PREVENTION OF INFECTION, HOUSE-KEEPING AND WASTE DISPOSAL

This module is designed for in-service orientation and continuing education of nursing personnel involved in care of newborn babies in the hospital.

LEARNING OBJECTIVES

After going through this module, participants will be able to:

- **Enumerate key points of prevention of infections in the hospital**
- **Enumerate eleven steps of effective hand washing**
- **Refer to housekeeping and disinfection routines for the hospital**
- **Learn waste disposal in the hospital**
- **Plan surveillance for infection**

MODULE CONTENTS

The module includes following elements:

- ***Text material:*** Easy to read format for quick reproduction and essential reference material for the participants. Key messages are highlighted in the boxes.
- ***Demonstration:*** Observing nursing routines for asepsis (house keeping, disinfectant use).
- ***Skills:*** Practice skills in a hospital setting.
- ***Self evaluation:*** At the end of text a self evaluation based on what you have already learnt is included. Feel free to consult your test material, if you need assistance in recapitulating.
- ***Video film:*** Learn asepsis routines for prevention of infections and hospital waste disposal in baby care area.

1. IMPORTANCE OF ASEPSIS

Sepsis is the most important cause of neonatal deaths in hospital. Every hospital should establish its own detailed policies to prevent infection of newborn in the baby care area.

Normally the newborn is free from harmful organisms for initial few hours after birth. Health care providers working in the hospital tend to transmit organisms during routine procedures, thus leading to colonization of organisms on surrounding skin of the abdomen, the perineum, groins and respiratory tract.

Prevention of infection is more cost effective than treating infection in neonates.

2. ASEPSIS BASICS

2.1 Basic requirements for asepsis in a baby care area

- Running water supply
- Soap
- Elbow or foot operated taps
- Strict hand washing
- Avoid overcrowding, recruit optimal number of nurses for care of more babies
- Plenty of disposables
- Rational antibiotic policy asepsis routine and house keeping
- Strict adherence to house keeping and asepsis routines

2.2 Guidelines for ENTRY into the baby care area

- Remove shoes, socks, woolens, watch, bangles, and rings
- Roll up the full sleeves up to elbow. Put on new slippers wash hands with soap and water for 1 minute (40-60 seconds) by following eleven steps of hand washing
- Put on sterile half sleeve gown

2.3 Policy regarding VISITORS

- Only parents of the babies should be allowed entry into the nursery
- Mothers are welcome any time, they can come every 2 to 3 hours to the baby care area
- Fathers should be allowed at the time of admission to the nursery, after stabilizing the baby, during hospital visiting hours (4 to 6 pm) or when the newborn is sick. Father should be allowed especially after the rounds or at a convenient time in the unit (this policy can be framed in consultation with your pediatrician)
- Parents and siblings should be guided and supervised about proper hand washing technique

Personnel with active infection should not be allowed entry into the baby care area

2.4 Sterile gloves

- Always use sterile gloves for invasive procedures like sampling, starting intravenous lines, giving intravenous injections etc.
- Throw used gloves in blue bag
- Adequate number of sterile and clean pair of gloves should be available in the unit

2.5 Full sleeve gown and masks

- Use them for all invasive procedures e.g. lumbar puncture, blood exchange transfusion etc.

2.6 Other basics

- Keep separate spirit and povidone iodine/ chlorhexidine swab containers, stethoscope, tape measure and thermometer for each baby
- Change intravenous sets and tubings used for TPN daily or as per set routine
- Feeding tubes can be left alone as long as baby can keep
- Do not keep fomites e.g. files, X-ray films, pens etc. on the baby cot
- Change antiseptic solution in suction bottles and sterile water in oxygen humidification chambers everyday and sterilize the bottles/chambers daily by dipping in 2% gluteraldehyde for 4 to 6 hours

2.7 Nursery environment

- The nursery temperature should be maintained between 28-30° C
- The environment should be calm and clean
- Ensure 24 hours water and electricity supply with adequate lighting and ventilation.
- Over crowding should be avoided
- Floor should be cleaned with diluted phenyl once in each nursing shift and as and when required. No dry cleaning, only wet mopping should be done
- Clean the walls with 2% bacillocid once in each nursing shift
- Dustbins should be washed daily with soap and water; polythene should be changed daily or whenever full

3. HAND WASHING

- It is the single MOST IMPORTANT means of preventing nosocomial infections
- It is VERY SIMPLE and CHEAP

3.1 Hand washing norm

- ONE MINUTE hand washing (11 steps) to be done before entering the unit
- Hand hygiene with alcohol hand rub for 20-30 seconds before and after touching babies, before any clean/aseptic procedure, after body fluid exposure risk and after touching baby surroundings.

3.2 Steps of effective hand washing

- Roll sleeves above elbow
- Remove wrist watch, bangles, rings etc.
- Using plain water and soap, wash parts of the hand in the following sequence:
  0. Wet hands with water
  1. Apply enough soap to cover all hand surfaces
  2. Rub hand palm to palm
  3. Right palm over left dorsum with interlaced fingers and vice versa.
  4. Palm to palm with fingers interlaced
  5. Back of fingers to opposing palms with fingers interlocked
  6. Rotational rubbing of left thumb clasped in right palm and vice versa
  7. Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa
  8. Rinse hands with water
  9. Dry hands thoroughly with a single use towel/sterile napkin
  10. Use towel to turn off tap
  11. Your hands are now safe

Once you have washed your hands, do not touch anything e.g. hair, pen or any fomite till you carry out the required job.

- Keep elbows always dependent, i.e. at a lower level than your hands
- Close the tap with elbow
- Dry hands using single-use sterile napkin or autoclaved newspaper pieces
- Discard napkin in the bin kept for the purpose, if newspaper pieces-in the black bucket
- Do not keep long or polished nails

Remember - Rinsing hands with alcohol is NOT A SUBSTITUTE for proper hand washing

4. HAND RUB

4.1 Purpose

To reduce bacterial colony counts on the hands of care providers so that hospital acquired infections can be prevented.

4.2 Points of emphasis

Use alcohol based hand rubs

- After drying hands following hand washing

- Before and after every routine patient contact

Remember: Alcohol based hand rubs have been shown to be definitely superior to soap and water hand washing in reducing bacterial colony counts of the hands. Hence, application of alcohol-based hand rubs must be preferred over hand washing for all routine contact.

It is equally important to remember: Alcohol-based hand antiseptics are not effective on hands that are visibly dirty or contaminated with organic materials. Hands that are visibly dirty or contaminated with organic material must be washed with soap and water, even if hand antiseptics are to be used as an adjunct measure.

4.3 Indications

The term "patient contact" is not restricted to direct contact with a patient. It includes the following:

- Performing any kind of non-invasive procedure
- Recording any patient parameter
- Touching baby's clothes/linen
- Handling baby's incubator/warmer/devices attached to baby
- Handling baby's probes/BP cuff
- Handling baby's IV tubings/syringes
- Handling baby's milk tubings/syringes

4.4 Procedure

Technique of applying alcohol-based hand rub

- Apply product to palm of one hand (two press on 500 mL Sterilium® bottle pours ~ 3.0 mL of sterilium) and rub hands together, covering all surfaces of hands and fingers as in steps of hand washing.
- For surgical scrub press six times: 9.0 mL of sterilium is required.
- Wait until hands are dry. Do not touch the baby with wet hands.

How to make an alcohol handrub locally at low cost :

- Because alcohol used by itself dries the skin and can make it crack, mix alcohol as follows with an ingredient to moisturize the skin
  - 100 ml of 60-90% alcohol
  - 2 ml of glycerin, propylene glycol, or sorbitol

How to use locally made hand rub:

- Pour 3-5 ml (1 teaspoon) of the alcohol handrub into the palm of your hand.
- Rub hands together, including between fingers and under nails, until dry.

After using this method 5-10 times, you will need to remove the build-up of moisturizer (such as glycerin) from your skin. Wash this off with soap and water.

5. SKIN PREPARATION FOR VENEPUNCTURE AND OTHER PROCEDURES

Skin preparation is an important part of asepsis routines. It should be performed meticulously to avoid entry of pathogens during insertion of IV cannula, pricks or procedure. The procedure of skin preparation is given in the box below:

Skin preparation for venipuncture

1. Wash and dry hands.
2. Wear sterile gloves.
3. Prepare skin site, confine to smallest possible area of skin.
4. Swab with alcohol/chlorhexidine 2% first, allow it to dry.
5. Swab iodine on site and allow it to dry.
6. Swab again with alcohol to wipe off iodine, allow it to dry.
7. Skin is now ready for puncture of prick.

6. OTHER RECOMMENDATIONS

- Never use stock IV fluids (heparinized saline). Do not use a single dextrose/saline bottle for >24 hours
- There should be separate IV fluid bottle for each baby
- Label the bottle with date and time of opening
- Open the top surface of the bottle , keeping the seal intact
- First clean with spirit swabs, then use povidone iodine soaked sterile cotton to cover the top surface of the bottle
- Change the burette set every 24 hour or as per policy of your unit
- Use syrups within 1 week of opening, write the opening date
- Antibiotic vials to be changed after 24 hrs. e.g. injections ampicillin and cefotaxime
- There is no need for flushing with heparinized saline to keep the IV line patent
- Use separate IV line for giving antibiotics (do not open the IV fluid line for giving injections)

7. UNIVERSAL PRECAUTIONS

7.1 Purpose

Universal precautions refers to the practice, in medicine, of avoiding contact with patients' bodily fluids, by means of the wearing of nonporous articles such as medical gloves, goggles, and face shields.

7.2 Points of emphasis

Under universal precautions all patients are considered be possible carriers of blood-borne pathogens. The guideline recommends wearing gloves when collecting or handling blood and body fluids contaminated with blood, wearing face shields when there is danger of blood splashing on mucous membranes and disposing of all needles and sharp objects in puncture-resistant containers.

7.3 Policy

Universal precautions are designed for doctors, nurses, patients and health care support workers who are required to come into contact with patients or bodily fluids. This includes staff and others who may not come into direct contact with patients.

What do universal precautions mean?

- Always wear sterile gloves for heel stabs, phlebotomy and insertion of vascular catheters
- Wear gloves while handling any kind of body fluids
- Do not recap used needles by hand

- Do not remove used needles from disposable syringes by hand
- Do not bend, break, or otherwise manipulate used needles by hand
- Destroy needles using the needle destroyer provided in every ward
- Dispose scalpel blades and other sharp items in puncture-resistant containers for disposal.

7.4 Indications

Universal precautions are typically practiced in any environment where workers are exposed to bodily fluids, such as

- Universal precautions apply to blood and to other body fluids containing visible blood. Universal precautions also apply to tissues and to the following fluids: CSF,synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, and amniotic fluid.
- Universal precautions do not apply to feces, nasal secretions, sputum, sweat, tears, urine, and vomits unless they contain visible blood. The risk of transmission of HIV and HBV from these fluids and materials is extremely low or nonexistent.

7.5 Supplies

Protective clothing includes but is not limited to:

- Barrier gowns
- Gloves
- Eyewear (goggles or glasses)
- Face shields

***You will be given individual feedback after you have evaluated yourself.**

How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

Duration of the entire procedure: 40-60 seconds

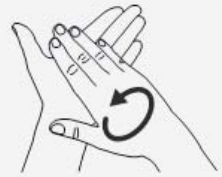
0

Wet hands with water;

1

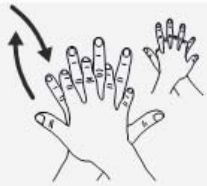
Apply enough soap to cover all hand surfaces;

2



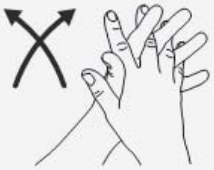
Rub hands palm to palm;

3



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

4



Palm to palm with fingers interlaced;

5

Backs of fingers to opposing palms with fingers interlocked;

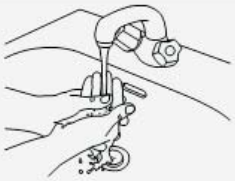
6

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

7

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

8



Rinse hands with water;

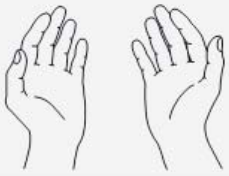
9

Dry hands thoroughly with a single use towel;

10

Use towel to turn off faucet;

11



Your hands are now safe.

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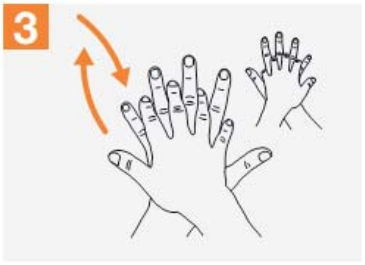
How to Handrub?

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

Duration of the entire procedure: 20-30 seconds

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

Rub hands palm to palm;



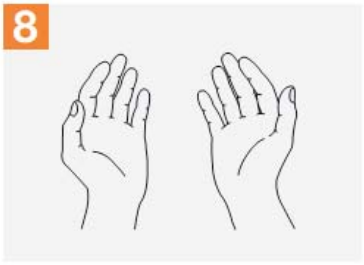
Right palm over left dorsum with interlaced fingers and vice versa;

Palm to palm with fingers interlaced;

Backs of fingers to opposing palms with fingers interlocked;

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

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



Once dry, your hands are safe.

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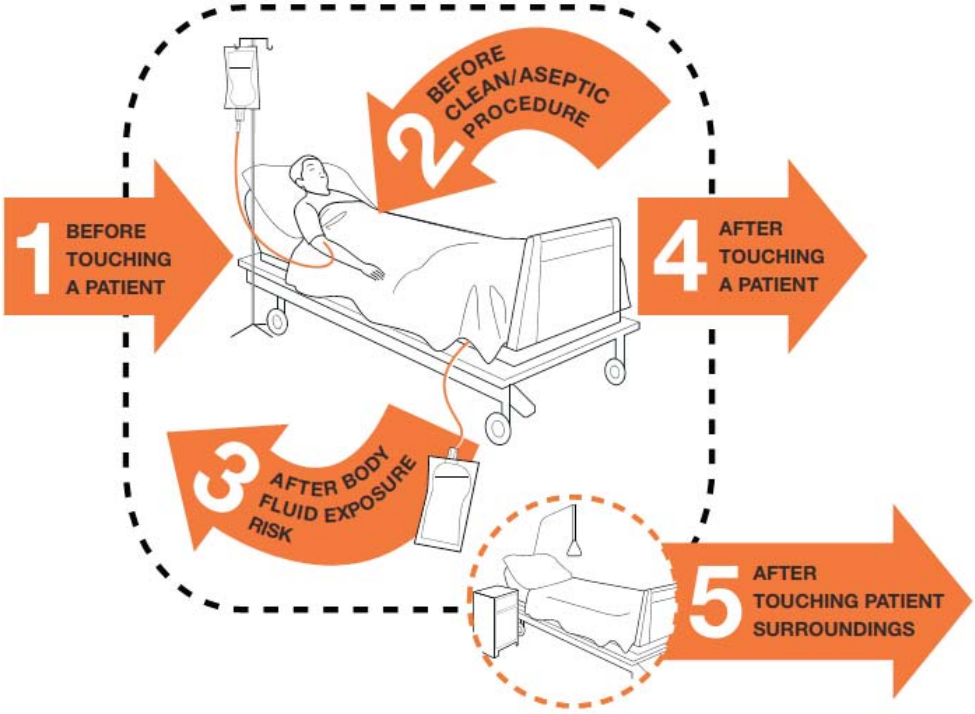
Your 5 Moments for Hand Hygiene



1	BEFORE TOUCHING A PATIENT	WHEN?	Clean your hands before touching a patient when approaching him/her.
		WHY?	To protect the patient against harmful germs carried on your hands.
2	BEFORE CLEAN/ ASEPTIC PROCEDURE	WHEN?	Clean your hands immediately before performing a clean/aseptic procedure.
		WHY?	To protect the patient against harmful germs, including the patient's own, from entering his/her body.
3	AFTER BODY FLUID EXPOSURE RISK	WHEN?	Clean your hands immediately after an exposure risk to body fluids (and after glove removal).
		WHY?	To protect yourself and the health-care environment from harmful patient germs.
4	AFTER TOUCHING A PATIENT	WHEN?	Clean your hands after touching a patient and her/his immediate surroundings, when leaving the patient's side.
		WHY?	To protect yourself and the health-care environment from harmful patient germs.
5	AFTER TOUCHING PATIENT SURROUNDINGS	WHEN?	Clean your hands after touching any object or furniture in the patient's immediate surroundings, when leaving – even if the patient has not been touched.
		WHY?	To protect yourself and the health-care environment from harmful patient germs.

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WHO acknowledges the Hôpitaux Universitaires de Geneve (HUG), in particular the members of the Infection Control Programme, for their active participation in developing this material.

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DEMONSTRATION

The facilitator will conduct a demonstration on 'Steps of hand washing and hand rub and five moments of hand hygiene ' using a poster. This will be followed by another demonstration on 'How to wear gloves'.

8. SURVEILLANCE

What is surveillance?

- It is the monitoring of infections in the unit by conducting periodic surveys in order to identify unusual pattern of flora and infections
- It also includes monitoring of antibiotic use and resistance, whereby positive culture are reviewed every 4-6 months based on which antibiotic policy of the unit is revised, if necessary

How frequently should surveillance be carried out? What all should be cultured?

- Room air - weekly
- Surfaces (viz. laminar flow, warmer, incubator, trolleys) - twice weekly
- Equipment (viz. laryngoscopes, AMBU bags, mask, stethoscopes, oxygen hoods, B.P. cuffs) - twice weekly
- Liquids (viz. water in humidifier bottles) - every two week

Babies

- Blood / CSF culture whenever indicated
- Pus cultures whenever present
- Personnel: hands, nasal / throat swabs as required

Terminal Disinfection

Terminal disinfection is done after transferring out, discharge or death of a baby. Preferably all items of the baby to be kept in the incubator and fumigated with 40% formalin (grossly infected baby)/20% ecoshield. Otherwise one can just do routine cleaning thoroughly.

9. OTHER STEPS

Assignment in the NICU and nursery

Baby should be assigned to the nurses, based on the total number of babies, sick babies, stable babies and the number of nurses present on duty in each shift. It helps the babies as well as the nurses and helps in the prevention of infection also.

Primary nurse assignment

Primary nurse is one who receives the baby in the nursery. She should be assigned that baby in each shift, whenever she is on duty. She should discuss with the parents the condition of the baby from the time of the admission till discharge. Parents will also have more confidence on that nurse.

Parents role

Parents are the part and parcel of newborn care team. They should be informed every morning and evening about the condition of the baby. They should be trained and supervised about the asepsis routines of the unit. Mother is welcome any time in nursery except during the rounds when the discussions are on, or caring for a very serious newborn.

Mother should be involved fully in the care of her baby. She should come in and look at her baby. If baby is stable, she can lift her baby, keep him in her lap, give breast feeds, or give katori spoon feed. She can help in changing napkin. She should be counseled regularly regarding:

- Her doubts/queries
- How to look after the baby in special care room/at home
- Risk factors and identification of signs of illness
- Prognosis of the baby and
- Follow up

Setting of a bed

Keep a warm bed ready for the new admission:

- Clean the radiant warmer with soap water/Bacillocid
- Use autoclaved linen
- Keep oxygen hood and source of oxygen ready
- Keep suction machine, suction catheter ready
- Keep supplies for initiating I.V. line ready
- Keep the following articles near the warmer for exclusive use of each baby:
  i. Spirit swab container
  ii. Povidone iodine swab container
  iii. Thermometer (clinical)
  iv. Stethoscope
  v. Tape measure
  vi. Adhesive tape for fixing lines / probes

SELF EVALUATION

1. Basic requirements for asepsis in baby care area include:

   _____

   _____

2. Single most important, very simple and cheap method for prevention of infection in baby care area is

   _____

3. The key features of good hand washing technique include:

   a._____ steps

   b._____ minutes hand rub before entering the newborn care area.

   c._____ seconds hand washing in between and after touching the baby.

4. Sterile gloves should be worn for the following procedures (Enumerate any three).

   _____

   _____

   _____

5. What are the steps of skin preparation for IV cannula insertion or needle prick?

   _____

   _____

   _____

   _____

   _____

You will be given individual feedback after you have evaluated yourself.

ORAL DRILL

There will be an oral drill by the facilitator on 'Disinfection routines'.

Name	Disinfection method	Frequency & other considerations
Baby linen, blanket cover	Wash and autoclave	Use autoclaved linen each time
Cotton gauze	Autoclave	As required.
Feeding utensils (paladai, spoon & katories etc.)	Wash with soap and water and then boil for 10 minutes	Before each use
Swab container, injection and medicine tray	Wash with soap and water / autoclave	Daily morning shift use separate swab containers for each baby
Sets for procedures	Autoclave	After each use ; every 72 hours if not used
Cheattle forceps	Autoclave	Daily. Put in sterile autoclaved bottle containing dry sterile cotton
Stethescope, measuring tape, thermometer, BP cuffs, probes of radiant warmer/incubator pulse oximeter	Clean with spirit swab	Daily and before use
Laryngoscope	Clean with spirit swabs thoroughly daily and after each use. Wrap in autoclaved cloth, put date on cover.	If used for an infected baby, wash with soap and water. Put the blade in 2% gluteraldehyde after removing the bulb. Wash thoroughly after removing from gluteraldehyde.
Syringe pumps	Clean with wet clean cloth. If blood stained, use soap and water.	Daily in morning shift ; if possible, in each shift
Oxygen hood	Wash with soap and water ; dry with Clean linen	Daily in morning shift.
Face mask	Clean with soap and water, immerse in gluteraldehyde for 20 min, rinse in distilled/running water, dry and wrap with autoclaved linen	Daily and after each use
Resuscitation bag and reservoirs, oxygen tubing, bottle and tubing of suction machine	Clean with detergent/soap and water after dismantling. Immerse in gluteraldehyde for 4-6 hours. Rinse in distilled water. Dry, wrap in autoclaved linen and put a date	Weekly for resuscitation bag and reservoir. Daily for others.
Weighing machine	Wipe with surface disinfectant	Daily in morning shift and when required
Radiant warmer & Incubator	Clean with soap water daily, if occupied. If not occupied, clean with 2% Bacilloicid	Daily

10. SAFE DISPOSAL OF HOSPITAL WASTE

Proper disposal of hospital waste is important to keep the environment clean. The waste should be disposed off in a proper way. All health professionals should be well conversant with their local hospital policies for waste disposal which may vary from place to place.

The following are different colour drums with different color polythene for different type of waste, to be disposed off in a different way.

a. Black drums / Bags

Left over food, fruits, feeds, vegetables, waste paper, packing material, empty box, bags etc. This waste is disposed off by routine municipal council committee machinery.

b. Yellow drums / Bags

Infected non-plastic waste e.g. human anatomical waste, blood, body fluids, placenta, diapers etc. This type of waste requires incineration.

c. Blue drums / Bags

Infected plastic waste such as used disposable syringes, needles (first destroy the needle in the needle destroyer) and soiled gloves.

Used sharps, blade and broken glass should be discarded in puncture proof containers before discarding.

Patients' IV set, blood transfusion set, endotracheal tube, catheter, urine bag etc. should be cut into pieces and disposed in blue bag. This waste will be autoclaved to make it non-infectious. This is then shredded and disposed off.

* Some hospitals use red drums / bags for disposal of glass, sharps and blades .

DEMONSTRATION

There will be demonstration by facilitator on safe disposal of hospital waste using a demonstration aid or a poster.

SELF EVALUATION

1. Indicate the bucket you will use for following wastes:
   - Paper towel after use _____
   - Soiled nappy of the baby _____
   - Used disposable syringe _____

2. How do you sterilize the following?
   - Thermometer _____
   - Ambu bag _____
   - Cheattle forceps _____
   - Probe of pulse oximeter _____
   - Oxygen tubing _____
   - Stethoscope _____

3. B/o Rajkumari is a 32 wk preterm baby with birth weight of 1.3 kg. The baby is 2 days old now. Mother is now recovered from her delivery problems and wants to help you in baby's work, what are the areas you would like to involve the mother?

   a. _____

   b. _____

   c. _____

   d. _____

4. Indicate the waste disposed based on colour of bag/drum in your hospital

   Black _____

   Yellow _____

   Blue _____

You will be given individual feedback after you have evaluated yourself.

ORAL DRILL

There will be an oral drill by the facilitator on 'Disinfectants and House-keeping routines':

I. Disinfectants and Germicides

Name	*Indication for use*	*Direction for use and special considerations*
Bacillocid spray (2%)	• Walls of nursery • Incubators & warmers (when not in use) • Surface of weighing machine	Put off air conditioners at the time of spray
2% gluteraldehyde (Cidex)	• Face mask & Ambu bag • Reservoir	Before immersing into cidex, clean thoroughly with soap and water time of contact : • For sterilization : 4-6 hours • For disinfection : 15 - 20 mins (once prepared, solution is active for 14 days)
Ecoshield (H_2O_2 11%w/v, 0.01% w/v Silver nitrate) (Prepare solution as per instruction of manufacturer)	Fumigation of nursery	**Routine fumigation:** 200 ml of ecoshield in 800 ml of water, 1 litre/1000 cu ft for aerial fumigation. Nursery is to be sealed properly - switch off AC and seal AC duct. Switch on fumigation machine for 1 hr. Open and clean the nursery.
Sodium hypocholorite (bleach)	Sharps / needles and disposables	Keep the solution covered, change it every 24 hours
Spirit	Skin preparation, cleaning laryngoscope blades, tape measure, and stethoscope	Do not use to clean incubators and warmers
Soap and water	Oxygen hood, feeding utensils, swab containers, injection tray, face mask, buckets	After washing in soap and water, boil the feeding utensils for 20 min
Phenyl 5%	Cleaning floors	Daily in the morning shift or as required
Povidone-iodine	Skin preparation	Use with caution in extremely preterm babies
Chlorhexidine 2%	Skin preparation	

II. House-keeping routines

Name	*Disinfection method*	*Frequency & other considerations*
Floors	Wet-mopping with phenyl	Once in each shift NO dry sweeping DO NOT use 2% glutearldehyde (Cidex)
Walls	2% Bacillocid	Once in each shift
Fans	Wipe with wet clean cloth	Once a week
Window AC	Surface and filters to be washed with soap and water	Once a week
Refrigerator	Defrost and clean with soap and water	Once a week
Buckets	Soap and water	Daily in the morning shift
Sinks	Detergent or powdered soap	Daily in the morning shift or as required

** These are general guidelines which may be adapted based on the avilability of disinfectants and the infection control policy of the hospital*

VIDEO

There will be video demonstration on 'Hand washing, asepsis routine and disposal of hospital waste'. The video demonstration will be followed by discussion.

1. Video demonstration covered following aspects for prevention of infection

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

2. Following should have been included in the video

_____

_____

3. Video covered

Hand washing	Yes/No
Equipment disinfection	Yes/No
Daily housekeeping	Yes/No
Waste disposal	Yes/No