Infection control protocol in Intensive Care Unit

Increased risk is associated with:

- The severity of the patient's illness and underlying conditions.
- The exposure to multiple invasive devices and procedures.
- Increased patient contact with health-care personnel.
- A longer ICU stay which prolongs the risk of exposure.
- Space limitations that increase the risk of contaminating equipment

- Since patients in the ICU are likely to have multiple devices for treating or monitoring their care, it is not surprising that the most common nosocomial infections are pneumonia (endotracheal tubes), urinary tract infections (urinary catheters) and catheter-related blood stream infections.
- Urinary catheter, ventilator-associated, and catheter-associated bloodstream infection are common complications of care provided in the ICU.
- Attributable mortality for pneumonia occurring in the ICU population is between 5 – 14%.

Sources of Cross-Infection in the ICU

- Hands of staff and attendants (via two-bowl
- handwashing and communal towels or no
- handwashing);
- Assisted ventilation equipment;
- Suction and drainage bottles;
- I.V. lines – central and peripheral;
- Urinary catheters;
- Wounds and wound dressings;
- Disinfectant containers;
- Dressing trolleys (on which disinfectants jars/bottles are stored)

The inanimate environment is a reservoir of pathogens

~ Contaminated surfaces increase cross-transmission ~

Strategies to Reduce Infection Risk

I- Patients needing ICU care should be assessed for.

II- Hand hygiene.

III- Procedures requiring aseptic technique (Intravenous Therapy, Urinary Catheterization & Respiratory Care Equipment /Practices).

IV-ICU Personnel

Strategies to Reduce Infection Risk

I- Patients needing ICU care should be assessed for:

- Diarrhea,
- Rashes or skin conditions;
- Recognized communicable disease;
- Known carrier of an epidemic strain of bacterium;
- Isolation: Patients suspected or known to have communicable diseases should be admitted directly to an isolation cubicle in the ICU or referred to a Fever Hospital.

II- Hand hygiene:

- Hands are the most common vehicle of transmission of organisms and therefore sinks should be provided for handwashing.
- All visitors and staff should wash their hands before direct contact with patients.
- Aseptic hand wash or alcohol based hand rub should be performed:
  - Before entering the ICU.
  - Before performing any invasive procedure inlcuding peripheral cannula Insertion and removal.
  - Before use of multidose vials.
  - Before adminstration of iv fluids or medications/drugs
  - Routine hand wash should be performed:
  - Before and after any contact with the patient
  - After touching environmental surfaces
  - Whenever soiled.

III- Procedures requiring aseptic technique (Intravenous Therapy, Urinary Catheterization & Respiratory Care Equipment /Practices)

A) IV care practices.

B) Respiratory care - Patient-Based Interventions.

C) Personal protective equipment for routine patient care.

III- Procedures requiring aseptic technique (Intravenous Therapy, Urinary Catheterization & Respiratory Care Equipment /Practices)

A) IV care practices

- Clean injection ports with 70% alcohol or an iodophor before accessing
- the system.
- Cap all stopcocks when not in use.
- Use aseptic technique including a cap, mask, sterile gown, sterile gloves,
- and a large sterile sheet for the insertion of central venous catheters
- (including PICCs) or guidewire exchange.
- Do not routinely replace central venous catheters, hemodialysis catheters,
- or pulmonary artery catheters.
- Do not remove CVCs or PICCs on the basis of fever alone. Use clinical judgment regarding the appropriateness of removing the catheter if infection is evidenced elsewhere or if a noninfectious cause of fever is suspected.
- Do not routinely replace peripheral arterial catheters.

B) Respiratory care - Patient-Based Interventions:

- If there is no medical contraindication, elevate the head of the bed of a patient at high risk for aspiration pneumonia, e.g., a person receiving mechanically assisted ventilation and/or who has an enteral tube in place, at an angle of 30-45 degrees.
- Periodically drain and discard any condensate that collects in the tubing of a mechanical ventilator, taking precautions not to allow condensate to drain toward the patient. Decontaminate hands with soap and water or a waterless antiseptic agent after performing the procedure or after handling the fluid.
- If available, use an endotracheal tube with a dorsal lumen above the endotracheal cuff to allow drainage (by continuous suctioning) of tracheal secretions that accumulate in the patient's subglottic area.

- Use sucralfate, H2-blockers, and/or antacids interchangeably for stress-bleeding prophylaxis in a patient receiving mechanically assisted ventilation (H2-blockers alone decrease gastric acidity and increase gastric colonization and increases the susceptibility to respiratory infections).
- Instruct preoperative patients, especially those at high risk of contracting pneumonia, regarding taking deep breaths and ambulating as soon as medically indicated in the postoperative period. High-risk patients include those who will have an abdominal, thoracic, head, or neck operation or who have substantial pulmonary dysfunction.

- Follow manufacturers' instructions for use and maintenance of wall oxygen humidifiers .
- Between patients, change the tubing, including any nasal prongs or mask used to deliver oxygen from a wall outlet.
- Small-volume medication nebulizers: "in-line" and hand-held nebulizers: Between treatments on the same patient, disinfect; rinse with sterile or pasteurized water; and air-dry small-volume in-line or hand-held medication nebulizers.

- Use only sterile or pasteurized fluid for nebulization and dispense the fluid into the nebulizer aseptically.
- If multidose medication vials are used, then handle, dispense, and store them according to manufacturers' instructions using sterile techniques.

C) Personal protective equipment for routine patient care

- Gloves: should be selected according to need.(e.g., sterile for procedures using aseptic technique such as insertion of central venous catheter and non-sterile for procedures such as emptying urinary drainage bags, insertion of peripheral IV catheters, contact with contaminated surfaces or equipment);
- Wear gloves for handling respiratory secretions or objects contaminated with respiratory secretions of any patient.

- Change gloves and decontaminate hands, as above:
  - Between contacts with different patients.
  - After handling respiratory secretions or objects contaminated with secretions from one patient.
  - Before contact with object, or environmental surface.
  - Between contacts with a contaminated body site and the respiratory tract of, or respiratory device on, the same patient.

- Wear a gown :When exposure to respiratory secretions from a patient is anticipated, and change it after soiling occurs and before providing care to another patient.
- Plastic aprons may be worn when contact with patient body fluids is anticipated;
- Disposable high-efficiency filter masks may be used for wound care.
- Shoe and head coverings are not required for routine care

IV- ICU Personnel

- All staff working on the unit should be offered hepatitis B vaccine before beginning work on the unit .
- Orientation to the unit should include basic infection control concepts that include hand hygiene, management of sharps, and associated risks of disease transmission.
- Training and education should include formal and informal infection control lectures and assessment of practices through periodic observations.

Environment Factors and Design Issues for the ICU

Unit Design should consider the following

- **Space**
- **Ventilation**
- **Traffic flow**
- **Visitors**
- **Non-ICU Staff**

I- Space

- **Beds**
  - The beds should be 2.5 - 3 meters (7-9 feet) apart, to allow free movement of staff and equipment, reducing risk of crosscontamination.
  - Ideally, a sharps container should be within easy access of each bed.
- **Partitions**
  - Privacy partitions should be of material that is easily cleaned and should be cleaned weekly and any time that it becomes soiled or contaminated. If curtains are used, they should be changed weekly and between patients.
- **Toilets**
  - May be located outside the ICU.

- **Medication preparation**
  - Medication prep areas should be separate from patient care areas and should be maintained as a clean area.
- **Clean storage**
  - An area should be identified and maintained for clean storage and should be separate from care and waste disposal areas.
- **Soiled and waste storage**
  - An area should be identifed for storing collected bedside waste and should be maintained separate from direct care and clean medication areas. Ideally, this area should have a clinical sink for the disposal of blood and body fluid waste. The area should include storage of filled sharps containers until these containers can be removed.

II- Ventilation

- **Type**
  - The source of clean air should be determined including central or through-the –wall air conditioning units.
- **Windows**
  - Windows should remain closed in order to control all airborne risks; plants and flowers should be kept outside the ICU.
- **Sinks and Waterless Handrub Dispensers**
  - Sinks should be placed near the ICU entrance and If this is not feasible, waterless handrub dispensers should be available at the ICU entrance and at each bedside. If the design permits scrub sinks.
  - An adequate number of easily accessible Elbow/Foot operated sinks should be available. Sinks should not be plugged or used for storage.
  - Sinks assigned for handwashing should not be using for washing instruments.

III- Traffic flow

- The unit may be situated close to the operating theatre and to the emergency department for accessibility, but should be separate from the main ward areas.
- Policies should consider controlling traffic flow to and from the unit in order to reduce sources of contamination from visitors, staff and equipment.

IV- Visitors

- Design of the unit should permit staff to assess visitors for communicable disease (eg, rash, respiratory infection) before permitted to enter unit.
- They should be instructed in washing their hands if assisting the patient.

V- Non-ICU Staff

Staff not assigned to the ICU should follow the following protocol:

- Street coats and white coats must be removed;
- Hands should be washed on entering the ICU and before leaving the unit.
- The proper procedure should be followed when attending the patient

Patient Care Equipment

Equipment and patient-care articles	Reprocessing Method
1. Ventilatory circuits	• Disposable tubing does not routinely need to be changed for a single patient unless it becomes visibly contaminated, malfunctions or within 3-4 days. • Multiple-use tubing must be heat-disinfected for a at least 76°C for 30 minutes or sterilized • If properly maintained, a ventilated patient may use the same circuit for 3-4 days before reprocessing becomes necessary. • Use a heat-moisture exchanger (HME) to prevent pneumonia in a patient receiving mechanically assisted ventilation. Change the HME when it malfunctions mechanically or becomes visibly soiled. • Do not *routinely* change an HME more frequently than every 48 hours. Install filters, e.g. heat-moisture exchangers with filters (HMEF) on the expiratory and inspiratory ends of the ventilator to prevent contamination

Patient Care Equipment

Equipment and patient-care articles	Reprocessing Method
2. Endotracheal suction catheters	• Closed suction catheters that incorporate a protective sleeve do not need to be changed every 24 hours. Studies have demonstrated these can safely be used on the same patient until the device is contaminated or malfunctions. • More often, disposable suction catheters are used for respiratory tract suctioning. This device should be discarded after each use or may be used maximum for up to 6 hours on the same patient. • The water used for flushing the catheter after each suction must be sterile and changed every time. • Suction catheters must not be shared between patients.

Patient Care Equipment

Equipment and patient-care articles	Reprocessing Method
3. Endotracheal tubes	• These may be recycled after thorough cleaning and autoclaving. • Disposable endotracheal tubes are available but are more expensive than recyclable ones.
4. Ambu-bags	These are used for resuscitation. Ambu-bags are extremely difficult to disinfect and become contaminated very quickly: • Heat is the most reliable method of disinfection; 2% glutaraldehyde is a less acceptable method. • The bags must be rinsed thoroughly in sterile water after immersion in glutaraldehyde. This will reduce the risk of chemical irritation, which can itself precipitate respiratory infection.
5. Oxygen delivery masks	These can be disposable or reusable; • Wash thoroughly. • Soak in alcohol for 10 minutes or soak in chlorine (500 ppm), rinse, dry and store.

Patient Care Equipment

Equipment and patient-care articles	Reprocessing Method
6. Suction and drainage bottles	These are usually disposable, with a self-sealing inner container held in a clear plastic outer container. Non-disposable bottles: • Must be changed every 24 hours (or sooner if full). • The contents may be emptied down the toilet. • Must be rinsed and autoclaved. • Do not leave fluids standing in suction bottles.
7. Resuscitaires	• Disconnect all connections. • Wash thoroughly with a soft brush and autoclave.

Patient Care Equipments sterilization

Method	Equipment and patient-care articles
Low temperature	•ETO gas (~15 h) and hydrogen peroxidegas plasma (~50 min)forHeat-sensitive Patient Care Equipment
Liquid immersion	. Chemical sterilants:a 2.4% glut (~10 h), 1.12% glut and 1.93% phenol(12 h), 7.35% HP and 0.23% PA (3h), 7.5% HP (6 h), 1.0% HP and0.08% PA (8 h), and 0.2% PA(~50 min at 50C–56C)for (respiratory-therapy equipment)& (GI endoscopes and bronchoscopes)
High temperature	Steam (~40 min) and dry heat (1–6 h, depending on temperature) For (surgical instruments)

ETO, ethylene oxide; ; glut, glutaraldehyde; HP, hydrogen peroxide; PA, peracetic acid; OPA, ortho-phthalaldehyde

Environmental Cleaning

- **Daily**
  - Cleaning must be done daily with the hospital approved cleaner. All surfaces must be wiped with a damp cloth to remove dust and dirt;
  - Cleaner/disinfectants should be identified by the IC- team and used as indicated. High level disinfectants (HLD) are not used for environmental cleaning.
  - Cleaner/disinfectants should be kept closed when not in use.
- **Terminal**
  - When patients are discharged from the unit, a thorough cleaning of the bed and bedside equipment must be completed before admitting new patients.
- **Scheduled**
  - A total cleaning of all areas, including the store clean and soiled storage areas , should be done at least every 1-2 weeks.
  - Separate mops, and cleaning utensils should be used for cleaning of the unit.
  - Cleaning equipment should be wiped and properly stored when not in use.

Thank you