



Infection Control Management Project

Volume 6: Infection Control in Nursery/NICU

1. Protocols
2. Reference Text
3. Tool for Monitoring

January 2011



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Adapted by AAA team from:

1. Control of Bloodstream Infection (BSI) in a Neonatal Intensive-Care Unit (NICU). MELAMED R, ZMORA E, PELED N, SCHLAEFFER P, GILAD J, ESKIRA S, BORER A; Interscience Conference on Antimicrobial Agents and Chemotherapy (42nd : 2002 : San Diego, Calif.). Abstr Intersci Conf Antimicrob Agents Chemother Intersci Conf Antimicrob Agents Chemother. 2002 Sep 27-30; 42: abstract no. G-1460.
2. Infection Control in the NICU. Recommended Standards by Study Group for the Control of Infection in NICUs. Barbara Lam and Maurice MP Leung. China April 2001.
3. Infection Prevention Guidelines for Healthcare Facilities in Ethiopia. Federal Ministry of Health Ethiopia. Disease Prevention and Control Department. Addis Ababa, Ethiopia. 2004
4. Infection Prevention Guidelines for Healthcare Facilities with Limited Resources. JHPIEGO and USAID. Linda Tietjen, Débora Bossemeyer, Noel McIntosh.
5. Manual of National Standards for Family Planning, Prepared by FALAH Project – MOPW, Population Council, Jhpiego, USAID Islamabad
6. Participants Handbook. Injection Safety in the Context of Infection Prevention and Control. Ministry of Health and John Snow, Inc. Research and Training (MMIS – Kenya Program). October 2006.
7. Revised CDC Guidelines for Isolation Precautions in Hospitals. American Academy of Pediatrics. 1998
8. Safe management of wastes from health-care activities (1999): WHO, 1999.
9. Saint Elizabeth Regional Medical Center 555 South 70th Street , Lincoln, NE 68510. Infection Control in the NICU –Recommended Standards adapted from “Guidelines for Perinatal Care, 4th Edition by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists”))
10. The National Infection Control Guidelines, 2006. The National AIDS Control Program, Ministry of Health, Pakistan
11. WHO Poster, How to Handwash & How to Hand rub, October 2006



Infection Control in NICU

YOU MUST:

A. Practice Standard and Transmission Based Precautions

1. **Understand and follow** Priorities for Infection Control and Care at the NICU.
2. Follow **Daily Routines** Appropriately, including **surgery** required at the NICU, and **Disease Surveillance**.
3. **Consider All Patients as Potentially Infectious**.
4. **Treat All Patients with the Same Basic Level of Standard Precautions**.
5. **Practice Hand Hygiene** between patients and tasks to prevent cross contamination from person to person or contaminated object to person.
6. **Have personal protective equipment** available (aprons, eyewear, gloves, close-toed shoes) and use them as needed.
7. Observe proper **Dress Requirements**, including scrubs and gowning.
8. **Follow Transmission-based precautions** when clinically indicated. Observe **Special Pediatric Considerations for Additional Transmission-Based Precautions**

9. Strictly follow **feeding guidelines** for breast and formula milk

B. Follow Safe Practices

1. **Observe Peri-natal Precautions**
2. **Use strict aseptic techniques** for all clinical procedures.
3. **Strictly observe injection safety guidelines and prevent needle stick and other sharps injuries** by following safe work practices.
4. **Follow Sharps Injury Protocol** in case of sharps injury.
5. **Safely dispose off infectious waste** materials to protect those who handle them and prevent injury or spread of infection to the community.
6. **Be immunized** against Hepatitis B and have adequate anti-HB antibody titers.
7. Healthcare workers **should not be part of the Intensive Care team** they have a communicable disease or not immunized against HBV, rubella, measles and chicken pox..
8. **Teach patients post delivery and post surgical care of their newborns.**

C. Maintain a Clean and Safe Environment

1. **Strictly implement Traffic Control**
2. **Ensure Infrastructure Requirements for the NICU**
3. **Perform environmental cleaning twice daily and this should include damp dusting.**
4. **Ensure appropriate use of chemicals in the NICU including antiseptics and disinfectants**
5. **Ensure proper cleaning and disinfection of Patient care equipment.**
6. **Properly Maintain Clean and Soiled Neonatal Linen**
7. **Handle spills of infectious material correctly**
8. **Protect mattresses and pillow cases with plastic, waterproof covers and these should be wiped with neutral detergent between neonates.**
9. **Avoid sharing of linen and blankets between neonates.**
10. **Have separate nebulizers, oxygen mask for each neonate requiring these.**
11. **Humidifiers, attached to flow meters, should be disinfected between neonates.**
12. **Use new suction catheters and regularly clean suction bottle with hot water and detergent between patients**
13. **Do not place patient files on the bed.**
14. **Minimize attendants and visitors in the nursery/NICU.**

Reference Text

A. Practice Standard and Transmission Based Precautions

A1. Understand and follow Priorities for Infection Control and Care at the NICU

Many NICU patients are at high risk for infection because of their illnesses, immature immune systems, and exposure to invasive procedures and devices. Recent studies show that more than 50% blood stream infections can be controlled, if the following aspects are given serious consideration:

- Staff education
- Surgical scrubbing/hand washing
- Attire of NICU staff
- Visitor control
- Catheter handling
- Environmental cleaning
- Clinical waste management
- Disinfection practices
- Infection surveillance.

Counselling and education of parents is a must in care and feeding, as well as obtaining parental consent for management. Due to an immature immune system, neonates and especially preterm newborns are highly susceptible to infections.

A2. Follow Daily Routines Appropriately, including surgical procedures required at the NICU, and Disease Surveillance

- **Personnel must ensure scrubbing and gowning as appropriate.**
- Nursery or other staff who have worked part of a shift in another area of the hospital are not to enter the patient care area, unless they change into a clean uniform or wear a clean cover gown and perform a three-minute scrub.
- **Cord care** must be done with sterile water.
- A **bath** is given every third day using a mild soap. The face, bottom, and hair are washed daily.
- **Strict asepsis** must be maintained during all invasive procedures.

In case of surgical procedures within the NICU:

- The following are parameters to be followed:
 - Personnel are attired and scrubbed in a manner consistent with the expectations of the operating room environment.
 - No Visitors are allowed to the NICU room, from the time of set up until the time of completion of wound dressing.
 - A minimum of concerned NICU personnel is only allowed
 - Concerned personnel's traffic and movement is kept to a minimum. E.g. all supplies needed should be collected and brought once in a trolley to the NICU.
 - Personnel should not go in and out of the NICU once inside.
 - Informed consent includes notification of the increased risk of infection in this circumstance and the rationale for performing it.

Disease Precautions

Surveillance cultures are performed by the hospital microbiologist in assistance with the head of NICU department to control nosocomial infections, deciding rotations for antibiotics and control of resistant strains of microorganisms.

- Surveillance cultures – one culture is taken of nares or groin and original site of infection, if still available.
- Perform screening culture of MRSA and/or VRE.
- Isolate MRSA and VRE patients.
- Screening may also include **health care providers** for various nosocomial infections.
- **Careers** are also to be identified, isolated and managed.
- Institute an **Antibiotic Use Policy** for rotation and rationalizing use of antibiotics.
- Investigate outbreaks especially MRSA, VRE as a regular feature.

A3 and A4. Consider All Patients as Potentially Infectious and Treat All Patients with the Same Basic Level of Standard Precautions

Treating all patients in the health care facility with the same basic level of "standard" precautions involves work practices that are essential to provide a high level of protection to patients, health care providers and visitors.

These include the following:

1. Hand washing and antiseptics (hand hygiene);
2. Use of personal protective equipment when handling blood, body substances, excretions and secretions;

3. Appropriate handling of patient care equipment and soiled linen;
4. Prevention of needle stick/ sharp injuries;
5. Environmental cleaning and spills-management; and
6. Appropriate handling of waste

A5. Practice Hand Hygiene between handling neonates and different tasks

- Hand hygiene is required for all persons entering the department who will have contact with infants or nursery equipment.
- The initial handwash for caregivers should be done with an antimicrobial soap for 3 minutes.
- Between each infant care, a 60 second handwash with soap and water, or handrub with alcohol-based product, is required.
- Infants should never come into contact with the unwashed portion of the skin.
- Before initial contact with the baby in the NICU, family members should perform a thorough handwash.
- Alcohol-based hand rubs should be available in each room.

Wash hands with soap and water when visibly soiled, otherwise use **hand rub**.

The purpose of handwashing is to mechanically remove soil and debris from the skin, and reduce the number of transient microorganisms. **Handwashing with plain soap and clean water is as effective as washing with antimicrobial soaps.** In addition, plain soap causes less skin irritation.

Handwashing should be done before:

- Examining a client/patient
- Wearing gloves for any routine procedure/examination

Handwashing should be done after:

- Any situation in which hands may become contaminated, such as:
 - Handling soiled instruments and other items,
 - Touching mucous membranes, blood, or other body fluids (secretions or excretions), and
 - Having contact with a neonate.
- Removing gloves

Method of 60-Seconds Handwashing



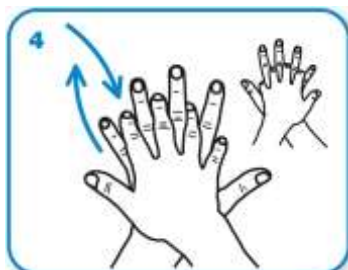
Wet hands with water



Apply enough soap to cover all hand surfaces



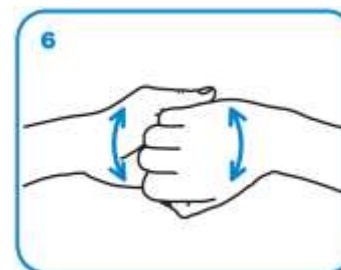
Rub hands palm to palm



Right palm over left dorsum with interlaced fingers and vice versa



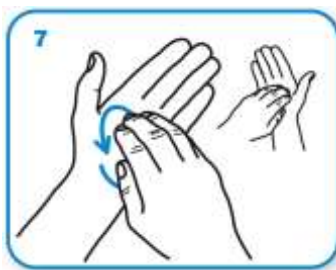
Palm to palm fingers interlaced



Backs of fingers to opposing palms with fingers interlocked



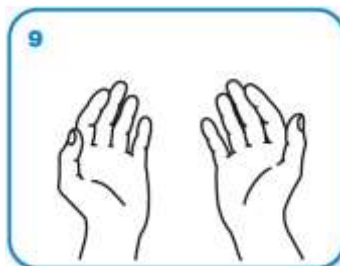
Rotational rubbing of left thumb clasped in right palm and vice versa



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



Rinse hands with water



And your hands are safe

Perform Antiseptic Hand Rub between patients. Use of an antiseptic hand rub is more effective in killing transient and resident flora than handwashing with antimicrobial

agents or plain soap and water. It is quick and convenient to perform, and gives a greater initial reduction in hand flora. Rub 5 ml for 15 seconds and let it dry in air

A non-irritating, antiseptic hand rub can be made by adding glycerin, propylene glycol, or sorbitol to alcohol (2 ml in 100 ml of 60-90 percent ethyl or isopropyl alcohol solution). Use 5 ml (about 1 teaspoonful) for each application and continue rubbing the solution over the hands until they are dry (15-30 seconds).

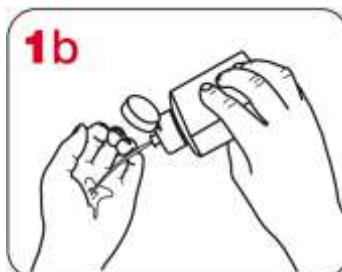
Method of Handrub

Wash hands only when visibly soiled! Otherwise, use handrub!

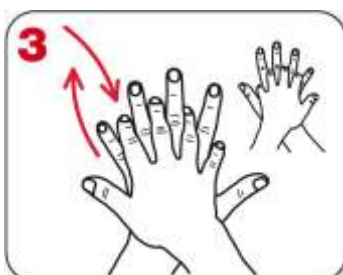
Duration of procedure: 30 sec.



Apply a handful of alcohol handrub in a cupped hand and cover all surfaces



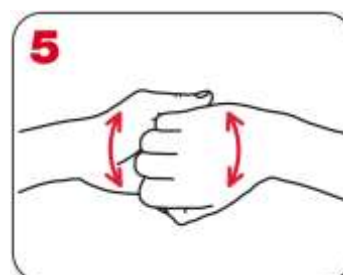
Rub hands palm to palm



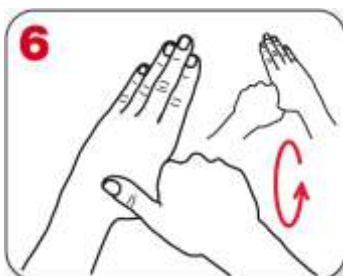
Right palm over left dorsum with interlaced fingers and vice versa



Palm to palm fingers interlaced



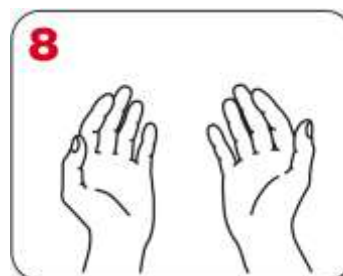
Backs of fingers to opposing palms with fingers interlocked



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



And your hands are safe

A6. Have Personal Protective Equipment (PPE) available

Protective barriers, commonly referred to as personal protective equipment (PPE), have been used for many years to protect clients from micro-organisms present on staff working in the health care setting. More recently, with the emergence of AIDS and HCV and the resurgence of tuberculosis and strains of influenza in many countries, use of PPE has become important for protecting the health care staff as well.

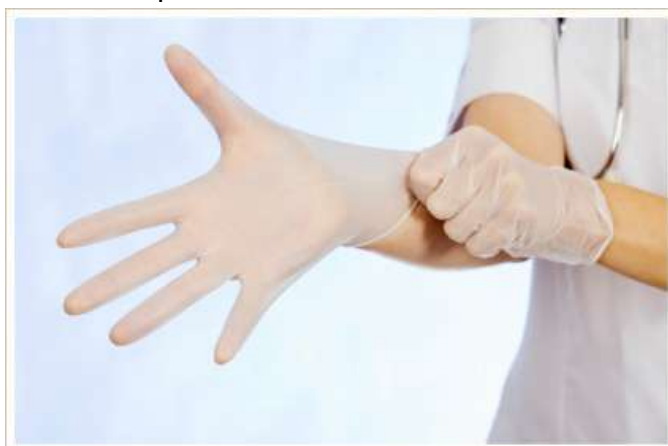
PPE includes gloves, masks/respirators, eyewear, (face shields, goggles or glasses), caps, gowns, aprons and other items. The NICU should have available and ready to use PPE at ALL times. These must be used by doctors, paramedics and other staff for situations where they may have contact with blood, body fluids, excretions or secretions. They must be adequately trained in proper use.

The following principles guide the use of personal protective equipment:

- Do not share personal protective equipment.
- Change personal protective equipment completely and thoroughly wash hands each time you leave a patient to attend to another patient or another duty.
- Personal protective equipment should be chosen according to the risk of exposure.
- Avoid any contact between contaminated (used) personal protective equipment and surfaces, clothing or people outside the patient care area
- Discard the used personal protective equipment in appropriate disposal bags

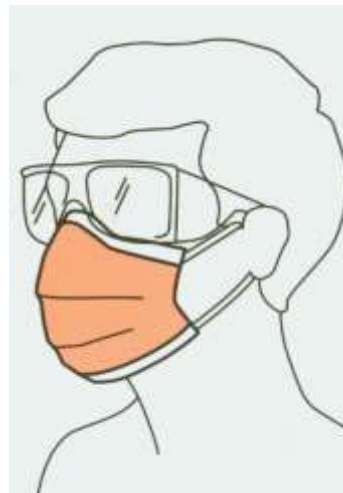
Gloves protect hands of health care providers from infectious materials and protect patients/clients from microorganisms on health care providers' hands.

- Wear gloves (clean, non-sterile) when touching blood, body fluids, secretions, excretions or mucous membranes.
- Change gloves between contacts with different patients.
- Change gloves between tasks/ procedures on the same patient to prevent cross-contamination between different body sites.
- Remove gloves immediately after use and before attending to another patient.
- Wash hands immediately after removing gloves.
- Use a plain soap, antimicrobial agent or waterless antiseptic agent.
- Disposable gloves should not be reused but should be disposed.



Masks should be large enough to cover the nose, lower face, jaw, and facial hair/beard. They are worn in an attempt to contain the moisture droplets expelled when health care

providers or surgical staff speak, cough, or sneeze, as well as prevent accidental splashes of blood or other contaminated body fluids from entering the health care provider's nose or mouth. Unless the masks are made of fluid-resistant materials, they are not effective in preventing either. Wear surgical masks rather than cotton material or gauze masks. Surgical masks have been designed to resist fluids to varying degrees depending on the design of the material in the mask. Do not reuse disposable masks.



Eyewear protects health care providers in the event of an accidental splash of blood or other body fluid by covering the eyes. Eyewear includes clear plastic goggles, safety glasses, etc. Prescription glasses or glasses with plain lenses also are acceptable. Masks and eyewear should be worn when performing any task in which an accidental splash into the face is likely (e.g., performing a minor surgical procedure or cleaning instruments). If disposable, discard appropriately. If they are reusable, decontaminate them according to the manufacturers' instructions.

Gowns (clean, non-sterile) should be worn to protect the skin and prevent soiling of clothing during procedures that are likely to generate splashes of blood, body fluids, secretions or excretions. Impermeable gowns are preferable. A plastic apron may be worn on top of the gown to protect exposure to blood, body fluids, secretions and excretions.

Caps are used to keep the hair and scalp covered so that flakes of skin and hair are not shed into the wound during clinical procedures. Caps should be large enough to cover all hair. While caps provide protection to the client, their primary purpose is to protect the wearer from blood or body fluid splashes and sprays.

Staff and Visitors – All visitors wear gloves to enter the room. Those with patient contact wear gowns. If parent is known positive and baby is found to be positive, may discontinue gown/glove precautions designed to keep the baby negative.

Masks – Required for suctioning (oral or respiratory)

Observe proper Dress Requirements, including scrubs and gowning.

General Dress Code and other essentials:

- Health care providers assigned to the care of babies will wear a clean scrub suit.
- Hair which is shoulder length or longer must be tied back off the collar.
- Beards are to be covered like hair with appropriate masks. Special beard masks have been developed for the purpose in Pakistan.
- Long-sleeved cover gowns will be worn by those working with babies with drainage or infectious disease process, or whenever soiling may be likely.
- Gowns are to be worn once and discarded.
- **No jewellery (especially hand and wrist jewellery) is allowed to be worn by the entire NICU team as a matter of principle.**
- Dress codes should be established for regular and part-time personnel who enter the neonatal unit.
- Sterile long-sleeved gowns to be worn by all personnel who have direct contact with the sterile field during surgical and invasive procedures in the neonatal unit.
- Gloves are to be worn when handling the neonate until blood and amniotic fluid have been removed from the skin.
- When a neonate is held outside the bassinet by nursing or other neonatal intensive care unit personnel, a gown should be worn over the clothing and either discarded after use or maintained for use exclusively in the care of that neonate.
- If one gown is used for each neonate, the gowns should be changed regularly.
- Caps, masks and sterile gloves must be used during surgical and invasive procedures.

Surgical Scrub

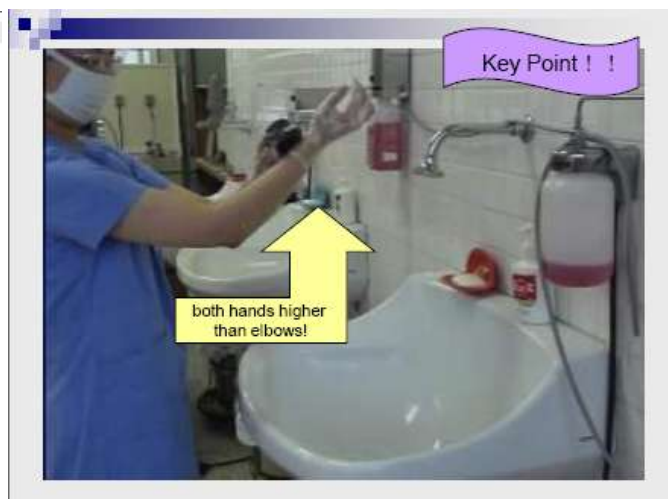
The surgical scrub is an everyday practice, and is an essential element of aseptic technique. Whilst it is not possible to sterilize your hands, the surgical scrub serves to minimize the number of pathogens, thus reducing the potential for cross infection in the event of a glove puncture.

- All staff should be in suitable surgical attire, with sleeves above the elbow (rolled if necessary).
- All hair should be contained within a surgical hat.
- Fingernails should be short and free from polish or artificial nails.
- Nails may be cleaned if necessary by using a disposable pick under running water.
- **All jewellery must be removed.**
- Hands and arms should be washed with anti microbial solution and running water immediately before beginning the surgical scrub.
- Hands and arms should be wet before applying scrub solution.

- The first wash should encompass the hands and arms to the elbows, utilising a systematic method to cover all areas.



- Follow the steps of handwashing as described above.
- The use of a scrubbing brush is not necessary for reduction of bacterial counts and can lead to skin damage and an increase in skin shedding.
- Subsequent washes should encompass two thirds of the forearms to avoid compromising the cleanliness of the hands.
- Hands must be rinsed thoroughly from fingertip to elbow, allowing excess water to drain from the elbows into the sink.
- Avoid splashing surgical clothing – if this becomes excessively wet it can compromise the protection afforded by the gown.



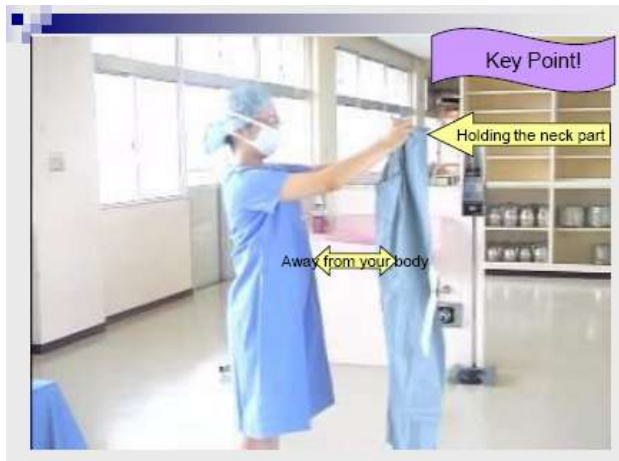


Drying

- Hands must be dried thoroughly –as wet surfaces transfer micro organisms more effectively than dry.
- The skin should be blotted dry with towels, as rubbing the skin dry will disturb skin cells.
- The principles of working from the fingertips to the elbows and using one towel per hand must be adhered to.
- Dry hands, first by placing the opposite hand behind the towel and blotting the skin, then by using a corkscrew movement to dry from hand to elbow. The towel must not be returned to the hand once the arm has been dried but must be discarded immediately.
- Repeat the process for the other hand.

Gowning

- Grasp the gown firmly and bring it away from the table. It has been folded so that the outside faces away.
- Holding the gown at the shoulders, allow it to unfold gently.
- Place hands inside the armholes and guide each arm through the sleeves by rising and spreading the arms. Do not allow hands to slide outside cuff of gown.
- The circulator assists by pulling the gown over the shoulders and tying it.



Gloving (Closed Technique)

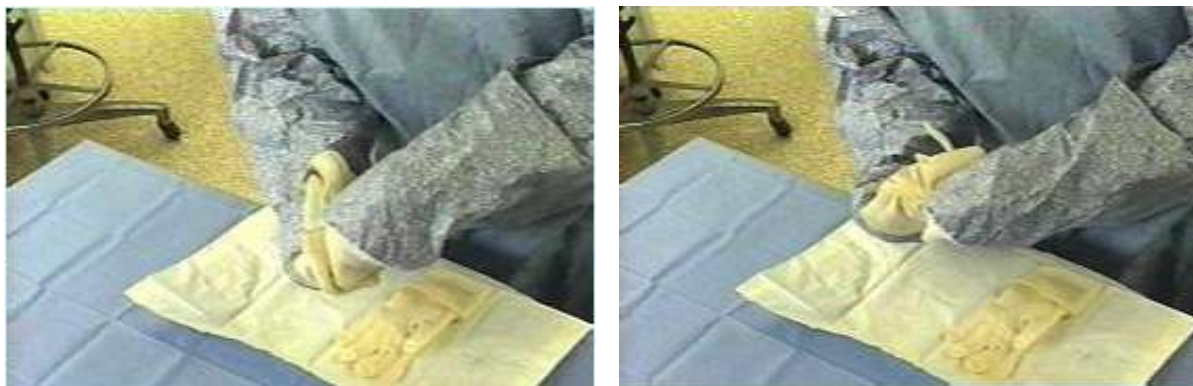
- Left hand (within the gown) lifts the right glove by its cuff.



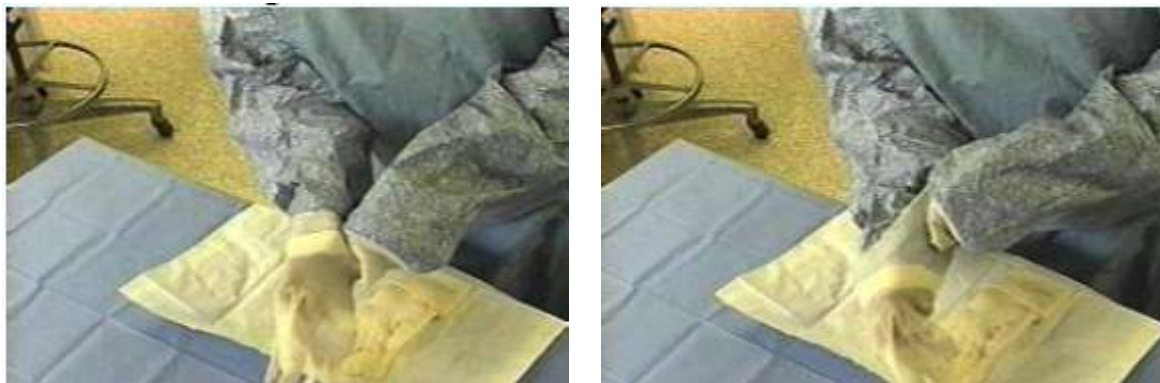
- The fingers of the glove face towards you.



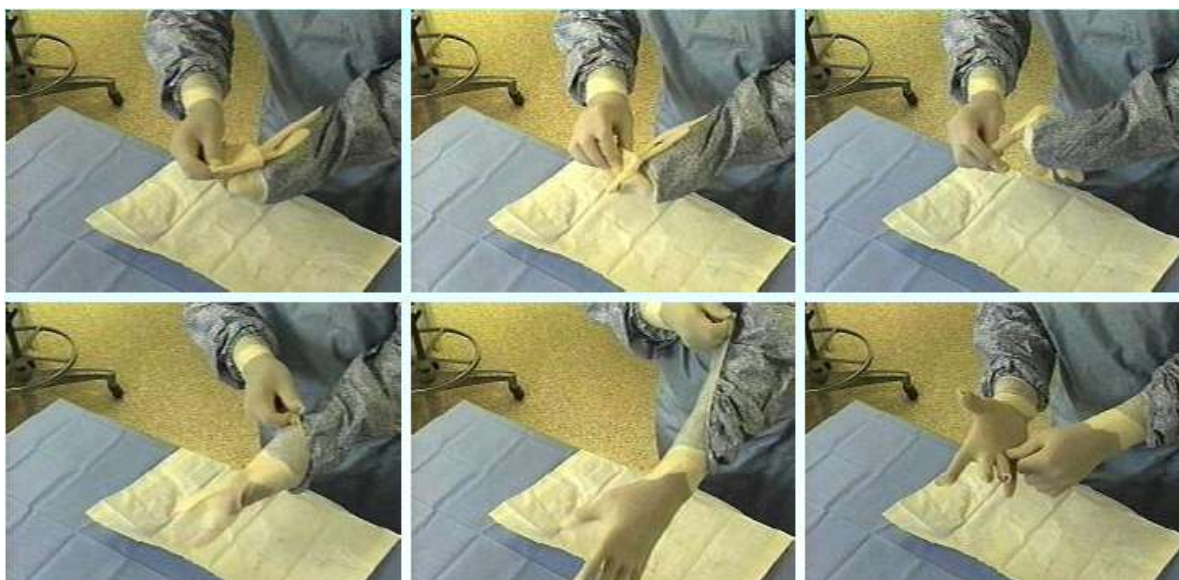
- Working through the gown sleeve, grasp the cuff of the glove and bring it over the open cuff of the sleeve.



- Unroll the glove cuff so that it covers the sleeve cuff.



- Proceed with the opposite hand, using the same technique.



- When both gloves are on, pull glove cuffs over gown sleeves and adjust gloves for comfort.



- Hold both hands higher than elbows and away from surgical attire prior to gowning.



A8. Follow Transmission-based Precautions

Transmission-based precautions are designed for patients documented or suspected to be infected or colonized with pathogens that require additional precautions, (beyond the standard precautions) necessary to interrupt transmission.

- The precautions may be combined for diseases that have multiple routes of transmission. Whether singly or in combination, they are **always to be used in addition to standard precautions**.
- These precautions apply to:
 1. Airborne precautions
 2. Droplet precautions
 3. Contact precautions.

Airborne Precautions

Airborne precautions are designed to reduce the transmission of diseases spread by the airborne route. Airborne transmission occurs when droplet nuclei (evaporated droplets) <5 micron in size are disseminated in the air. These droplet nuclei can remain suspended in the air for some time. Droplet nuclei are the residuals of droplets and when suspended in the air, dry and produce particles ranging in size from 1-5 micron. These particles can remain suspended in the air for long periods of time, especially when bound on dust particles.

Diseases which spread by this mode include *open/active respiratory tuberculosis (TB), measles, chicken pox, pulmonary plague and hemorrhagic fever with pneumonia*. Once patients with these diseases are diagnosed, quickly move them in single rooms designated for such patients.

Droplet Precautions

Droplet transmission occurs when there is adequate contact between the mucous membranes of the nose and mouth or conjunctivae of a susceptible person and large particle droplets (>5 microns). Droplets are usually generated from the infected person during coughing, sneezing, talking or when health care providers undertake procedures such as tracheal suctioning. Diseases, which are transmitted by this route, include *pneumonias, pertussis, diphtheria, influenza type B, mumps, and meningitis*. Once patients with these diseases are diagnosed, quickly move them in single rooms designated for such patients.

Contact Precautions

Diseases which are transmitted by this route include *colonization or infection with multiple antibiotic resistant organisms, enteric infections and skin infections*. Once patients with these diseases are diagnosed, quickly move them in single rooms designated for such patients.



A9. Observe Special Pediatric Considerations for Additional Transmission-Based Precautions

Paediatric care necessitates modification of these guidelines, particularly concerning:

- Use of gloves for routine diaper changing
- Private rooms and cohorting
- Common-use areas such as playrooms and schoolrooms.

Gloving for Diaper Changing

- Routine use of gloves for diaper changing in hospitalized children could minimize the potential transmission of colonizing microbes (eg, cytomegalovirus, *Clostridium difficile*, and *Citrobacter freundii*) to another patient who might become infected.
- Gloves must be discarded before handling another baby.
- **There are no exceptions to this rule for gloving at the NICU.**

Isolation Rooms

- Isolation rooms adequately designed to care for airborne infection should ideally be available in any hospital with an NICU. In most cases, this is situated within the NICU; but, in some circumstances, utilization of an isolation room elsewhere in the hospital would be suitable.
- An area for handwashing, gowning, and storage of clean and soiled materials should be provided near the entrance to the room.
- Isolation rooms should have a minimum of 13.94 sq metre (150 square feet) of clear space, excluding the entry work area. Single and multi-bedded configurations are appropriate based on use.
- Ventilation systems for isolation room(s) should be engineered to have negative air pressure with air 100% exhausted to the outside. Air exhaust to outside the building do not need to be filtered but the exhaust vent needs to be away from air-intake vents, persons or animals.
- A hands-free two-way emergency communication system is required within the isolation room to connect to the outside.
- Remote physiologic monitoring of an isolated infant should be considered.
- Isolation rooms should have observation windows with blinds for privacy. Choice and placement of blinds, windows, and other structural items should allow for ease of operation and cleaning.

Common Use Areas (Hospital Schoolrooms, Playrooms, Etc)



- Any child being treated with isolation precautions should be excluded from these general use areas.

Transmission-Based Precautions for specific conditions

Airborne Precautions for known or suspected cases of:

- Measles
- Varicella (including disseminated zoster)[†]
- Tuberculosis

Droplet Precautions for known or suspected cases of:

- Invasive Haemophilus influenzae type b disease, including meningitis, pneumonia, epiglottitis, and sepsis
- Invasive Neisseria meningitidis disease, including meningitis, pneumonia, and sepsis
- Other serious bacterial respiratory infections spread by droplet transmission, including:
 - Diphtheria (pharyngeal)
 - Mycoplasma pneumonia
 - Pertussis
 - Pneumonic plague
 - Streptococcal pharyngitis, pneumonia, or scarlet fever in infants and young children
- Serious viral infections spread by droplet transmission, including those caused by:
 - Adenovirus
 - Influenza
 - Mumps
 - Parvovirus B19
 - Rubella

Contact Precautions for known or suspected cases of:

- serious illnesses easily transmitted by direct patient contact or by contact with items in the patient's environment.
- Include:
 - Gastrointestinal, respiratory, skin, or wound infections or colonization with multidrug-resistant bacteria. These are to be judged by the infection control program), based on current state, regional, or national recommendations, to be of special clinical and epidemiologic significance.
 - Enteric infections with a low infectious dose or prolonged environmental survival, including those caused by:
 - Clostridium difficile
 - For diapered or incontinent patients: enterohemorrhagic Escherichia coli O157:H7, Shigella, hepatitis A, or rotavirus

- Respiratory syncytial virus, parainfluenza virus, or enteroviral infections in infants and young children
- Skin infections that are highly contagious or that may occur on dry skin, including:
 - Diphtheria (cutaneous)
 - Herpes simplex virus (neonatal or mucocutaneous)
 - Impetigo
 - Major (noncontained) abscesses, cellulitis, or decubiti
 - Pediculosis
 - Scabies
 - Staphylococcal furunculosis in infants and young children
 - Zoster (disseminated or in the immunocompromised host)
- Viral/hemorrhagic conjunctivitis
- Viral hemorrhagic infections (Ebola, Lassa, or Marburg)

**Clinical Syndromes or Conditions Warranting Additional Empiric Precautions
to Prevent Transmission of Epidemiologically Important Pathogens Pending
Confirmation of Diagnosis¹**

Clinical Syndrome or Condition²	Potential Pathogens³	Empiric Precautions
Diarrhea		
Acute diarrhea with a likely infectious cause in an incontinent or diapered patient	Enteric pathogens ⁴	Contact
Diarrhea in an adult with a history of recent antibiotic use	<i>Clostridium difficile</i>	Contact
Meningitis	<i>Neisseria meningitides</i>	Droplet
Rash or exanthems, generalized, etiology unknown		
Petechial/ecchymotic with fever	<i>Neisseria meningitides</i>	Droplet
Petechial/ecchymotic with fever	<i>Neisseria meningitides</i>	Droplet
Vesicular	Varicella	Airborne and contact
Maculopapular with coryza and fever	Rubeola (measles)	Airborne
Respiratory infections		
Cough/fever/upper lobe pulmonary infiltrate in an HIV-negative patient or a patient at low risk for HIV infection	<i>Mycobacterium tuberculosis</i>	Airborne
Cough/fever/pulmonary infiltrate in any lung location in an HIV-infected patient or a patient at high risk for HIV infection	<i>Mycobacterium tuberculosis</i>	Airborne
Paroxysmal or severe persistent cough during periods of pertussis activity	<i>Bordetella pertussis</i>	Droplet
Respiratory infections, particularly bronchiolitis and croup, in infants and young children	Respiratory syncytial or parainfluenza virus	Contact
Risk of multidrug-resistant microorganisms		
History of infection or colonization with multidrug-resistant organisms ⁵	Resistant bacteria	Contact
Skin, wound, or urinary tract infection in a patient with a recent hospital or nursing home stay in a facility where multidrug-resistant organisms are prevalent	Resistant bacteria	Contact
Skin or wound infection		
Abscess or draining wound that cannot be covered	<i>Staphylococcus aureus</i> , group A streptococcus	Contact

¹ Infection control professionals are encouraged to modify or adapt this table according to local conditions. To ensure that appropriate empiric precautions are implemented always, hospitals must have systems in place to evaluate patients routinely according to these criteria as part of their preadmission and admission care.

² Patients with the syndromes or conditions listed herein may present with atypical signs or symptoms (e.g., neonates and adults with pertussis may not have paroxysmal or severe cough). The clinician's index of suspicion should be guided by the prevalence of specific conditions in the community, as well as clinical judgment.

³ The organisms listed are not intended to represent the complete, or even most likely, diagnoses, but rather possible etiologic agents that require additional precautions beyond standard precautions until they can be ruled out.

⁴ These pathogens include enterohemorrhagic *Escherichia coli* 0157:H7, *Shigella*, hepatitis A, and rotavirus..

⁵ Resistant bacteria judged by the infection control program, based on current state, regional, or national recommendations, to be of special clinical or epidemiological significance.

Recommendations for Transmission-Based Precautions for Hospitalized Patients

Category of Precautions	Hand Washing for Patient Contact	Single Room	Masks	Gowns	Gloves
Airborne	Yes	Yes, with negative-pressure ventilation	Yes	No	No
Droplet	Yes	Yes*	Yes, for those close to patient	No	No
Contact	Yes	Yes*	No	Yes	Yes
*Preferred but not required for crib-confined patients. Cohorting of children infected with the same pathogen is acceptable.					

A10. Strictly follow feeding guidelines for breast and formula milk

Breast feeding

- Breast feeding is to be actively encouraged, and ways and means have to be worked out for providing breast milk to the neonate.
- Mothers have to be educated on breast and nipple care, as well as hand hygiene.

Formula Milk

- Mothers will be instructed to cleanse hands before receiving baby for formula feeding.
- Formula products should be selected based on nutritional needs; alternatives to powdered forms should be chosen when possible.
- Sterile water is used for reconstituting powdered forms.
- Trained personnel prepares powdered formula under aseptic technique in the designated Nutrition Room.
- Manufacturer's instructions are followed; product should be refrigerated immediately (35-50° F) and discarded if not used within 24 hours after preparation.
- The administration or "hang time" for continuous enteral feeding should not exceed 4 hours.

B. Follow Safe Practices

B1. Observe Peri-natal Precautions

During birth, observe the following precautions.

Receive the baby onto a warm, clean and dry towel/cloth and place on mother's chest: The baby should be delivered onto a warm and CLEAN towel/cloth and kept on mother's chest. If this is not possible, the baby should be kept in a clean, warm, safe place close to the mother.

Clamp and cut the umbilical cord with sterile instruments, thoroughly decontaminated by sterilization (sterile scissor or blade). This is of utmost importance for the prevention of infections. Clean the cord stump and keep it dry. Topical application of antiseptics is usually not necessary unless the baby is likely to live in a highly contaminated area.

Immediately dry the baby: Immediately after delivery, the baby should be dried with CLEAN warm towels or cloths, while being placed on the mother's abdomen or in her arms. Blood or meconium on baby's skin should be wiped away; however, the white greasy substance covering the baby's body (vernix) should not be wiped off. This vernix helps to protect against infection.

Ensure that the airway is clear: removing mucus and other material from the mouth, nose and throat with a sterile suction pump.

Encourage mother to initiate exclusive breastfeeding: The immune system of the newborn is limited at birth. Mother's milk has large amounts of secretory IgA antibodies, which protects neonate efficiently against several infections, including neonatal septicaemia. Therefore, breastfeeding should be initiated within half an hour of birth in all babies. Babies can be breast-fed as soon as the airway is cleared and they are breathing normally.

Wipe both the eyes with sterile gauze. Clean the eyes using sterile gauze/cotton. Use separate gauze for each eye. Wipe from the medial side (inner canthus) to the lateral site (outer canthus).

Use a clean cloth as a diaper

Educate mother on signs of infection, as this will help in early detection and treatment. These are:

- Poor feeding
- Breathing difficulty
- Listlessness
- Decreased or elevated temperature
- Unusual skin rash or change in skin color
- Persistent crying

- Unusual irritability

B2. Use Strict Aseptic Techniques For All Clinical Procedures

General Principles

- Make sure that you collect all necessary equipment before the start of the procedure.
- Practice Hand Hygiene.
- Wear sterile gloves, gown, mask and eyewear.
- Prepare the patient site as described for each procedure.
- Safely dispose of any sharps used in the procedure.
- Remove gloves after performing the clinical procedure and practice hand hygiene again.

Preventing Catheter-related sepsis

- Meticulous attention should be given to aseptic insertion and maintenance of the cannula and to aseptic techniques of fluid administration.
- All parenteral nutrition fluids should be mixed in the pharmacy, under a laminar flow hood.
- If bottles of lipid emulsions are kept in the neonatal unit refrigerator, care should be taken to prevent contamination, as they are susceptible to contamination with a wide variety of bacteria and fungi that can proliferate to high concentrations within hours. Open bottles must be discarded no later than 24 hours after the seal has been broken.
- Intravenous tubing, stopcocks, flush syringes should be changed (using 12 sterile technique) on a regular basis and no less frequently than every 72 hours.
- Replace tubing used to administer blood, blood products, or lipid emulsions within 24 hours of initiating the infusion.

Procedure for Insertion Peripheral IV Lines

- Collect all necessary equipment.
- Practice Hand Hygiene.
- Place a clean sheet under the arm.
- Select an appropriate site.
- Disinfect intravascular insertion skin site with alcohol or povidone-iodine. Allow the antiseptic to dry completely.
- Do not touch the venipuncture site once the skin has been disinfected. Carefully remove the cap of the catheter taking care not to touch the shaft of the catheter with the fingers before and during insertion.
- Select the correct catheter site.
- Insert the catheter as swiftly as possible using a “no touch” technique.
- **Do not attempt repeated insertion with the same catheter.**
- **Do not attempt cleaning or disinfecting the catheter with any chemicals, including alcohol, povidone iodine or glutaraldehyde.**
- Look out for flashback and then advance the catheter slowly.

- Apply sterile dressing.
- Secure the catheter to avoid movement.
- Label the site with the insertion date and time.
- Connect to the IV administration set.
- Clean around the site with alcohol.
- Inform and educate the patient and attendants about care of the catheter.
- Safely discard sharps.
- Practice hand hygiene after completion of the procedure.
- Change IV cannula after 72 hours.
- Change drip set after 72 hours.

Procedure for Urinary Catheterization

- All equipment used must be sterile. Lay out the top of the trolley making sure all items are open and accessible.
- Perform hand hygiene.
- Sterile gloves must be worn and a “no-touch” aseptic technique should be used. A second pair of gloves should be available should contamination occur.
- The peri-urethral area should be thoroughly cleaned. Wiping motions should be carried out from front to back to avoid faecal bacteria being transported to the urinary meatus.
- In males, clean the glans with a disinfectant/detergent preparation.
- In females, separate the labia and cleanse the vulva using front to back technique.
- Use antiseptic solution to clean the urethral meatus prior to the insertion of the catheter.
- Single-use sachets of sterile (water-soluble) lubricant or Ointment Lignocaine should be used on the catheter prior to urethral insertion to reduce friction and trauma to meatus.
- Gently insert the catheter and advance it by holding the inner sterile sleeve, avoiding contact with non-sterile surfaces.
- Inflate the balloon by instilling the recommended amount of sterile water.
- Connect catheter to a sterile, closed urinary drainage system. Do not disconnect catheter unless absolutely necessary.
- Hang drainage bag below the level of the bed to prevent reflux. The bag must be supported in the drainage stand to allow free flow of urine. Do not allow the bag to touch the floor. Keep the bag always below the level of the bladder. Empty bag every 8 hours or earlier as needed. Put date and time on catheter bag every time a new bag is attached.
- Secure the catheter to the patient’s thigh to prevent movement and urethral meatal ulceration.
- Put the date and time of catheter insertion on the catheter tubing with a marker, and on the patient’s chart.
- Practice hand hygiene after completion of the procedure.
- Practice hand hygiene before emptying bag. Use a separate disinfected jug to collect urine from each bag.
- Secure the catheter for movement in and out of bed is also important.

- Educate staff on catheter care and bag emptying. Also educate on signs of infection and trauma caused by the catheter.

Procedure for Collecting Urine Specimen

- NEVER DISCONNECT CLOSED DRAINAGE SYSTEM TO OBTAIN A SAMPLE OF URINE.
- Never collect a sample for bacteriologic culture from the bag.
- Disinfect outside of catheter proximal to junction with drainage tube by applying alcohol wipe, allow to dry, then aspirate urine with a sterile needle and syringe.
- Transfer to a sterile container.

B3. Strictly Observe Injection Safety and Prevent Needlestick and Other Sharps Injuries

Sharps are defined as comprising of needles, syringes, scalpels, blades, glass i.e. anything that may cause puncture or cuts. Take care to prevent injuries when using sharps.

- Use needle and syringe only once
- Keep handling to a minimum. DO NOT pass directly from hand to hand.
- **Do not recap or bend needles** prior to disposal.
- Do not disassemble the needle and syringe after use.
- **Mutilate** prior to disposal to prevent any unauthorized reuse by using needle cutters/destroyers.
- Dispose off the used mutilated disposable syringes and needles, scalpel blades and other sharp items in a **puncture-resistant container with a lid that closes.**



The puncture proof sharp containers can be made from cardboard box, used tin box, or hard plastic bottles that are closed.

Make only a small opening in the box for disposing off sharps. These sharp containers should be available in dressing/injection rooms, EPI vaccination rooms, examination rooms, labor and birth rooms, wards and laboratories, i.e. such containers must be located in ALL patient care and laboratory areas where they are very easily accessible to personnel working in these locations. They should be closed and immediately replaced when $\frac{3}{4}$ full.



B4. Follow Sharps Injuries Protocol in Case of Sharps Injury

Needle stick injuries are the commonest of sharps injuries, although other contaminated sharp instruments may also cause injuries. All health care providers with potential exposure should be vaccinated. For other personnel, the risk of hepatitis B, hepatitis C and HIV infection should be assessed and appropriate immunization or chemoprophylactic steps taken.

First aid

- **Contaminated needlestick, sharps injury, bite or scratch** – allow to bleed, wash with soap and running water. Do not squeeze wound or force bleeding.
- **Blood or body fluid in eyes or mouth** - irrigate with copious quantities of cold water
- **Blood or body fluid on broken skin** - encourage bleeding if possible and wash with soap under running water (but without scrubbing).

Report incident and discuss with consultant immediately

Discuss type of injury, donor HIV status if known, etc. If this urgent preliminary risk assessment considers there is a significant risk of HIV, post-exposure prophylaxis (PEP) for HIV needs to be started as soon as possible - ideally within 1 hour. This reduces risk of transmission by 80%. It may be appropriate to give the first dose of PEP pending a fuller assessment after the HIV status of the 'donor' is known. Where the donor is unknown, epidemiological likelihood of HIV in the source needs to be considered, although in most cases PEP will not be justified.

PEP for HIV currently consists of a 28-day course of treatment with a triple combination of antiretroviral drugs, has significant side-effects and needs careful follow-up.

Hepatitis B immunoglobulin should be given within 72 hours if the source is known to be HBeAg positive or their status is unknown and the exposed person has negative serology. HBV vaccination should be offered to all health workers who have never been immunized or are non-immune.

The exposed person should also be advised to have safe sex for three months, not to donate blood until all necessary screening tests are clear, and to see their GP if they develop a fever.

Investigations

- Take blood for virology, (HIV, hepatitis B, hepatitis C) from the injured worker.
- Start PEP where appropriate and consider the need for antibiotic therapy or hepatitis B immunisation. Recheck HIV status 3 months later and hepatitis serology 3 and 6 months later.
- Liver function tests should be performed and repeated at 3 and 6 months.
- Female workers should have a B-hCG check to exclude pregnancy.

Documentation

Maintain needle stick/sharps injury record, with details of PEP and other follow-up procedures to help in auditing such events, and also to see how to prevent such injuries in the future.

Follow-up

Ensure there is adequate follow-up of both healthcare provider and donor. They may need specific advice about having to take sick leave if medication is required and the possible requirement for psychological support.

B5. Safely dispose off infectious waste materials

Bedside area of every patient should have the following:

- 1 bucket with green liner
- 1 bucket with red liner and lid
- 1 sputum cup if needed
- 1 disinfected urine jug/urinal
- An adequately sized puncture resistant sharp container (yellow if possible) should be available at the nursing station, or as appropriate between the NICU beds.

Counseling of staff and parents as to the purpose of these buckets and containers is essential to run the system of segregation effectively. Without their cooperation, this simple system will not succeed.

Identification of the type of waste:

- General waste (recyclable and non-recyclable)
- Infectious waste
- Sharps waste

Segregation of Waste into Infectious and Non-Infectious at the Bedside**a. Green Bucket with Green Bag for General Waste (Non-Infectious)**

- Paper and packaging
- Foods, fruits and vegetables
- Juice and Food Boxes
- Injectables
- Glass bottles (but not broken glass)
- Plastic drips

Contents can be recycled or composted.

b. Red Bucket with Lid with Red Bag for Infectious Waste

- Human tissues
- Blood bags and all blood products
- Soiled bandages, gauze
- Urinary catheter tubing and bag, IV tubing
- Surgical drains and bags, NGT, ET tube
- Used IV and arterial catheters
- Diapers

Bag should be incinerated as it is.

c. Sharps Waste

- Needles
- Scalpels
- Knives
- Blades
- Broken Glass

Sharps waste should be incinerated together with the Sharps Box

General principles

- Easy access to supply of color-coded bags and containers
- Fill bags to maximum of 3/4 capacity.
- Do not put hands inside the bags / containers.
- Avoid the pressing of filled bag.
- The bags to be tied and handled by neck only while transportation.

- Staff must wear protective clothing, gloves, mask, aprons etc while handling infected waste.
- Never allow any person to put their hands inside the bags.
- If bags tear, they should be replaced / re-bagged in new clean bags

Primary Transportation of Buckets and Containers from the Bedside

- Primary transportation starts from patient bedside to primary storage area in the ward. However in some hospitals, there is only one general storage area for the entire hospital. Some hospitals do not have any storage area and the waste is directly taken to the disposal point (incinerator or burial site).
- Small wheeled trolley should be used for primary transportation.
- Trolley should be dedicated only to transportation of waste
- Trolley should be cleaned regularly

Primary storage area:

- Primary storage area is available in the premises of emergency room and can be a small room in a corner with good ventilation, if possible, and a door to the outside.
- Primary storage area should contain large bins with color coded liners
- Bin with red liner and lid for infectious waste
- Bin with green liner for general and non-recyclable waste
- Bin with white liner for general and recyclable waste

Bins may be any color but color coded bags / liners should be proper color. Bags should be used to maintain the segregation.

The waste of the green bucket should now be sorted into two categories in the primary storage area.

- Recyclable waste goes into the bin with the white liner
- Non-recyclable waste goes into the bin with the green liner

The waste of the red buckets or sharps container must NEVER be sorted.

Secondary Storage area:

From the primary storage area, waste should be transported in a dedicated trolley to the main secondary storage area of the facility from where waste is taken for final disposal.

Management of liquid waste

Drain liquid wastes (body fluids, etc) into the toilet. Decontaminate instruments such as bed pans after each use by using 0.5% Chlorine solution for at least 10 minutes.

B6. Be immunized against Hepatitis B

All healthcare providers (HCPs) should be screened and tested for antibodies to HBsAg at the time of employment and all medical students should be screened on their entry into clinical posting.

All those who have not received previous immunization against hepatitis B should be given the 3 dose vaccination. They should be followed up 3 months after the completion of the course to test the antibodies to HBsAG levels. Those who do not respond should be offered a fourth dose or a further 3 doses, depending on the antibody level.

Those who have been immunized earlier but have titers below 10 mIU/ml should be given a booster dose of HBV vaccination. They should also be followed up to test antibodies to HBsAg levels after completion of the vaccination course. Those who do not respond should be offered a fourth dose or a further 3 doses, depending on the antibody level.

Persistent non-responders should be informed about the need for HBIG within 48 hours of parenteral exposure to HBV.

Pregnancy should not be considered a contraindication to HBIG or HBV vaccination.

B7. Healthcare workers should not be part of the Intensive Care team they have a communicable disease or not immunized against HBV, rubella, measles and chicken pox.

Health care workers in NICU should be immune to rubella, measles and chicken pox in addition to hepatitis B immunization. Health care worker should not enter NICU if suffering from symptoms of diarrhea, upper respiratory infection, cold sores, fever blisters, any lesion on the genitals, irritating vaginal discharge, skin infection or pustular acne.

Suggested work restrictions for HCPs exposed to or infected with a communicable disease are described below and should be part of a good program of Occupational Health and Safety.

Disease	Work Restriction	Duration
Conjunctivitis	Restrict from patient contact.	Until discharge ceases.
Cytomegalovirus	No restriction.	
Diarrhoeal diseases	Restrict from patient contact and food handling.	Until symptoms resolve.
Diphtheria	Exclude from duty.	Until antimicrobial therapy completed and 2 cultures are negative.
Enteroviral Infections	Restrict from care of	Until symptoms resolve.

Disease	Work Restriction	Duration
	neonates, infants and the immunocompromised.	
Hepatitis A	Restrict from patient contact and food handling.	Until 7 days after onset of jaundice.
Hepatitis B	Do not perform exposure prone invasive procedures.	
Hepatitis C	Do not perform exposure prone invasive procedures.	
Herpes Simplex	If herpetic whitlow on hands, restrict from patient contact. If oro-facial, restrict from care of neonates and high risk patients such as the immunocompromised.	Until lesions heal.
HIV	Do not perform exposure prone invasive procedures.	
Measles	Exclude from duty if active disease.	Until 7 days after the rash appears.
Post-exposure (susceptible HCP)	Exclude from duty.	From 5 th day after first exposure through 21 st day.
Mumps	Exclude from duty if active disease.	Until 9 days after onset of parotitis.
Post-exposure (susceptible HCP)	Exclude from duty.	From 12 th day after first exposure through 26 th day after last exposure.
Pediculosis	Restrict from patient contact.	Until treated and free of adult and immature lice.
Pertussis		
Active	Exclude from duty	From beginning of catarrhal stage through 3 rd week after onset of paroxysms or until 5 days after start of antibiotics
Post-exposure (asymptomatic HCP)	No restriction but prophylaxis recommended.	
Post-exposure (symptomatic HCP)		Until 5 days after start of effective antibiotic therapy.
Rubella		

Disease	Work Restriction	Duration
Active	Exclude from duty.	Until 5 days after rash appears.
Post-exposure (susceptible HCP)	Exclude from duty.	From 7 th day after first exposure through 21 st day after last exposure.
Scabies	Restrict from patient contact.	Until cleared by medical evaluation.
<i>Staphylococcus aureus</i> infection		
Active, draining lesions	Restrict from patient contact and food handling.	Until healed and dry.
Carrier state	No restriction, unless HCP is epidemiologically linked to transmission of the organism.	
Streptococcal infection, Group A	Restrict from patient contact and food handling.	Until 24 hrs after antibiotic therapy.
Tuberculosis		
Active	Exclude from duty.	Until proven non-infectious with 3 negative sputum AFB smears.
PPD convertor	No restriction.	
Varicella		
Active	Exclude from all duty.	Until all lesions dry and crusted over.
Post-exposure (susceptible healthcare provider)	Exclude from duty.	From 10 th day after first exposure through 21 st day after last exposure.
Zoster	Cover lesions, restrict from care of high-risk patients.	Until all lesions dry and crusted over.
Post-exposure (susceptible HCP)	Restrict from patient contact.	From 8 th day after first exposure through 21 st day after last exposure.
Viral respiratory infection, acute febrile	Exclude from care of high risk patients during community outbreak of RSV	Until acute symptoms resolve.

Disease	Work Restriction	Duration
	and influenza.	

B8. Teach patients post delivery and post surgical care, including care of their newborns to prevent any potential infections.

Patients and their attendants need to be taught post delivery and post surgical care, which may range from basic personal hygiene to dealing with vaginal discharge, lochia, blood, etc.

Care of the newborn is also an important aspect, since admitted mothers are expected to nurse their babies who might be staying either next to them at the ward, or admitted in the nursery, if available. Post partum breast and perineal care and care of the umbilical cord stump, are other areas to be considered for patient education.

Post delivery instruction for mother should include the following:

- Early ambulation
- Perineal hygiene
- Restrict use of bedpan
- Use of hygienic sanitary towel and discourage use of self made towels

Newborn Instruction should include:

- Cord care with alcohol swab
- Clean dress

C. Maintain a Clean and Safe Environment

C1. Strictly implement Traffic Control/visitation policy

Guidelines for visits should be established to maximize opportunities for visiting and to minimize the risks of nosocomial spread of pathogens brought into the unit by these young visitors.

- Parents are educated about visitation policies prior to the birth of the infant.
- The parents, grandparents, or a designated support person and siblings of infants will be admitted to that area following NICU visiting protocols.
- **Sibling Visits:** No child with fever or symptoms of an acute illness, including an upper respiratory tract infection, gastroenteritis, or dermatitis, should be allowed to visit.
 - Siblings who recently have been exposed to a known communicable disease and are susceptible should not be allowed to visit. These interviews should be documented in the patient's record, and approval for each sibling visit should be noted.
 - Children should carefully wash their hands before patient contact.
- Visitors with active infections should be excluded from the area with the following exceptions:
 - Fathers with respiratory symptoms may wear a mask at the delivery but may not visit the baby in NICU. Other visitors with respiratory symptoms are excluded from visiting under any circumstances.
 - Parents and siblings may visit in the NICU with a mask IF the infant is in critical condition.
 - A mother (not father or sibling) with active (non-dried) herpes simplex 1 infection may have contact with the infant. She is to wear a mask and be educated on the importance of hand hygiene before contact with the infant. No facial contact should occur.

C2. Ensure Infrastructure Requirements for the NICU

Space

- Each infant care space in the Neonatal Intensive Care Unit should ideally contain a minimum of 11.2 square meters (120 square feet), excluding sinks and aisles.
- There shall be an aisle adjacent to each infant care space with a minimum width of 0.9 meters (3 feet).
- Traffic to other services shall not pass through the unit.

Ventilation

- Install HEPA filters as a routine. Mobile HEPA filters cost much less than other NICU equipment, and can be very helpful in maintaining air quality.
- A minimum of 6 air changes per hour is required for the NICU, with a minimum of 2 changes being outside air.



- The ventilation pattern shall inhibit particulate matter from moving freely in the space and intake and exhaust vents shall be situated as to minimize drafts on or near the infant beds.
- Ventilation air delivered to the NICU shall be filtered with at least 90 % efficiency.
- Fresh air intake shall be located at least 7.6 meters (25 feet) from exhaust outlets of ventilating systems, combustion equipment stacks, medical/surgical vacuum systems, plumbing vents, or areas that may collect vehicular exhausts or other noxious fumes.

Scrub Areas

- In the NICU, there should be at least 1 hands-free handwashing sink for 4 beds.
- In single bedroom, a hands-free handwashing sink shall be provided within each infant care room.
- Handwashing facilities that can be used by children and people in wheelchairs shall be available in the NICU.
- Sinks for handwashing should not be built into counters used for other purposes.
- Sink location, construction material and related hardware (paper towel, covered trash receptacle, and soap dispensers) should be chosen with durability, ease of operation and noise control in mind.
- Minimum dimensions for a handwashing sink are 61 cm wide X 41 cm front to back X 25 cm deep (24 in. X 16 in. X 10 in.) from the bottom of the sink to the top of its rim; so as to minimize splashing.
- Pictorial handwashing instructions should be provided above all sinks.
- Sinks should be designed so as to control splashing and avoid standing or retained water.
- Sinks should be scrubbed clean daily with a detergent.

Isolation Room(s)

- Isolation rooms adequately designed to care for airborne infection should be available in any hospital with an NICU. In most cases, this is ideally situated within the NICU; but, in some circumstances, utilization of an isolation room elsewhere in the hospital would be suitable.
- An area for handwashing, gowning, and storage of clean and soiled materials shall be provided near the entrance to the room.
- Isolation rooms should have a minimum of 13.94 sq metre (150 square feet) of clear space, excluding the entry work area. Single and multibedded configurations are appropriate based on use.
- Ventilation systems for isolation room(s) shall be engineered to have negative air pressure with air 100% exhausted to the outside. Air exhaust to outside the building do not need to be filtered but the exhaust vent needs to be away from air-intake vents, persons or animals.
- A hands-free two-way emergency communication system is required within the isolation room to connect to the outside.
- Remote physiologic monitoring of an isolated infant should be considered.

- Isolation rooms should have observation windows with blinds for privacy. Choice and placement of blinds, windows, and other structural items should allow for ease of operation and cleaning.

C3. Perform environmental cleaning twice daily.

Perform environmental cleaning twice daily and this should include damp dusting. Dry dusting and cleaning with Brooms is not allowed. Only use wet mop with decontaminant detergent solution

Follow Cleaning procedures for the environment and equipment properly

- Floors and routine housekeeping should be done when babies are out to mothers.
- Formalin and Phenolics are NOT to be used to clean any surface which will have direct contact with infants.
- Long-term care infants should be re-placed in clean incubators every 7 days.
- Diaper collection cans are lined with a plastic bag, emptied and cleaned on a regular basis.
- Appropriate Cleaning solutions should be selected:
 - Quaternary cleaner - for floors, walls, countertops, diaper cans, cribs, incubators, scales, and other infant contact equipment.
 - Appropriate cleaners - for plexiglass, stethoscopes, ophthalmoscopes
- The refrigerator should be defrosted weekly and spot checked daily.

Disposables

- Items marked disposable will not be reprocessed for another patient.
- If available use disposable single patient use of nebulizers, oxygen mask, suction catheters.

Refrigerator

- The refrigerators are used only for medication, expressed breast milk, and opened formula.
- The freezer in is used for expressed milk. Staff food is not mixed with patient food.

Laryngoscope Blades

The blades should be disinfected using HLD.

Feeding Supplies

Utensils and supplies used for milk are washed by parents with detergent after every use.

General Housekeeping

- Cleaning should be performed in the following order – patient areas, accessory areas and then adjacent halls.
- In the cleaning procedure, dust should not be dispersed into the air.
- Standard types of portable vacuum cleaners should not be used in the neonatal ICU or SCBU because particulate matter and microbial contamination in the room may be disturbed and distributed by the exhaust jet. Vacuum cleaners that discharge outside the patient care area (ie, central vacuum cleaning systems or portable vacuums) should be used so
- that only the cleaning wand, floor tool, and high-efficiency, particulate air filtered vacuum hose are brought into the patient care area.
- Once dust has been removed, scrubbing with a mop and a disinfectant/detergent solution should be performed. Mop heads should be machine laundered and thoroughly dried daily.
- Cabinet counters, work surfaces, and similar horizontal areas should be cleaned once a day and between patient use with a disinfectant/detergent and clean cloths; as they may be subject to heavy contamination during routine use.
- Friction cleaning is important to ensure physical removal of dirt and contaminating microorganisms.
- Surfaces that are contaminated by patient specimens or accidental spills should be carefully cleaned and disinfected.
- Walls, windows, storage shelves and similar non-critical surfaces should be scrubbed periodically with a disinfectant/detergent solution as part of the general housekeeping program.
- Sinks should be scrubbed clean at least daily with a detergent.

Check infrastructure, making sure that there is no crevices and cracks on floors, no seepage on walls, and no leakage from the roofs.

General Principles

- **Scrubbing (frictional cleaning)** is the best way to physically remove dirt, debris and microorganisms.
- **Cleaning** is required prior to any disinfection process because dirt, debris and other materials can decrease the effectiveness of many chemical disinfectants.
- Always progress **from the least soiled areas to the most soiled areas** and from **high to low areas**, so that the dirtiest areas and debris that fall on the floor will be cleaned up last.
- **Dry sweeping**, mopping and dusting should be avoided to prevent dust, debris and microorganisms from getting into the air and landing on clean surfaces.
- **Follow mixing (dilution) instructions** for disinfectants. Too much or too little water may reduce the effectiveness.
- **Written cleaning schedules** should be made.

Cleaning Methods



Make sure that the staff is educated about the frequency of cleaning, with the type of cleaning method used at each site, and for each type of equipment and surface.

Use wet mopping with:

- **Single-bucket (basin) technique:** One bucket of cleaning solution is used. The solution must be changed when dirty. The killing power decreases with the increased load of soil and organic material present.



- **Double-bucket technique:** Two different buckets are used, one containing a cleaning solution and the other containing rinse water. The mop is always rinsed and wrung out before it is dipped into the cleaning solution. The double-bucket technique extends the life

of the cleaning solution (fewer changes required), saving both labor and material costs.

Do Not Use Formaldehyde/Formalin

- Do not use disinfectant fogging (e.g., fumigation with dilute formaldehyde (formalin) solutions to reduce microbial contamination of environmental surfaces such as walls, ceilings and floors.
- It is not effective, is time-consuming (requires 24 hours) and the fumes are toxic (irritating to mucous membranes of the nose and eyes).

Scrubbing with a disinfectant and cleaning is a safer, quicker and more effective way to reduce microbial contamination on these surfaces.

Schedule and Procedures

Write up schedules and follow them closely. Develop schedules according to the needs of each area. Do not clean during visiting hours.

The detailed guideline is below.

Site, Areas, Equipment	Cleaning schedule and procedure
Walls, windows, ceilings and doors, including door handles	<ul style="list-style-type: none"> ▪ Spot clean when visibly dirty with a damp cloth, detergent and water. ▪ Usually, routine damp dusting is adequate; disinfection not required.
Chairs, lamps, tables, tabletops, beds, handrails, grab bars, lights, tops of doors and counters	<ul style="list-style-type: none"> ▪ Wipe daily and whenever visibly soiled with a damp cloth, containing disinfectant cleaning solution. ▪ Immediately disinfect when contaminated.
Noncritical equipment (e.g., stethoscopes and blood pressure cuffs)	<ul style="list-style-type: none"> ▪ Wipe daily and whenever visibly soiled with a damp cloth, detergent and water. ▪ If equipment visibly soiled with blood or other body fluids or the patient is under contact precautions, it should be cleaned AND disinfected before reuse.
Floors	<ul style="list-style-type: none"> ▪ Daily and as needed with a wet mop, detergent and water. ▪ Disinfectant needed, when contaminated. ▪ Mop should be disinfected and kept dry after use
Sinks	<ul style="list-style-type: none"> ▪ Scrub daily or more often as needed. ▪ Use SEPARATE mop, cloth, brush and disinfectant cleaning solution. ▪ Rinse with water.
Toilets and latrines	<ul style="list-style-type: none"> ▪ Scrub daily or more often as needed. ▪ Use SEPARATE mop, cloth, brush and disinfectant cleaning solution.
Patient rooms and wards	<ul style="list-style-type: none"> ▪ Clean daily and after patient discharge. ▪ Same cleaning process applies to rooms used for isolation. ▪ Keep SEPARATE cleaning equipment for isolation rooms, and disinfect and clean on a routine basis, if possible. ▪ If same equipment is to be used, clean and disinfect equipment used in isolation rooms, before being used in another room.
Procedure rooms connected to the emergency room	<ul style="list-style-type: none"> ▪ After each procedure and whenever visibly soiled, wipe horizontal surfaces, equipment and furniture with disinfectant cleaning solution. ▪ Clean blood or other body fluid spills.
Examination rooms	<ul style="list-style-type: none"> ▪ After each procedure and whenever visibly soiled, wipe horizontal surfaces, equipment and furniture with disinfectant cleaning solution. ▪ Ideally, linen on the examination table should be changed after each patient. ▪ Clean blood or other body fluid spills.
Curtains	<ul style="list-style-type: none"> ▪ Change and clean curtains according to the routine

	schedule and when visibly soiled.
Soiled linen	<ul style="list-style-type: none"> ▪ Collect soiled linen daily (or more often as needed) in closed, leakproof containers.
Waste	<ul style="list-style-type: none"> ▪ Collect waste from all areas at least daily, or more frequently as needed. ▪ Avoid overflowing.
Waste containers	<ul style="list-style-type: none"> ▪ Clean contaminated waste containers after emptying each time with proper precautions. ▪ Clean non-contaminated waste containers when visibly soiled and at least once a week. ▪ Use a disinfectant cleaning solution and scrub to remove soil and organic material.
Clinical Equipment that needs reusing	<ul style="list-style-type: none"> ▪ Thermometers should be washed with soap and water between each use. Do not immerse in spirit or dettol solutions. ▪ Tongue depressors should be washed with soap and water after each use. ▪ Wheelchairs and stretchers should be decontaminated and cleaned if soiled.

C4. Ensure appropriate use of chemicals in the NICU including antiseptics and disinfectants

USE CHEMICALS, INCLUDING ANTISEPTICS AND DISINFECTANTS APPROPRIATELY.

- **Antiseptics** are used on skin and mucous membranes (living surfaces).
- **Water based antiseptics** are used on mucosal membranes, while **alcohol based** are for skin.
- **Disinfectants** are meant to be used on instruments and surfaces (inanimate objects).
- **Antiseptics should not be used as disinfectants, and vice versa.**
- Disinfectants should never be used on skin, or on mucous membranes.
- There is a difference between disinfectants and High Level Disinfectants. Use both appropriately.

These products are NOT Disinfectants, and are only antiseptics. Do NOT use for disinfection:

- Acridine derivatives
- Cetrimide (Cetavlaon®)
- Chlorohexedine gluconate and cetrimide in various concentration (Savlon®),
- Chlorinated Lime and boric acid (Eusol®)
- Chloroxynelol in alcohol (Dettol®)
- Mercury compounds are not in common use now, and should be actively discouraged.

Alcohols and iodophors are disinfectants and NOT high-level disinfectants and should not be used for HLD purposes.

Glutaraldehyde and Formalin/Formaldehyde are extremely dangerous chemicals which are not to be used, and should be replaced with alternates. Also while their use is being phased out, proper usage is also necessary.

Remember:

- **Glutaraldehyde** (common tradename: Cidex) is carcinogenic, causes respiratory and skin irritation, and so it should not be used. Alternates are available, which should be explored for use for specific needs. Glutaraldehyde works best at room temperature, and will NOT WORK IN COLD ENVIRONMENTS (temperatures less than 20C/68F), even with prolonged soaking.
- FORMALDEHYDE IS NOT TO BE USED BECAUSE OF ITS DANGERS. IT SHOULD ALSO NEVER BE MIXED WITH CHLORINE OR CHLORINATED WATER because a dangerous gas (bis-chloromethyle-ether) is produced.
- Decontaminate, clean and dry all instruments and other items to be sterilized.
- Completely submerge items in a clean container filled with the chemical solution and place the lid on the container.

- Remove objects from the solution with sterile forceps; rinse all surfaces three times in sterile water and air dry. Ideally, three separate (sequential) rinse containers should be used.

C5. Ensure proper Cleaning & Disinfection of Patient Care Equipment

Incubators, Open Care Units & Bassinets

- When the incubators, open care units or bassinets are being cleaned and disinfected, all detachable parts should be removed and scrubbed meticulously.
- If the incubator has a fan, it should be cleaned and disinfected; the manufacturer's instructions should be followed to avoid equipment damage.
- The air filter should be maintained as recommended by the manufacturer.
- Mattresses should be replaced when the surface covering is broken, because such a break precludes effective disinfection or sterilization.
- Portholes and porthole cuffs and sleeves are easily contaminated, often heavily; cuffs should be replaced on a regular schedule or cleaned and disinfected frequently with freshly prepared mild soap or disinfectant solutions.
- Incubators not in use should be thoroughly dried by running the incubator hot without water in the reservoir for 24 hours after disinfection.
- Infants who remain in the nursery for an extended period should be transferred periodically to a different, disinfected unit so that the originally occupied unit can be cleaned.

Cleaning Respiratory Equipment

- Circuits of ventilators will be changed every 7 days by the respiratory therapist. Water for humidification is supplied by non-refillable containers which are replaced as needed.
- Cleaning is the act of removing visible organic residue (e.g., respiratory secretions) and inorganic salts from patient-care equipment. Proper cleaning is critical in that a hard, nonporous surface cannot be disinfected if it is not properly cleaned first. This includes getting into all small surfaces and lumens of respiratory equipment.
- Decontamination should be as per the manufacturer's guidelines.

Sterile Supplies

- Supplies and trays will be wrapped in plastic protective covers and kept in cabinets or on carts.
- Supplies will be checked by the Support Tech for outdates and are checked for damaged covers at the time of use.

Medications



- Multiple-use vials must be discarded after 72 hours, or earlier according to expiration date set by Pharmacy.

Clean Linen

- Linen is stored in a closed cabinet or on a covered cart.
- All infants will be supplied with linen supplies through the hospital laundry or brought clean from home.

Trash and Soiled Linen

- Diapers and other heavily soiled disposable items are disposed of in impervious plastic bags.
- Soiled linen is transported to the Soiled Hold and Laundry in an impervious plastic bag.

C6. Properly Maintain Clean and Soiled Neonatal Linen

Clean Linen

- Procedures for laundering, making up packs and delivering linen to the nursery should be established by the medical, nursing, laundry and administrative staffs of the hospital.
- Each delivery of clean linen should contain sufficient linen for at least one 8-hour shift.
- Linen should be cleaned and transported in covered carts or laundry bags to the nursery areas.
- No new garments or linen should be used for neonates without prior laundering.

Soiled Linen

- An established procedure for the disposal of soiled linen should be strictly followed.
- Chutes for the transfer of soiled linen from patient care areas to the laundry are not acceptable unless they are under negative air pressure.
- Soiled linen should be discarded into bags that prevent leakage.
- Sealed bags of reusable, soiled nursery linens should be taken to the laundry at least twice each day.
- Impervious bags of soiled diapers (reusable or disposable) and other linen should be sealed and removed from the nursery at least every 8 hours.
- All personnel should be aware that **handling dirty diapers with bare hands can result in heavy contamination** and transient colonization of the hands with microorganisms that cannot be easily eliminated with hand-washing and can be readily transmitted to the next neonate for whom they provide care.

Precautions in using Washing Agents for Linen

- The chemicals trichlorocarbanilide or sodium salt of pentachlorophenol should not be used in hospital laundering because they may be harmful.

- To avoid the hazards associated with the use of such chemicals or enzymes in the hospital laundry, the physician in charge should be aware of all agents in use and should be informed before any changes are made in laundry chemicals or procedures.
- Caution should be exercised when new laundry or cleaning agents are introduced into the nursery or when procedures are changed.

C7. Handle spills of infectious material correctly

Ensure that cleaning of spills of blood, body fluids and other potentially infectious fluids is IMMEDIATE, with trained personnel. Any incident involving patients that need or needed potential isolation measures, or suspected outbreak should be efficiently reported.

In the event of a spill, the following spill clean-up procedure should be used:

For small spills

- Wear utility or examination gloves
- Remove visible material using a cloth soaked in a 0.5% chlorine solution
- Wipe clean with a disinfectant cleaning solution.

For large spills

- Cordon off the area so that patients and staff do not accidentally step on the spill.
- Wear utility gloves and protective clothing, including face and eye protection if indicated.
- Contain the spill with cloth or paper towels or any absorbent material. Use an appropriate disinfectant (0.5% Chlorine solution) over the paper towels (absorbent material) and the immediate surrounding area.
- Apply disinfectant concentrically beginning at the outer margin of the spill area, working toward the centre.
- Mop up the solution.
- After the appropriate amount of time (e.g. 30 min), clear away the materials.
- Do not use hands for collection of glass and other materials. If there is broken glass or other sharps involved, use a dustpan or a piece of stiff cardboard to collect the material and deposit it into a puncture-resistant container for disposal.
- Disinfect the area of the spillage.
- Clean as usual with detergent and water.

C8. Protect mattresses and pillows with plastic, waterproof covers.

Clean and disinfect the cover regularly as part of a routine. Rinse thoroughly and dry. If there has been an infected patient, disinfect with a disinfectant solution, allow 2 minutes contact time then rinse and dry. Inspect mattresses routinely for damage.

C9. Avoid sharing of linen and blankets between patients

Linen and blankets should be laundered between patients. Launder in hot water (70 degrees to 80 degrees) OR soak in clean water with bleaching powder 0.5% for 30 minutes. Wash again with detergent and water to remove the bleach.

C10. Only have single patient use for nebulizers, oxygen mask

If masks and nebulization kit/lines have to be reused, then first decontaminate with 0.5% Chlorine solution, followed by washing with detergent, and rinsing with water. Dry with sterile gauze. Re-fill with sterile water only.

C11. Humidifiers, attached to flow meters, should be disinfected between patients

Clean and disinfect device with 0.5% bleach between patients and fill with distilled water which must be changed every 24 hours or sooner, if necessary.

C12. Use new suction catheters and regularly clean suction bottle with hot water and detergent between patients

Following use, the reservoir should be emptied, washed with hot water and detergent and stored when dry. Wear a plastic apron and non-sterile disposable gloves for this procedure.

C13. Do not place patient files on the bed

The immediate environment of the patient is heavily contaminated with microorganisms. Files must not be placed on the bed of the patient, since they will become contaminated with microorganisms and then spread through the hands of the many healthcare providers. Files should be stacked in a file trolley or on a holder behind the patient bed.

Monitoring Tool for Nursery/NICU

Emergency room:

Date: __/__/__

1	Hand Hygiene	YES	NO	Comments
	Health care provider observed: Designation:			
	Hand hygiene prior to clinical procedure/examination			
	Hand hygiene after clinical procedure/examination			
	Staff nails short and clean			
	Handwashing sink available			
	<ul style="list-style-type: none"> • Running water available 			
	<ul style="list-style-type: none"> • Soap available 			
	<ul style="list-style-type: none"> • Hand Drying Method: towel paper air-dry 			
	Hand rub available			
	<ul style="list-style-type: none"> • Alcohol rub at point of patient care 			
	<ul style="list-style-type: none"> • Ratio of rub to patient :_____ 			
	<ul style="list-style-type: none"> • Alcohol rub dispenser filled 			
	<ul style="list-style-type: none"> • Dispenser in working order 			
2	Personal Protective Equipment	YES	NO	
	PPE readily available			
	Health care provider observed: Designation:			
	Wearing gloves when handling blood and body fluids			
	Gloves removed after task completed			
	Hand hygiene after removal of gloves			
	HCP does not go from one patient to another with same gloves			
	Wearing gowns when splashing/soiling likely to occur			
	Gown removed after task completed			
	HCP does not go from one patient to another with same gown			
	Goggles/Eye wear worn when indicated			

	Caps worn when indicated			
	Wearing N95 mask for TB patients			
	Paediatric Considerations being Observed			
	Gloving for diaper change			
	Gloves changed for each patient			
	Children with infectious disease in private rooms			
	Children with isolation prevention precautions are not allowed in common use areas			
	Transmission based Precautions being adhered to for different categories of patients			
	Feeding guidelines for breastmilk being followed			
	Feeding guidelines for formula being followed			
	Perinatal Precautions			
	Baby received onto a warm, clean and dry towel/cloth and place on mother's chest			
	Umbilical cord cut and Clamped with sterile instruments			
	Baby immediately dried			
	Ensure that the airway is clear			
	Mother initiates exclusive breastfeeding			
	Both the eyes with sterile gauze			
	Clean cloth used as a diaper			
	Mother educated on signs of infection			
3	Prevention of Blood Stream Infections	YES	NO	
	Date and time of insertion of Peripheral Venous catheter (PVC) written on tape			
	PVC inserted for less than 72 hours			

	Signs of phlebitis present			
	Date and time of insertion of Central Venous Catheter (CVC) written on tape			
	Dressing of CVC clean			
4	IV injections and lines	YES	NO	NA
	Needle left inserted into multidose vial or fluid bag			
	New single use needle and syringe to draw up med			
	New single use needle and syringe to inject med			
	Needle/syringe discarded safely			
	Saline from same drip shared between patients			
5	Prevention of Urinary Tract Infection	YES	NO	
	Date and time of insertion of urinary catheter noted			
	Is urinary catheter bag touching floor			
6	Emptying of urinary bag (direct observation)	YES	NO	
	Who performs emptying usually:			
	Hand hygiene before opening tap			
	Jug single patient used			
	Jug disinfected after each use			
	Catheter bag draining in garbage can			
	Where is the urine emptied:			
7	Sampling of urine: (Ask to demonstrate)	YES	NO	
	Urine collected from bag			
	Tubing disconnected to collect urine			
	Urine aspirated with sterile needle/syringe			
8	Implementation of Infection Control Precautions	YES	NO	
	What is ratio of isolation rooms to hospital beds: 1: __			

	Are patients with MDRO on contact precautions			
	Are TB patients on airborne precautions(N95 available)			
	Is TB patient transported wearing surgical mask			
	Does hospital have a Needle Stick Injury Policy			
	Is there a needle stick injury record being kept, with details of PEP and other follow-up procedures?			
9	Cleaning of the Ward and Attached Rooms	YES	NO	
	Written schedule is displayed in local language			
	Schedules are followed by the cleaning staff			
	Spills are appropriately and promptly handled by the staff			
	Formaldehyde is strictly prohibited in patient areas			
	Floor Clean			
	Blood stains not seen			
	Mop disinfected by bleach prior to use			
	Which Cleaning and Disinfectant agent used:			
	Patient furniture clean			
	Damp dusting			
	Linen clean			
10	Waste Collection	YES	NO	
	Waste segregated into infectious and non infectious?			
	Sharp containers available			
	Sharps container appropriate			
	Plastic waste is collected separately			
	Plastic waste is decontaminated at point of use			
	Pathologic waste is collected in the red bin			
	Waste collection is understood as a hazardous exercise and personnel use PPE			
	Hand decontamination and PPE cleaning is observed after collection			

	Red and green bags are tied when 3/4 th full			
	Collection of bags is prompt and on schedule			
	Nurses and paramedical staff observe their duties related to waste collection			
	Containers are decontaminated daily			
	Containers are not left on the floor			
	Incidents related to sharps or any injuries during waste collection are reported			
11	Patients are educated on post partum issues that could potentially cause infections			
12	Other Infection Control Measures	YES	NO	
	Clinical waste containers close to patient area			
	Oxygen masks single patient use			
	Nebulizer single patient use			
	Oxygen humidifier water sterile and changed daily			
	Humidifier containers disinfected between patients			
	Ambu bag disinfected			
	Alcohol swab freshly prepared daily			
	Equipment disinfected between patients			
	Oral thermometer single patient use			
	Healthcare workers checked for communicable disease and immunization against HBV, rubella, measles and chicken pox.			
	Traffic control policy implemented			
	Infrastructure requirements			
	Spacing of neonates adequate			
	Ventilation: HEPA installed			
	HEPA maintenance as per schedule			
	Scrub areas have 1 handwashing sink for every 4 beds			
	Handwashing sink in each single room			

	Faucets elbow or foot operated			
	Pictorials displayed for staff and patients			
	Supplies for hand washing available			
	Sinks not being used for any other purpose such as washing of clothes, diapers, etc			
	Appropriate Chemical Use			
	Glutaraldehyde not being used			
	Formalin not in use			
	Appropriate use of disinfectants			
	Appropriate use of antiseptics			
	Maintaining Linen			
	Linen sufficient for 8 hour shift			
	Linen available for emergency events			
	Soiled linen procedure written and displayed in NICU			
	Soiled linen collection procedure taught and practiced by relevant staff			
	Soiled linen not being sorted inside NICU			
	Soiled linen collected and transported in sealed bag/s or containers			
	Separate trolley for soiled and clean linen			
	Trolleys being used appropriately, not to mix both linen			
	Appropriate Washing agents selected for linen washing			
	Linen and blankets not shared between patients			
	Linen and blankets washed between patients			