Red: plastic waste, plastic gloves, plastic syringes.

SEGREGATION OF SOLID BIO-MEDICAL WASTE
જૈવિક કચરાનો નિકાલ

SWACHH BHARAT MISSION ⋄ **Lets Join Hands together to Keep our Environment Clean and Green**

WHITE BAG — સફેદ બેગ

SHARPS INCLUDING METALS — ધાર્યો ધારદાર તેમજ ધાતુની વસ્તુ જેવીકે :

- NEEDLES — Syringes With Fixed Needles, Needles From Needle Tip Cutter Or Burner — સોય (નીડલ) — સોય સાથેની સીરીંજ, નીડલ સાથે નીડલ ટીપ કટર અને બર્નર
- SCALPELS, KNIFE — સ્કાલ્પેલ, ચપ્પુ (છરી)
- BLADES OR ANY OTHER METAL SHARPS — contaminated both used and discarded — બ્લેડ કે અન્ય કોઈ ધારદાર ધાતુ દુષિત, વપરાયેલ કે પણ નાશ કરેલ

RED BAG — લાલ બેગ

CONTAMINATED WASTE (RECYCLABLE) — દુષિત કચરો (રીસાયકલેબલ)

- TUBING — Plastic bottles intravenous tubes and sets — ટયુબીંગ — દુષિત પ્લાસ્ટિકની બોટલ, આઇ.વી. ટયુબ સેટ
- CATHETERS — Urine bags, syringes (without needles and fixed needle syringes) — કેથેટર્સ — યુરીન બેગ, સીરીંજ (નીડલ વગર અને ફીક્સડ નીડલ સીરીંજ)
- VACUTAINERS — with their needles cut — વેકયુટેનર — નીડલ કટ કરી
- GLOVES — Cut plastic and dispose in 10% Sodium Hypochlorite after 20 min. drop in red containers — મોજા — પ્લાસ્ટિકને કાપી અને ૨૦% વા૫ સોડિયમ હાઇપોક્લોરાઇટમાં નાખવા ત્યાર બાદ ૨૦ મિનિટ બાદ લાલ કોથળીવાળા કન્ટેનરમાં નાખવું

BLUE BAG — વાદળી બેગ

GLASSWARE & METALLIC BODY IMPLANTS — તુટેલા કાચ અને ધાતુના (શરીરનાં) ઈમ્પલાન્ટ

- GLASSWARE BROKEN — Broken or discarded and contaminated glass — કાચની વસ્તુ (તુટેલી, ફેંકી દીધેલી, કે દુષિત/ભરાયેલી)
- MEDICINE VIALS — દવાની શીશીઓ
- AMPOULES — except those contaminated with cytotoxic wastes — એમ્પુલ્સ (સાયટોટોક્સિક દવાઓથી દુષિત સિવાયની એમ્પુલ્સ)
- METALLIC BODY IMPLANTS — Screw, Nail, Plate — ધાતુ શરીરના ઈમ્પલાન્ટ — સ્ક્રુ, ખીલ, પ્લેટ

YELLOW BAG — પીળી બેગ

HUMAN ANATOMICAL, ANIMAL ANATOMICAL SOILED WASTE, EXPIRED OR DISCARDED MEDICINES — માનવ અંગો, પ્રાણીજન્ય કચરો, એક્સપાયર્ડ કે ફેંકી દીધેલી દવાઓ

- HUMAN ANATOMICAL WASTE — Human tissues, organs body parts and fetus below the viability period. — માનવ અંગો જેવા કે : લ્યુકસ, હાથ, પગ કે અન્ય કોઈ શરીરનો ભાગ, ભ્રુણ (ભ્રુણ અમને તે સમય પહેલાનું)
- ANIMAL ANATOMICAL WASTE — Experimental animal carcasses, body parts, organs, tissues — પ્રાણીજન્ય કચરો જેવો કે : એક્સપરીમેંટલ પ્રાણીઓ તેમજ તેમના અવયવો
- SOILED WASTE — CONTAMINATED WITH BLOOD, BODY FLUIDS like Dressings, Plaster Casts, Cotton Swabs, Bags containing Residual or discarded blood and blood components — લોહી કે લોહીના ઘટકોવાળી કે દુષિત — ડ્રેસીંગ મટીરીયલ, પ્લાસ્ટર કાસ્ટ, રૂના પુમડાં, પ્લાસ્ટીક ની થેલા - લોહી કે લોહીના ઘટકોવાળી કે દુષિત
- EXPIRED OR DISCARDED MEDICINE — Antibiotics, Cytotoxic drugs all items contaminated with Cytotoxic drugs (glass or plastic ampoules, vials and etc) — એક્સપાયર્ડ કે ફેંકી દીધેલી દવાઓ એન્ટીબાયોટીક, સાયટોટોક્સિક દવાઓ કે તેનાથી દુષિત/ભરાયેલી વસ્તુઓ જેવીકે (કાચ કે પ્લાસ્ટિકની બોટલ વાયલ કે એમ્પુલ્સ વિગેરે)

Government Dental College & Hospital - Ahmedabad.

Storage

- Impermeable floor with good drainage which is easy to clean & disinfect.
- Water supply
- Easy access for staff & vehicles
- Inaccessible for animals, insects & birds.
- Good lighting & ventilation
- Should not be close to food sources.

Transportation

- By wheeled trolleys, containers or carts which are:

  -easy to load & unload

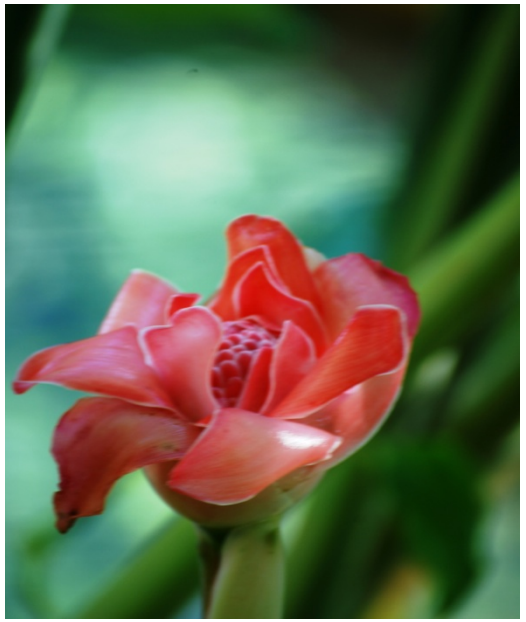
  -no sharp edges to damage bags

  - easy to clean

Vehicles have to be cleaned & disinfected daily

Treatment & disposal

- 1. Incineration: Pyrolytic, single chamber, Rotary kiln
- Chemical disinfection
- Wet thermal treatment
- Microwave irradiation
- Encapsulation
- Safe burying
- Inertiazation



Incinerators

- High temperature dry oxidation process that reduces organic & combustible waste to inorganic, incombustible matter & results in very significant reduction of waste volume & weight.
- Used to treat waste that cannot be recycled, reused or disposed off in a landfill site.

Pyrolytic incinerator

- A pyrolytic chamber
- A post combustion chamber.
- Made of steel with an internal lining of refractory bricks, resistant to corrosion, gas, thermal shock
- Waste gets thermally decomposed through an oxygen deficient medium temperature combustion process [800-900° C]
- Gases produced are burned [90-1200°C] in the post combustion chamber by a fuel burner

Incinerators

- Suitable for infectious waste including sharps & pathological waste, pharmaceutical & chemical residues.
- Expensive, requires well trained personnel
- Must be located at a minimum distance of 500 meters from any human settlement

Single chamber incinerator

- Cheaper
- Treats waste in batches
- 210 liter steel drum with both ends removed
- Wood has to be added to the waste till it gets completely burnt.
- Causes emission of black smoke, ash, toxic gases

Rotary kiln

- Rotating oven
- Post combustion chamber
- Axis 3-5% slope, rotates 2-5 times per minute, can operate continuously.
- 1200-1600°C
- Used for infectious, chemical & pharmaceutical waste including cytotoxic.
- Well trained personnel, expensive, corrosive waste may damage lining of kiln

Chemical disinfection

Chemicals are added to waste to kill or inactivate pathogens

- Formaldehyde: 45 minutes contact
- Ethylene oxide: solid wastes 37-55° C at 60-80% humidity for 4-12 hours
- Gluteraldehyde: 2% aqueous solution; 5 minutes disinfection, 10 hours to kill spores
- NaOCl
- Chlorine dioxide

Methods of refuse disposal

- Dumping
- Controlled tipping or sanitary landfill: TRENCH/RAMP/ AREA
- Incineration
- Composting
- Manure pits
- Burial

Encapsulation

- Fill containers, made of high density polyethylene or metal drums with waste– fill it up with immobilizing material like plastic foam, cement mortar, clay- seal & dispose off
- Low cost safe method
- Not recommended for non sharp infectious waste

Inertiazation

- Mix waste with cement & other substances before disposal
- Suitable for pharmaceuticals & incineration ashes with a high metal content
- Inexpensive
- Not applicable to infectious waste

Composting

- Method of solid waste disposal
- Excretement /sludge is combined with solid wastes to produce manure like material
- Mechanized process: Refuse cleaned of rags, bones, metal, glass etc--- pulverization of raw materials & mixing with sludge – ready in 2-4 weeks
- 'Bangalore method' : natural hot fermentation method in which trenches are dug & filled alternatively with refuse & excreta till it rises 30 cm above ground. Bacterial action will generate heat which will decompose the substances to 'compost' in 4-6 months. (600°C)

Questions

- How will you carry out infection control in a dental clinic?
- How will you dispose off infectious (biologic) & non infectious waste from a dental clinic?
- Short notes:

Waste disposal

Incinerators

Universal precautions

Barrier techniques