

Women and Babies: Infection Prevention and Control in NICU - GUIDELINES

Introduction

The risks addressed by this policy:

Clinical risk of acquired infection between healthcare workers, infants and families from exposure to maternal or neonatal infection

Clinical risk of transmission of infection between new born infants

The aims / expected outcome of this policy

To facilitate evidence-based recommendations for infection control in NICU and to prevent acquisition and spread of infections

POLICY STATEMENT

The goal of this guideline is to:

- 1) Describe the process of point-of-care risk assessment for all patient interactions
- 2) Outline hand hygiene practice and use of personal protective equipment
- 3) Describe environmental cleaning measures used in NICU
- 4) Describe equipment decontamination and sterilisation in NICU
- 5) Ensure health of staff and visitors
- 6) Describe additional precautions required to prevent transmission of known infections

Background

The responsibility for infection control applies to everybody working and visiting a healthcare facility, including administrators, staff, patients and carers.

Perinatal

The challenge of current perinatal infection prevention is to decrease the risk for health care associated infection (HAI) while supporting family-centred maternity care.

1. Mothers and their new-borns are usually at low risk of HAI, unless the new born is born prematurely or has other complications or conditions. New-borns hospitalized in neonatal intensive care units (NICUs) are at risk for HAIs because of their physiologic instability and exposure to invasive devices and broad-spectrum antibiotics.
2. Host risk factors for infection in new-borns include:
 - Low birth weight
 - Acuity of underlying illness

- Immature immune system
- Permeable skin.

New-born Infection can be congenital or acquired:

Congenital Infections

A congenital infection is an infection of the new born that is acquired in utero and is present at birth. A congenital infection may or may not be clinically apparent at birth. Infections Acquired During Parturition.

New-borns may be colonised or infected by microorganisms acquired during the delivery.

Microorganisms found in the maternal birth canal may result in infection of the new born based on the pathogenicity of the microorganism and the susceptibility of the new born Postpartum and Health Care-associated Infections (HAIs)

Postpartum infections and HAIs are acquired after birth. Colonization of mucous membranes and skin of new-borns occurs rapidly after birth.

Risk factors for HAI acquisition include:

- Exposure to invasive devices
- Exposure to broad-spectrum antibiotics
- Over-crowding
- Poor staffing ratios

Standard Precautions in NICU

Standard Precautions are based on the premise that all patients are potentially infectious, even when asymptomatic, and that the same safe standards of practice should be used routinely with all patients to prevent exposure to blood, body fluids, secretions, excretions, mucous membranes, non-intact skin or soiled items and to prevent the spread of microorganisms.

The basic elements that comprise Standard Precautions are:

- Risk assessment
- hand hygiene
- Environmental controls
- Administrative controls
- Personal protective equipment (PPE).

Risk Assessment and Screening

A point-of-care risk assessment is applied before every interaction with the mother or new born, throughout the continuum of care (antenatal, care at birth, postnatal and new born care).

- Exposure of hands WEAR GLOVES
- Exposure of clothing or forearms WEAR A GOWN

Hand Hygiene

Hand hygiene is the single most important and effective infection prevention and control measure to prevent the spread of health care-associated infections.

Hand hygiene relates to the removal or killing of transient micro-organisms from the hands while maintaining good skin integrity. In the neonatal intensive care unit (NICU) setting, improved adherence to hand hygiene practice has been shown to reduce infection rates.

What to use for hand hygiene?

Hand washing with soap and running water must be performed when hands are visibly soiled.

Chlorhexidine 0.5% in Alcohol 70% Microshield

Chlorhexidine 2% aqu.

Micro shield Triclosan (1%).

Procedure for a Routine Hand washing

- Remove wrist watch and rings
- Wet hands and wrists (warm water)
- Apply one application of liquid soap or antiseptic solution to palms
- Ensure you rinse thoroughly to remove product as this can cause skin dryness
- Pat hands dry using disposable paper towels

How long for?

Hand wash

- Aseptic wash: 40 – 60 seconds

Hand rub

- Aseptic wash: 30 seconds (or until hands are completely dry)

Hand hygiene policy as per WHO guidelines:

Hand Wash Technique:

HOW TO HANDWASH?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

⌚ Duration of the entire procedure: 40-60 seconds

<p>0</p> 	<p>1</p> 	<p>2</p> 
<p>3</p> 	<p>4</p> 	<p>5</p> 
<p>6</p> 	<p>7</p> 	<p>8</p> 
<p>9</p> 	<p>10</p> 	<p>11</p> 

Wet hands with water;

Apply enough soap to cover all hand 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;

Rinse hands with water;

Dry hands thoroughly with a single use towel;

Use towel to turn off faucet;

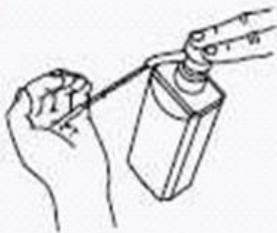
Your hands are now safe.

HOW TO HANDRUB?

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

⌚ Duration of the entire procedure: 20-30 seconds

1a



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

1b



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



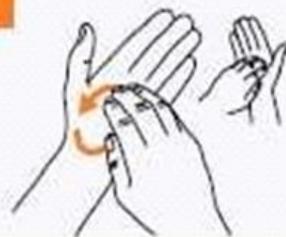
Backs of fingers to opposing palms with fingers interlocked;

6



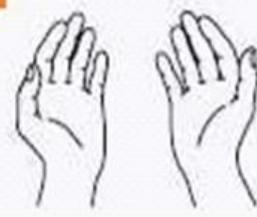
Rotational rubbing of left thumb clasped in right palm and vice versa;

7



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

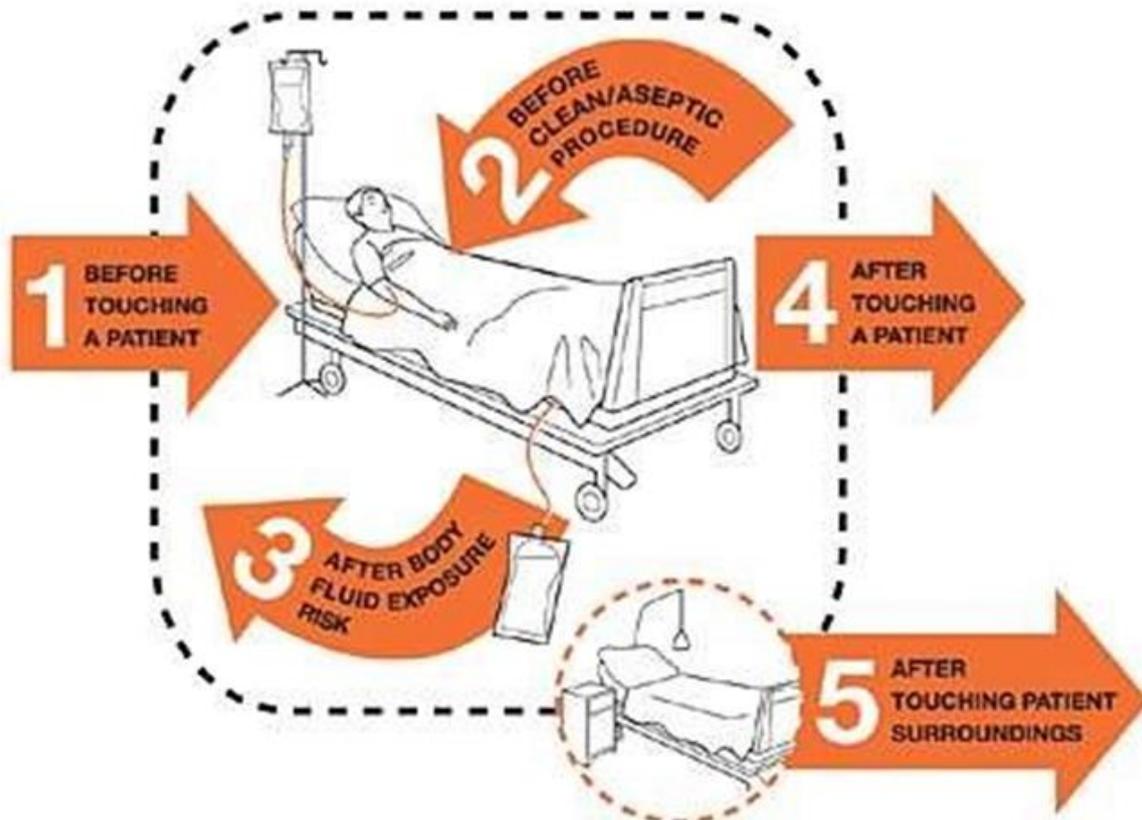
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Once dry, your hands are safe.

When to perform hand hygiene?

The recommended WHO 5 moments shown below should be followed



Hand hygiene should also be performed:

- When starting and finishing work;
- Before and after eating and using the toilet
- After touching objects that are likely to be contaminated (communal area telephones and keyboards);
- Following contact with own mucosal membranes and bodily fluids;
- Anytime when re-entering the nursery.

HAND CARE

- Healthcare workers should check their skin integrity prior to each shift, visually and with the use of an alcohol hand rub.
- Cuts and abrasions on exposed skin should be covered with a water-resistant occlusive dressing which should be changed as necessary.
- In situations where non-intact skin cannot be covered appropriately or impacts on effective hand hygiene, temporary redeployment of staff involved in direct patient care may be necessary.

- Hands can be protected and skin integrity maintained by regular use of non-oil-based moisturising lotions compatible with cleaning products provided by the hospital.
- All staff and visitors in the nursery must not wear any hand and wrist accessories including artificial nails or any nail enhancement, and no hand and wrist jewellery.
- Arms should be bare below the elbows.
- Dry and broken skin and hand accessories are hard to clean and tend to harbour an increased number of microorganisms.

Accessories

Jewellery is hard to clean and hides bacteria and viruses from the action of the hand hygiene agent. Rings increase the number of microorganisms present on hands 18-20, although this has not been linked to increases in infections. Rings may increase the risk of tears in gloves. It is recommended that rings and bracelets not be worn by those with direct contact with mothers or newborns. In the NICU setting, for provision of direct patient care, arms should be bare below the elbows, i.e., no bracelets, rings, or watches.

Hair should be tied back if longer than collar length.

Nails, Nail Polish and Artificial Nails

Long nails are difficult to clean, can pierce gloves and harbour more microorganisms than short nails. Natural nails should be kept clean and short. Nail polish should not be used.

Personal Protective Equipment

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

PPE includes: gloves, gown and facial protection.

PPE should be put on just prior to the interaction with the mother/ newborn. When the interaction for which the PPE was used has ended, PPE should be removed immediately and disposed in the appropriate receptacle

Gloves

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

Appropriate glove use:

- Perform hand hygiene before putting on gloves.
- Put on gloves immediately before the activity for which they are indicated.

- Remove gloves and discard immediately after the activity for which they were used.
- Change gloves between care for each patient, including the mother and her new born.
- Wear gloves when handling the new born after delivery prior to bath or adequate removal of the mother's body substances.
- Wear gloves for all diaper changes.
- Wear gloves for contact with an undiagnosed rash, lesion or non-intact skin.
- Do not re-use or wash gloves.
- Perform hand hygiene after gloves are removed.

Gowns

A gown is worn when a procedure or care activity is likely to generate splashes or sprays of blood, body fluids, secretions or excretions. Long-sleeved gowns protect the forearms and clothing from contamination with potentially infectious material.

Appropriate gown uses by staff:

- Wear a gown when providing care that may contaminate skin or clothing.
- Put gown on immediately before the activity for which it is indicated.
- Remove gown immediately after the activity for which it is used.
- Change gown between care for each mother or new born.
- Wear gown properly, i.e., appropriately tied at neck and waist.
- Discard gown into an appropriate receptacle after each use and do not re-use.
- Perform hand hygiene after gown is removed.

Appropriate mask use:

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

HOUSEKEEPING

PROTOCOL FOR HOUSEKEEPING ACTIVITIES IN NICU

Sl.no	Purpose	Disinfectant	Frequency
1	Cupboards, doors, tables and telephone	Wipe with 70% isopropyl alcohol	Every morning
2	NICU floors and corridors	Soap and water, followed by 2% bacillocid	Every 3hrs during the day and 6hrs during the night
3	NICU walls	2% bacillocid	Every morning
4	Refrigerators	Defrost and clean with soap and water	Every Sunday
5	Washbasin handles and taps	Vim/Surf/R2	Every morning and evening
6	AC grills	Soap and water, followed by wipe with 2% bacillocid	Every Sunday
7	Fans	Soap and water	Every Sunday
8	Lights	Soap and water	Every Sunday
9	Windows	2% bacillocid	Every Morning
10	Floor Scrubbing	With hard brush, detergent and water	Once a month

Activities to be carried out by House-keeping staff:

- All the furniture's Cupboards, doors, table and electrical switches should be dry mopped every morning.
- Iron Handles of doors and cupboards and Cot should be cleaned with soap and water and dried.
- Bed sheets, blankets etc. should be changed daily and earlier whenever contaminated with blood and body fluids and sent to the laundry for washing.
- Contaminated linen should be packed, tied properly and sent separately.
- Phone instrument along with the receiver should be cleaned with 70% isopropyl Alcohol
- Wash basin handles and taps should be cleaned with soap (R2) and water.
- NICU Floor and corridors should be wiped with R2 solution followed by Bacillocid special 2% at least every third hourly in the day and every sixth hourly in the night time daily. The two bucket system to be followed strictly.
- Refrigerators and freezers are defrosted and cleaned with soap(R2) and water every Sunday
- AC grills should be cleaned every 15 days

10. Walls, lights and ceiling fans should be cleaned with wet mop and water and wiped with disinfectant (2% Bacillocid) once every 15 days.
11. Biomedical waste should be collected every fourth hourly.
12. Spill of blood and body fluids should be immediately cleaned with 1% Hypochlorite solution.
13. Floor are scrubbed every month before fogging
14. Terminal cleaning once a week
15. Fogging should be done once every month

Maintenance:

- HEPA filter should be validated every year and changed whenever required.
- Pre- filters should be washed with fresh water and dried every week.
- It should be monitored that moisture does not accumulate in the AHU.
- All the overhead and sump water tanks should be cleaned once in three months.

Fogging protocol in NICU

- Fogging will be done every week preferably on Saturday.
- The area should be thoroughly scrubbed before fogging.
- Fogging will be done with Aerox o Dilution: o Aerox: 250ml per 1000cu ft.

Procedure:

- Scrubbing:
- Send all linen for washing o Wipe table, mattress, telephones ,ac grills, lights, monitors with 2%bacillocid o Wash (clean) and dry all furniture and equipment suction holders, foot & sitting stools, Mayo stands, IV poles, basin stands, X-ray view boxes, hamper stands, all tables in the room, holes to oxygen tank, kick buckets and holder, and wall cupboards). o Wipe the doors and window panels with damp and dry cloth to remove dust o Scrub the floor with a hard brush o Wipe the walls with 2% bacillocid solution. o Mop the floor with 2% bacillocid solution.
- HVAC pre filters should cleaned by the people arranged by maintenance

Fogging:

- Fill the disinfectant into the fogger machine as per the dimensions of the NICU) o Seal all areas to prevent escape of fog o Keep the machine in the centre of the room to Switch the machine on for 30 min o Keep the door closed for one hour to Send air samples and swabs to microbiology laboratory as per protocol.

Surface Sampling Procedure:

- Collect immediately after opening the room o Don sterile mask and gloves o Moisten the swab with sterile water take care to prevent cross contamination o Wipe the surface to be sampled with vertical S strokes o Place the swab in sterile container and cap immediately.
- Culture swabs will be sent in the following order:
 - Two each from the floor and wall
 - Two from the Equipment's as listed below on alternate basis.
 1. Monitor Screen
 2. Ac Grill
 3. Warmer Humidifier Water
 4. Any other area, if suspected

Air Sampling Procedure

Air sampling is done by the settle plate method o Two Blood Agar plates should be kept exposed for 1Hour, One at the centre of the room and the other at any one corner of the room. o After Exposure the lid should be closed and sealed with micro pore and sent to Microbiology Lab

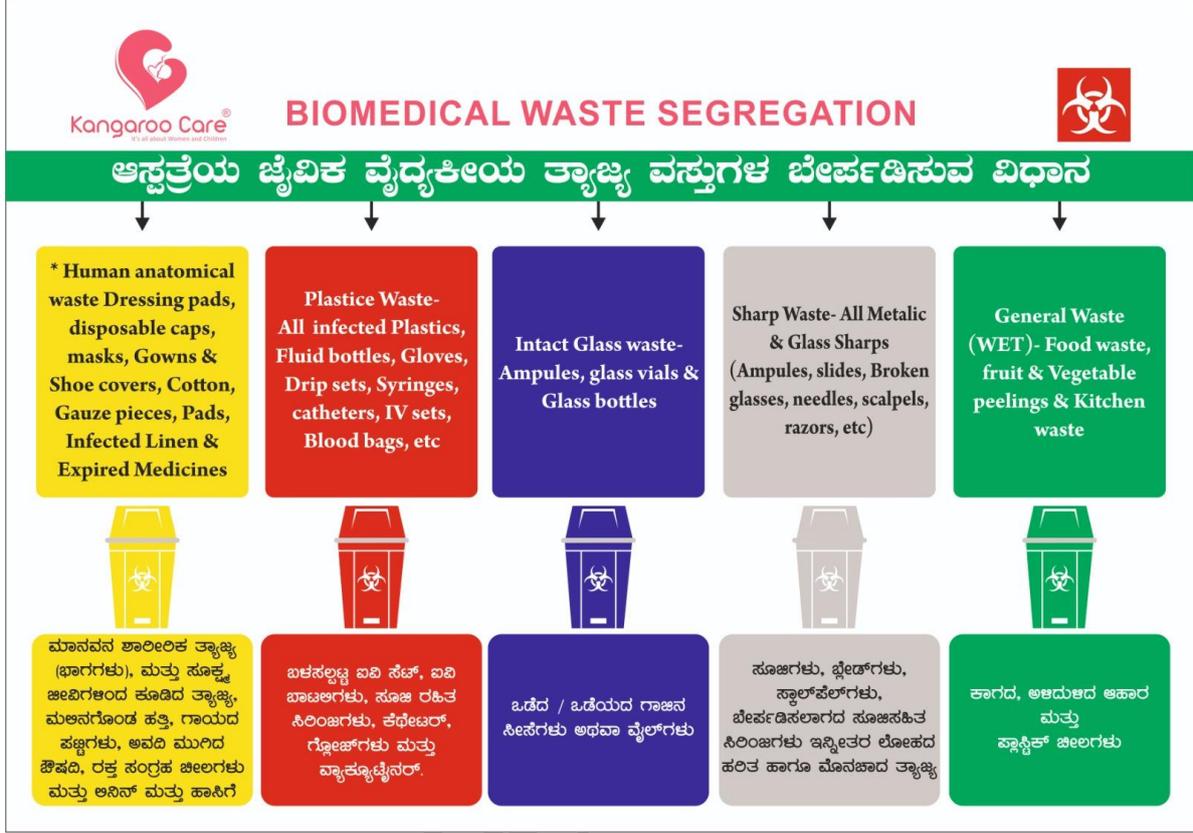
DOCUMENT

- Name of the centre, Sample location, time and date of collection .name of person collecting the sample.
- Environmental cleaning and disinfection should be performed on a routine and consistent basis to provide for a safe and sanitary environment.

BIOMEDICAL WASTE MANAGEMENT:

All the waste generated in the hospital should be managed as per the waste management policy.

Segregation and color coding:



Transportation of the Waste Bags

All waste containers shall be tied and replaced when they are 3/4th full- preferably every shift and when they are 3/4th full in between shifts. Procedure- On Site Transportation of Waste

1. Segregated wastes have to be transported within the facility from the point of generation to the final waste disposal site.
2. All bags should be fastened, small trolleys can be used or the bin themselves be carried.
3. Care must be taken to avoid spills. Non-infectious waste should not be transported with infectious waste

Guidelines for Transport of Waste:

1. When waste is collected, from a particular area, it will be wheeled through a specific corridor to the specific lift earmarked to carry waste to the central garbage storage area where it is weighed and transferred to the loading truck for disposal.
2. This will be done four times during the day once at 7:00 am, 12 pm, 3 pm, and 7 pm and if required in between the time mentioned.

3. The wheel-able bin will be cleaned and disinfected with Sodium hypochlorite solution once in 24 hrs. This will keep the bin clean and odourless.
4. While transferring waste to storage bins to the central garbage storage area, housekeeping staff will wear protective clothing e.g. **mask, heavy duty gloves, and rubber boots.**

Storage of Waste

1. Waste should be stored only in the dirty utility rooms provided transiently then should be stored in Bio medical storage room provided for specific reason.
2. No waste bags shall be stored in the corridors or any other areas.
3. No untreated waste shall be kept within the premises for more than 48 hours.
4. Access to the waste storage rooms should be restricted

Safe Disposal of Waste

Waste will be handed over to the Waste Treating Unit in the following manner:

1. All waste held in the storage bins will be wheeled up to the garbage truck itself
2. Waste plastic bags, whether, Blue, Yellow or Black will not be opened in the collecting truck, but will be stored and transported out of the hospital premises directly.
3. The contractors 'garbage handlers should wear heavy duty gloves, mask, and rubber boots while transferring waste from the hospital's bins to the truck.
4. Transfer of waste to the truck should be overseen by housekeeping supervisor.
5. Housekeeping supervisor should maintain a log book which will document, the date, and weight of the waste collected by the contractor.
6. Waste will be disposed of on daily basis; it should always be monitored that any untreated wastes are not kept in the hospital premises beyond 48 hours.
7. All laboratory waste shall be autoclaved and handed over to the central bio medical waste treatment facility.

EQUIPMENT REPROCESSING PROTOCOL FOR DISINFECTION IN NICU

Sl.No	ITEM/EQUIPMENT	DISINFECTION	FREQUENCY
1	Thermometers, BP cuffs, Stethoscopes	Wipe with 70% isopropyl alcohol	Daily and after each use
2	Warmers , syringe pumps, infusion pumps, pulse oxymeters, phototherapy units, ECG monitors	Wipe with 70% isopropyl alcohol.	Daily morning and if visibly soiled
3	Incubators, Ventilator monitors	Cidex Opa	Daily morning and if visibly soiled
4	Expiratory Flow valve	Cidex Opa as per protocol	Every 72hrs and in between patients
5	Rest of the ventilator body	1% bacillocid	Every morning
6	Oxygen Hoods	Wash with soap and water	Every morning
7	Suction Jar	Wash with soap and water	Every morning
8	Transducers	Wipe with 70% isopropyl alcohol	Every morning and in between patients
9	Ambu bags	ETO ,Cidex OPA Ideally sent to ETO after washing with soap and water. If required immerse in Cidex OPA for 10 min dry and use	Between each use
10	Ventilator tubing's	ETO sterilization	If visibly soiled
11	Feeding utensils	Clean with soap and water and boil for 15mins	After every feed
12	Laryngeal blades	Wash with soap and water, wipe with 70% isopropyl alcohol	After each use
13	Drug trolley	Wipe with 70% isopropyl alcohol	Every shift

14	Baby weighing Scales	Wipe with 1% bacillocid	Every use
15	Fogging – After carbolization and scrubbing	Aerox – as per manufacturer recommendations	Once a month

GENERAL MEASURES

1. To keep the NICU door closed at all times
2. To not switch the AC off at any point in time
3. To observe strict hand hygiene by all consultants' registrars nursing staff and anybody handling the babies.
4. To restrict entry of unauthorised personnel into the NICU.

Disinfection of equipment's:

Will be carried out by nursing staff:

1. **Thermometers:** are for individual patient use. It is cleaned with 70% isopropyl alcohol swab, before and after use.
2. **Stethoscope** after use for individual patients will be wiped with isopropyl alcohol at the beginning of each shift and after every use.
3. **Humidifiers** are cleaned with 70% Isopropyl alcohol every morning dried and sterilized by ETO every 72 hrs. and in between patients. Humidifiers should be filled with sterile distilled water and changed every day.
4. Warmers ventilators syringe pumps, infusion pumps pulse ox meters, phototherapy units ECG monitors to be wiped with 70% isopropyl alcohol every morning.
5. Incubators and ventilator monitor to be wiped with Cidex OPA.
6. Expiratory flow sensors are removed and washed with mild detergent and water. Then dipped in Cidex OPA for 12 minutes. Drain the solution completely and immerse in large quantities of sterile water for three changes. Leave in water for one minute for each cycle.
7. Air dry and use.
8. Clean the arm and rest of the ventilator body with 1% bacillocid
9. Bases of ventilators ,drug trolleys to be wiped with 1% bacillocid every morning
10. Suction apparatus to be cleaned with hot water and detergent, disinfected with 1% sodium hypochlorite for 30 mins, rinsed with water, dried and used.
11. Ambu Bags washed every 48 hours and between each patient with soap and water and sent for ETO sterilisation. Alternately may be disinfected with Cidex OPA 10 mins and rinsed with water.
12. Oxygen masks & hoods are washed with soap & water once in a day and as required.

13. Ventilator tubing's to be changed between patients and if visibly soiled and sent to CSSD for cleaning and sterilization.
14. Laryngeal blades should be washed with soap and water and cleaned with 70% Isopropyl alcohol for 5-10 minutes and keep it dry in a box.
15. Kidney Trays wash with soap and water. Disinfect with 1% Bacillocid for 30mins, rinse with water, dried and used.
16. Transducers: Shall be wiped with 70% Isopropyl Alcohol between patients
17. Baby weighing scales: Clean tray as necessary with detergent & water. Wipe with 1% bacillocid solution. If gross contamination with blood/ body fluids decontaminates with 1% sodium hypochlorite solution.
18. Toys should be washed with soap and dried at interval of 1 week
19. Feeding utensils will be washed with soap and water and immersed in boiling water for 15min and air dried.
20. Drug trolleys tray to be wiped with 70% Isopropyl alcohol every shift.

SURVEILLANCE AND REPORTING OF INFECTION

Surveillance involves the routine collection of data on infection, analysis of data and feedback to hospital staff. The surveillance of infections will be both passive and active.

Passive surveillance

- It consists of reporting of any occurrence of suspected HAI by the clinicians.
- Suspected case will be reported to the chairman or deputy chairman of HICC with details regarding the patient, all procedures, treatment administered etc.

Active surveillance

The ICN will monitor the rates of HAI in various units.

Monitoring of patients for infection:

- Catheter associated urinary tract infection (CAUTI)
- Ventilator associated pneumonia (VAP)
- Surgical site infection (SSI)
- Central line associated blood stream infection (CLABSI)

1.1. Objectives of surveillance:

- Reducing the infection rates within health care facilities.
- Establishing endemic infection rates.

- Identifying outbreaks
- Identifying high risk patients.
- Convincing medical personnel to adopt recommended preventive practices.
- Evaluating control measures.

1.2. Methods of surveillance and Reporting

Active surveillance will be carried out by the Infection Control nurse

Passive surveillance is by the clinicians to whom a Performa will be circulated for reporting infections.

Surveillance of Compliance with Hand Hygiene:

Hand Hygiene compliance will be monitored by the Infection Control Nurses twice weekly basis across all categories of stall and units involved in direct patient care wherever blood and body fluids are handled.

The surveillance should be done the Performa given by WHO

The results of the surveillance will be reported by Infection Control Nurse to Infection Control Officer and Quality Manager

Necessary corrective actions will be taken

Surveillance of House Keeping Activities:

It will be done by the Infection control Nurse once a week in the patient cares and where ever blood and body fluids are handled, Areas will be chosen on Random basis.

Adherence to protocols will be monitored as per the checklist for monitoring housekeeping Activities.

Surveillance and Monitoring of Biomedical Waste management:

Monitoring of Segregation and collection of BMW will be done by the ICN on weekly basis in all the BMW generating areas within the hospital

Monitoring of the Outsourced facility should be done by Infection Control Officer and quality manager every six months to ascertain that the BMW is disposed as per the BMW Rules 1998.

Families and Visitors/Health workers:

Parents are encouraged to spend as much time with their new born baby as possible. Whilst respecting the concept of family-based care, the number of visitors outside of family is restricted.

Parents, siblings and visitors are all required to follow the following infection prevention measures:

- On entering the nursery coats, jumpers, watches and jewellery should be removed.

- Hand hygiene, including washing hands and forearms up to the elbows, before and after visiting should be emphasised.
- Parents and regular visitors are encouraged to be up to date with immunisations and to have the yearly influenza vaccine.

Family members and others should not visit if they are unwell with signs and symptoms that are possibly infectious in aetiology, including:

- Fever
- Cough or influenza-like symptoms
- Runny nose
- Vomiting or diarrhoea
- Rash
- Conjunctivitis.
- Symptoms of other communicable disease (chicken pox/ measles/herpes cold sores)

Information regards visitors, hand hygiene, vaccinations for families is included in the parent information booklet, and advertised around the nursery on posters.

Abbreviations Infection Control

ABHR - Alcohol-based hand rub

AP - Additional Precautions

ARO - Antibiotic Resistance Organisms

CSD - central sterilisation department

EBM - expressed breast milk

GMO - genetically modified organism

HAI - Healthcare Associated Infections

HSV - Herpes Simplex Virus

MRSA - Methicillin Resistant Staphylococcus Aureus

NICU - Neonatal Intensive Care Unit

NICUS - Neonatal Intensive Care Units Data collection

PHDM - Pasteurized Human Donor Milk

PIDAC - Provincial Infectious Disease Advisory Committee

QI - Quality Insurance

RMD - Reusable Medical Device

TB - Tuberculosis

TPN - Total Parenteral Fluids.

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Kangaroo Care