PREVENTION OF URINARY TRACT INFECTION

IPC.5.a Definition

Urinary tract infections (UTIs) are the infections of the urethra, bladder, ureters, or the kidneys, which comprise the urinary tract. When it afffects the lower urinary tract, it is known as a simple cystitis (a bladders infection) and when it afffects the upper urinary tract it is known as pyelonephritis (a kidney infection).

An indwelling urinary catheter is present within 48 hrs before urine is cultured and patient has history of (h/o) fever (> 38.3°C) urgency, frequency, dysuria, or suprapubic tenderness AND has urine culture of $\geq 10^5$ organisms /ml urine with no more than two species or organisms.

Urinary tract infections (UTI) are defined using Symptomatic Urinary Tract Infection (SUTI) criteria and Asymptomatic Bacteremia UTI (ABUTI).

Indications for insertion of urinary catheter

1. Patient has acute urinary retention of bladder outlet obstruction
2. Need for accurate measurements of urinary output in critically ill patients
3. Preoperative use for selected surgical procedures:

- Patients undergoing urologic surgery or other surgery on contiguous structures of the genitourinary tract
- Anticipated prolonged duration of surgery (catheters inserted for this reason should be removed in the post anesthetic care unit itself)
- Patients anticipated to receive large-volume infusions or diuretics during surgery
- Need for intra operative monitoring of urinary output

4. To Assist in healing of open sacral or perineal wounds in incontinent patient
5. Patient requiring prolonged immobilization (e.g., potentially unstable thoracic or lumbar spine, multiple traumatic injuries such as pelvic fractures)
6. To improve comfort for end of life care if needed

PREVENTION OF CA-UTI

Avoid indwelling catheters

- As a substitute for nursing care of the patient with incontinence.
- As a means of obtaining urine for culture or other diagnostic tests when the patient can voluntarily void

- For prolonged postoperative duration without appropriate indications (e.g. structural repair of urethra or contiguous structures, prolonged efffect of epidural anesthesia, etc.)

Proper insertion techniques

- Perform hand hygiene immediately before and after insertion or any manipulation of the catheter device or site.
- Ensure that only properly trained persons who know the correct techniques of aseptic catheter insertion and maintenance are given this responsibility.
- Insert urinary catheters using aseptic technique and sterile equipment using sterile gloves, drape, sponges, an appropriate antiseptic or sterile solution for per urethral cleaning, and a single- use packet of lubricant jelly for insertion.
- Properly secure indwelling catheters after insertion to prevent movement and urethral traction.
- Antiseptic solution/ sterile water will be used to clean per urethral cleaning prior to catheter insertion.

PROPER MAINTENANCE TECHNIQUES

- Following aseptic insertion of the urinary catheter, maintain a closed drainage system.

- If breaks in aseptic technique, disconnection, or leakage occur, replace the catheter and collection system using aseptic technique and sterile equipment.
- Maintain unobstructed urine fow.
- Keep the catheter and collecting tube free from kinking.
- Keep the collecting bag below the level of the bladder at all times. Do not rest the bag on the foor.
- Empty the collecting bag regularly using a separate, clean collecting container for each patient; avoid splashing, and prevent contact of the drainage spigot with the no sterile collecting container.
- Use Standard Precautions, including the use of gloves as appropriate, during any manipulation of the catheter of collecting systems.
- Unless clinical indications exist do not use systemic antimicrobials routinely to prevent CAUTI in patients requiring either short or long-term catheterization.
- Do not clean the peri-urethral area with antiseptics to prevent CAUTI while the catheter is in place. Routine hygiene (e.g. cleansing of the meatal surface during daily bathing or showering) is appropriate.
- Routine instillation of antiseptic or antimicrobial solutions into urinary drainage bags is not recommended.

- Clamping indwelling catheters prior to removal is not necessary however in certain condition intermittent clamping of catheters may be practiced as per the physicians orders
- Routine irrigation of bladder with antimicrobials is not recommended.
- Unless obstruction is anticipated (e.g. as might occur with bleeding after prostatic or bladder surgery) bladder irrigation is not recommended.
- **Catheter material:** Silicone might be preferable to other catheter materials to reduce the risk of encrustation in long- term catheterized patients who have frequent obstruction.

Specimen collection

- Prevention of contamination by normal vaginal, perineal and anterior uretheral flora is very vital.
- Collect sample in sterile sample collection bottle.
- Mid-stream urine or clean catch urine is collected. Whenever possible, urine specimen should be collected in the morning, before the patient has voided urine.

Specimen collection from catheter

- Wash hands and prepare equipments

- Clamp the catheter for few minutes (approximately for 2 minutes)
- Clean the aspiration port with antiseptic solution
- Aspirate required amount of sample
- Unclamp the catheter

PREVENTIVE STRATEGIES FOR URINARY CATHETER RELATED INFECTIONS

- Catheterize only if absolutely necessary
- Reduce the duration of catheterization
- Closed drainage
- Ensure dependent drainage
- Use of systemic antimicrobials: Only if patient is symptomatic and culture suggests UTI
- Remove catheters as early as possible

PREVENTIVE BUNDLE FOR CAUTI

1. Aseptic precautions - Hand Hygiene
2. Secure the catheter
3. Uro bag below the bladder/waist level
4. Empty the bag frequently

5. Closed sterile drainage circuit/continuous system of drainage
6. Daily review of catheter site
7. Early removal of catheter

NURSES RESPONSIBILITY IN PREVENTION OF UTI

- Nurses should encourage ongoing hydration to reduce urinary stasis and flush the urinary tract.
- The drainage bag should be emptied at least every 4th hourly or when the bag is 2/3rd full whichever is earlier provided there are no standing orders otherwise.
- In order to avoid cross- contamination, staf should wear gloves and use proper hand washing when handling catheters.
- The practice and promotion of hand hygiene is very essential and forms the core of prevention of CAUTI.
- Use if standard precautions with consistent use of aseptic techniques during manipulation of catheters are strongly advised and the catheters should be secured properly.
- The urine collection bag should always be kept below the bed level and if at all it is to be raised in some unavoidable instances (e.g. shifting of patient, positioning of patient) make sure it is clamped and the lid of the collection bag should always be kept closed.

- Patient education plays an important role in making the patient aware of the importance of continuing with safe practices even at home.
- Removal of unnecessary catheters Use of bundle strategies for infection prevention

Criterion	Urinary Tract Infection (UTI)
	Symptomatic UTI (SUTI) Must meet at least ***one*** of the following criteria:
SUTI 1a **Catheter-associated Urinary Tract Infection (CAUTI)**	Patient must meet 1, 2, and 3 below: 1. Patient had an indwelling urinary catheter that had been in place for > 2 days on the date of event (day of device placement = Day 1) AND was either: • Present for any portion of the calendar day on the date of event†, OR • Removed the day before the date of event‡ 2. Patient has at least ***one*** of the following signs or symptoms: • fever (>38.0°C) • suprapubic tenderness* • costovertebral angle pain or tenderness* • urinary urgency ^ • urinary frequency ^ • dysuria ^ 3. Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of ≥10^5 CFU/ml (See Comment Section on page 7-8). All elements of the UTI criterion must occur during the Infection Window Period (See Definition Chapter 2 Identifying HAIs in NHSN). † When entering event into NHSN choose "INPLACE" for Risk Factor for Urinary Catheter ‡ When entering event into NHSN choose "REMOVE" for Risk Factor for Urinary Catheter *With no other recognized cause (see Notes below) ^ These symptoms cannot be used when catheter is in place **Notes:** • An indwelling urinary catheter in place could cause patient complaints of "frequency" "urgency" or "dysuria" and therefore these cannot be used as symptoms when catheter is in place. • Fever is a non-specific symptom of infection and cannot be excluded from UTI determination because it is clinically deemed due to another recognized cause.

HIC.4.b

Intubation procedure:

- Preoxygenate with 100% oxygen to provide apneic or distressed patient with reserve while attempting to intubate.
- Do not allow more than 30 seconds to any intubation attempt.
- If intubation is unsuccessful, ventilate with 100% oxygen for 3-5 minutes before a reattempt.

Volume and pressure ventilation

Volume ventilation: Volume is constant and pressure will vary with patient"s lung compliance.

Pressure ventilation: Pressure is constant and volume will vary with patient"s lung compliance.

Initial settings:

- Select your mode of ventilation
- Set sensitivity at Flow trigger mode
- Set Tidal Volume
- Set Rate
- Set Inspiratory Flow (if necessary)

- Set PEEP
- Set Pressure Limit

Humidification

Post initial settings:

Obtain an ABG (arterial blood gas) about 30 minutes after you set your patient up on the ventilator.

Goal:

Keep patient's acid/base balance within normal range:

- pH 7.35 – 7.45
- PCO_2 35-45 mmHg
- PO_2 80-100 mmHg

PREVENTION OF VAP

- Avoid cross-contamination by FREQUENT HANDWASHING
- Decrease risk of aspiration (cuf occlusion of trachea, positioning, use of small-bore NG tubes)
- SUCTION only when clinically indicated, using STERILE TECHNIQUE

- Maintain closed system setup on ventilator circuitry and avoid pooling of condensation in the tubings.
- Ensure adequate nutrition
- Neutralization of gastric contents with antacids and H2 blockers

Plan of care for the ventilated patient

Patient Goals:

- Patient will have efffective breathing pattern.
- Patient will have adequate gas exchange.
- Patient's nutritional status will be maintained to meet body needs
- Patient will not develop a pulmonary infection.
- Patient will not develop problems related to immobility.
- Patient and/or family will indicate understanding of the purpose for mechanical ventilation.

ROLE OF A NURSE:

- Observe changes in respiratory rate and depth; observe for SOB and use of accessory muscles.

- An increase in the work of breathing will add to fatigue; may indicate patient fiighting ventilator.
- Observe for tube misplacement- note and post cm. marking at lip/teeth/nares after x-ray confirmation and q. 2 h. Indicates correct position to provide adequate ventilation..
- Inspect thorax for symmetry of movement. Determines adequacy of breathing pattern;asymmetry may indicate hemothorax or pneumothorax.
- Measure tidal volume and vital capacity. Indicates volume of air moving in and out of lungs.
- Asses for pain. Pain may prevent patient from coughing and deep breathing.
- Monitor chest x-rays Shows extent and location of fuid or infltrates in lungs.
- Maintain ventilator settings as ordered. Ventilator provides adequate ventilator pattern for the patient.
- Elevate head of bed 30- 45 degrees. This position moves the abdominal contents away from the diaphragm, which facilitates its contraction..
- Determines acid-base balance and need for oxygen.
- Assess LOC, listlessness, and irritability. These signs may indicate hypoxia.
- Observe skin color and capillary refill. Determine adequacy of blood fow needed to carry oxygen to tissues.

- Monitor ABG. Indicates the oxygen carrying capacity available.
- Administer oxygen as ordered. Decreases work of breathing and supplies supplemental oxygen.
- Observe for tube obstruction; suction when necessary ensure adequate humidification.
- May result in inadequate ventilation or mucous plug.
- Reposition patient q. 1-2 h. Repositioning helps all lobes of the lung to be adequately perfused and ventilated.
- Provide nutrition as ordered, e.g. TPN, lipids or enteral feedings.
- Calories, minerals, vitamins, and protein are needed for energy and tissue repair. Obtain nutrition consult.
- Provides guidance and continued surveillance.
  - Potential for pulmonary infection related to compromised tissue integrity.
- Secure airway and support ventilator tubing.
- Prevent mucosal damage.
- Provide good oral care 6th hourly.; suction when need indicated using sterile technique; hand washing with antimicrobial for 30 seconds before and after patient contact. Measures aimed at prevention of nosocomial infections.

- Ensure ventilator tubing changed q. 7 days, ambu bags changes between patients and whenever become soiled.
- Assess for GI problems. Preventative measures include relieving anxiety, antacids or H2 receptor antagonist therapy, adequate sleep cycles, adequate communication system. Most serious is stress ulcer. May develop constipation.
- Observe skin integrity for pressure ulcers; preventative measures include turning patient at least q2 h.; use pressure relief mattress or turning bed if indicated; follow prevention of pressure ulcers plan of care;
- Patient is at high risk for developing pressure ulcers due to immobility and decreased tissue perfusion.
- Patient is at risk for developing contractures due to immobility, use of paralytics and ventilator related deficiencies.
- Encourage patient to relax and breath with the ventilator; explain alarms; teach importance of deep breathing; provide alternate method of communication.
- Reduce anxiety, gain cooperation and participation in plan of care
- Anxious Patient
  - Can be due to a malfunction of the ventilator
  - Patient may need to be suctioned

- Frequently the patient needs medication for anxiety or sedation to help them relax

- Attempt to fix the problem
- Call your DOCTOR
- Anytime you have concerns, alarms, ventilator changes or any other problem with your ventilated patient.

- Call your DOCTOR

- NEVER hit the silence button!

RECOMMENDED ELEMENTS OF PREVENTIVE BUNDLE FOR VAP

- Avoid unnecessary antibiotics
- Avoid unnecessary stress ulcer prophylaxis
- Oral intubation
- Chlorhexidine oral rinse
- Selective digestive decontamination
- Short-course parenteral antibiotics
- Appropriate hand disinfection

- Appropriate staffifng
- Avoid tracheal intubation
- Shorten duration of mechanical ventilation
- Semi recumbent positioning
- Avoid gastric overdistention
- Subglottic suctioning
- Avoid ventilator circuit changes/manipulation
- Drain ventilator circuit condensate
- Prevent accidental extubation

VENTILATOR CARE BUNDLE

- HOB > 30 degree
- Oral care once in each shift
- Sedation vacations to check readiness to extubate
- Peptic ulcer disease prophylaxis
- DVT prophylaxis

Figure 1: Ventilator-Associated Events (VAE) Surveillance Algorithm

Patient has a baseline period of stability or improvement on the ventilator, defined by ≥ 2 calendar days of stable or decreasing daily minimum* FiO_2 or PEEP values. The baseline period is defined as the 2 calendar days immediately preceding the first day of increased daily minimum PEEP or FiO_2.

*Daily minimum defined by lowest value of FiO_2 or PEEP during a calendar day that is maintained for at least 1 hour.

↓

After a period of stability or improvement on the ventilator, the patient has at least one of the following indicators of worsening oxygenation:

1) Increase in daily minimum* FiO_2 of ≥ 0.20 (20 points) over the daily minimum FiO_2 in the baseline period, sustained for ≥ 2 calendar days.
2) Increase in daily minimum* PEEP values of ≥ 3 cmH_2O over the daily minimum PEEP in the baseline period†, sustained for ≥ 2 calendar days.

*Daily minimum defined by lowest value of FiO_2 or PEEP during a calendar day that is maintained for at least 1 hour.

†Daily minimum PEEP values of 0-5 cmH_2O are considered equivalent for the purposes of VAE surveillance.

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Ventilator-Associated Condition (VAC)

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On or after calendar day 3 of mechanical ventilation and within 2 calendar days before or after the onset of worsening oxygenation, the patient meets both of the following criteria:

1) Temperature > 38 °C or < 36°C, **OR** white blood cell count ≥ 12,000 cells/mm^3 or ≤ 4,000 cells/mm^3.

AND

2) A new antimicrobial agent(s) (see Appendix for eligible antimicrobial agents) is started, and is continued for ≥ 4 calendar days.

↓

Infection-related Ventilator-Associated Complication (IVAC)

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On or after calendar day 3 of mechanical ventilation and within 2 calendar days before or after the onset of worsening oxygenation, ONE of the following criteria is met (**taking into account organism exclusions specified in the protocol**):

1) Criterion 1: Positive culture of one of the following specimens, meeting quantitative or semi-quantitative thresholds as outlined in protocol, without requirement for purulent respiratory secretions:
   - Endotracheal aspirate, ≥ 10^5 CFU/ml or corresponding semi-quantitative result

- Bronchoalveolar lavage, ≥ 10^4 CFU/ml or corresponding semi-quantitative result
- Lung tissue, ≥ 10^4 CFU/g or corresponding semi-quantitative result
- Protected specimen brush, ≥ 10^3 CFU/ml or corresponding semi-quantitative result

2) Criterion 2: Purulent respiratory secretions (defined as secretions from the lungs, bronchi, or trachea that contain ≥25 neutrophils and ≤10 squamous epithelial cells per low power field [lpf, x100])† plus organism identified from one of the following specimens (to include qualitative culture, or quantitative/semi-quantitative culture without sufficient growth to meet criterion #1):
   - Sputum
   - Endotracheal aspirate
   - Bronchoalveolar lavage
   - Lung tissue
   - Protected specimen brush

   † If the laboratory reports semi-quantitative results, those results must correspond to the above quantitative thresholds. See additional instructions for using the purulent respiratory secretions criterion in the VAE Protocol.
3) Criterion 3: One of the following positive tests:
   - Organism identified from pleural fluid (where specimen was obtained during thoracentesis or initial placement of chest tube and NOT from an indwelling chest tube)
   - Lung histopathology, defined as: 1) abscess formation or foci of consolidation with intense neutrophil accumulation in bronchioles and alveoli; 2) evidence of lung parenchyma invasion by fungi (hyphae, pseudohyphae or yeast forms); 3) evidence of infection with the viral pathogens listed below based on results of immunohistochemical assays, cytology, or microscopy performed on lung tissue
   - Diagnostic test for *Legionella* species
   - Diagnostic test on respiratory secretions for influenza virus, respiratory syncytial virus, adenovirus, parainfluenza virus, rhinovirus, human metapneumovirus, coronavirus

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Possible Ventilator-Associated Pneumonia (PVAP)

TRACHEOSTOMY CARE AND MONITORING

Purpose:

- To maintain patent airway
- To maintain skin integrity
- To prevent infection
- To prevent displacement

Equipment:

- Sterile tracheostomy care tray with 2 trays
- Sterile suction catheter
- Tracheal dressing
- Gauze sponges
- Drape
- Tracheal ties
- Brush
- Forceps
- Pipe cleaner
- Gloves
- Normal saline/sterile water;
- Suction apparatus;

- Sterile saline for instillation;
- Anesthesia bag for hyperventilation prior to and after suctioning;
- Eye protection.

PROCEDURE

Before Tracheostomy Care

1. Introduce self, verify patient and explain the procedure.
2. Perform hand hygiene and other appropriate infection control measures.
3. Prepare the client and the equipment
4. Place client in semi-Fowler's or Fowler's position. This will promote lung expansion.
5. Open necessary supplies and establish a sterile field
6. Suction as necessary.

PROCEDURE

1. Wash hands.
2. Open sterile tracheostomy care tray.
3. Don sterile gloves.
4. Arrange contents of tray on to sterile field.
5. Pour saline and cleaning solution into two separate containers.
6. Remove tracheostomy collar.

7. Remove inner cannula and immerse in cleaning solution. Clean inner cannula with brush and pipe cleaners.
8. Immerse and rinse inner cannula in sterile saline/sterile water.
9. Replace inner cannula and resume oxygen therapy if ordered.
10. Clean tracheostomy stoma site with cotton tipped applicator and/or 4X4 moistened with saline.
11. Assess for evidence of wound erosion.
12. If twill tape ties are soiled, replace ties. Do not remove old ties until new ties are secure. Tie tightly with head fllexed. You should be able to insert one finger between tie and neck. (Tracheal ties must be secure enough to prevent tube movement in and out of wound insertion site, causing tracheal damage. When skin on neck is excoriated, use padded ties.)
13. For new tracheostomy, change ties after 48 hours; then every 8 hours if needed; progressing to every 24 hours if dry and clean.
14. Discard equipment, wash hands, and document procedure.

HIC.4.c

PREVENTION AND MANAGEMENT OF BLOOD STREAM INFECTIONS

Identifcation of blood stream infections (BSIs)

Definitions Specific to BSI / CLABSI Surveillance: Primary bloodstream infection (BSI): A Laboratory Confirmed Bloodstream Infection (LCBI) that is not secondary to an infection at another body site.

Central line (CL): An intravascular catheter that terminates at or close to the heart, OR in one of the great vessels that is used for infusion, withdrawal of blood, or hemodynamic monitoring. Consider the following great vessels when making determinations about CLABSI events and counting CL device days:

- Aorta
- Pulmonary artery
- Superior vena cava

- Inferior vena cava
- Brachiocephalic veins
- Internal jugular veins
- Subclavian veins
- External iliac veins
- Common iliac veins
- Femoral veins
- In neonates, the umbilical artery/vein.

Devices Not Considered CLs for NHSN Reporting Purposes:

- Arterial catheters
- Arteriovenous fistula
- Arteriovenous graft
- Atrial catheters (also known as transthoracic intra-cardiac catheters, those catheters inserted directly into the right or left atrium via the heart wall)
- Extracorporeal life support (ECMO)
- Hemodialysis reliable outflow (HERO) dialysis catheter
- Intra-aortic balloon pump (IABP) devices
- Peripheral IV or Midlines

- Ventricular Assist Device (VAD)

The infection control nurses work in collaboration with other units in identifying the CLABSIs.

- All patients in the clinical area are monitored with their devices such as Central lines, Arterial lines, Peripheral venous catheters for identify the development of catheter related blood stream infections.
- The catheter related blood stream infections that are identified are notified to the Consultants, Senior residents and staf responsible for looking after those patients by the HICNs.
- The blood culture positivity is daily reported from the lab and the patients with such positivity are monitored for primary or secondary infections.
- The secondary blood stream infections are those related to any secondary source such as pneumonia, urinary tract, wound and surgical site etc.
- Paired blood samples (one from central line and one from peripheral vein) are collected from suspected blood stream infection cases.

PREVENTION AND MANAGEMENT OF BLOOD STREAM INFECTION

- The recommendation of CDC is considered as a reference for the management of blood stream infections. The major recommendations of CDC is given below

SELECTION OF CATHETERS AND SITES

- In adults, use an upper-extremity site for catheter insertion. Replace a catheter inserted in a lower extremity site to an upper extremity site as soon as possible
- Select catheters on the basis of the intended purpose and duration of use, known infectious and non infectious complications.
- In pediatric patients, the upper or lower extremities or the scalp (in neonates or young infants) can be used as the catheter insertion site.
- Evaluate the catheter insertion site daily.
- Remove peripheral venous catheters if the patients develop signs of phlebitis, infection, or a malfunctioning catheter.

CENTRAL VENOUS CATHETERS

- Weigh the risks and benefits of placing a central venous device at a recommended site to reduce infectious complications against the risk for mechanical complications.
- Avoid using the femoral vein for central venous access in adult patients.
- Use a subclavian site, rather than a jugular or a femoral site, in adult patients to minimize infection risk for non tunneled CVC placement.
- Avoid the subclavian site in hemodialysis patients and patients with advanced kidney disease, to avoid subclavian vein stenosis.
- Use a fistula or graft in patients with chronic renal failure instead of a CVC for permanent access for dialysis.
- Use ultrasound guidance to place central venous catheters (if this technology is available) to reduce the number of cannulation attempts and mechanical complications.
- Promptly remove any intravascular catheter that is no longer essential.
- When adherence to aseptic technique cannot be ensured (i.e catheters inserted during a medical emergency), replace the catheter as soon as possible, i.e, within 48 hours.

HAND HYGIENE AND ASEPTIC TECHNIQUE

- Perform hand hygiene procedures, either by washing hands with conventional soap and water or with alcohol-based hand rubs (ABHR). Hand hygiene should be performed before and after palpating catheter insertion sites as well as before and after inserting, replacing, accessing, repairing, or dressing an intravascular catheter.
- Maintain aseptic technique for the insertion and care of intravascular catheters.
- Sterile gloves should be worn for the insertion of arterial, central, and midline catheters.
- Use new sterile gloves before handling the new catheter when guidewire exchanges are performed.
- Wear either clean or sterile gloves when changing the dressing on intravascular catheters.
- Use maximal sterile barrier precautions, including the use of a cap, mask, sterile gown, sterile gloves, and a sterile full body drape, for the insertion of CVCs, PICCs, or guide wire exchange.
- Prepare clean skin with a >0.5% chlorhexidine preparation with alcohol before central venous catheter and peripheral arterial catheter insertion and during dressing changes. If there is a contraindication to chlorhexidine, tincture of iodine, an iodophor, or 70% alcohol can be used as alternatives.

- Antiseptics should be allowed to dry according to the manufacturer"s recommendation
- Prior to placing the catheter.

CATHETER SITE DRESSING REGIMENS

- Use either sterile gauze or sterile, transparent, semipermeable dressing to cover the catheter site if the patient is diaphoretic or if the site is bleeding or oozing, use a gauze dressing until this is resolved.
- Replace catheter site dressing if the dressing becomes damp, loosened, or visibly soiled.
- Replace dressings used on CVC sites at least every 7 days for transparent dressings with chlorhexidine pack, except in those pediatric patients in which the risk for dislodging the catheter may outweigh the benefit of changing the dressing.
- Ensure that catheter site care is compatible with the catheter material.
- Monitor the catheter sites visually when changing the dressing or by palpation through an intact dressing on a regular basis, depending on the clinical situation of the individual patient.
- Encourage patients to report any changes in their catheter site or any new discomfort to their provider.

SYSTEMIC ANTIBIOTIC PROPHYLAXIS

- Do not administer systemic antimicrobial prophylaxis routinely before insertion or during use of an intravascular catheter to prevent catheter colonization.

ANTICOAGULANTS

Do not routinely use anticoagulant therapy to reduce the risk of catheter-related infection in general patient population.

Replacement of Peripheral and Midline Catheters

- There is no need to replace peripheral catheters more frequently than every 72-96 hours to reduce risk of infection and phlebitis in adults
- No recommendation is made regarding replacement of peripheral catheters in adults only when clinically indicated.
- Replace peripheral catheters in children only when clinically indicated.
- Replace midline catheters only when there is a specific indication.

Replacement of CVCs, Including PICCs and Hemodialysis Catheters

- Do not routinely replace CVCs, PICCs, hemodialysis catheters, or pulmonary artery catheters to prevent catheter-related infections.
- Do not remove CVCs or PICCs on the basis of fever alone.
- Do not use guidewire exchanges routinely for non-tunneled catheters to prevent infection.
- Use a guidewire exchange to replace a malfunctioning non-tunneled catheter if no evidence of infection is present.
- Use new sterile gloves before handling the new catheter when guidewire exchanges are performed.
- In patients not receiving blood, blood products or fat emulsions, replace administration sets that are continuously used, including secondary sets and add-on devices, no more frequently than at 96-hour intervals, but at least every 7 days.
- Replace tubing used to administer blood, blood products, or fat emulsions (those combined with amino acids and glucose in a 3-in-1 admixture or infused separately) within 24 hours of initiating the infusion.
- Replace tubing used to administer propofol infusions every 6 or 12 hours, when the vial is changed, per the manufacturer's recommendation.

Peripheral Arterial Catheters and Pressure Monitoring Devices for Adult and Pediatric Patients

- In adults, use of the radial, brachial or dorsalis pedis sites is preferred over the femoral or axillary sites of insertion to reduce the risk of infection.
- In children, the brachial site should not be used. The radial, dorsalis pedis, and posterior tibial sites are preferred over the femoral or axillary sites of insertion.
- A minimum of a cap, mask, sterile gloves and a small sterile fenestrated drape should be used during peripheral arterial catheter insertion.
- During axillary or femoral artery catheter insertion, maximal sterile barriers precautions should be used.
- Replace arterial catheters only when there is a clinical indication and remove the arterial catheter as soon as it is no longer needed.
- Use disposable, rather than reusable, transducer assemblies when possible
- Do not routinely replace arterial catheters to prevent catheter-related infections.
- Replace disposable or reusable transducers at 96-hour intervals. Replace other components of the system (including the tubing, continuous-flush device, and flush solution) at the time the transducer is replaced.
- Keep all components of the pressure monitoring system (including calibration devices and flush solution) sterile.
- Minimize the number of manipulations of and entries into the pressure monitoring system. Use a closed flush system (i.e. continuous flush), rather than an open system

(i.e. one that requires a syringe and stopcock), to maintain the patency of the pressure monitoring.

Replacement of Administration Sets

- In patients not receiving blood, blood products or fat emulsions, replace administration sets that are continuously used, including secondary sets and add-on devices, no more frequently than at 96-hour intervals but at least every 7 days.
- No recommendation can be made regarding the frequency for replacing intermittently used administration sets.
- Replace tubing used to administer blood, blood products, or fat emulsions (those combined with amino acids and glucose in a 3-in-1 admixture or infused separately) within 24 hours of initiating the infusion.
- Replace tubing used to administer propofol infusions every 6 or 12 hours, when the vial is changed, per the manufacturer"s recommendation.
- Complete the infusion of lipid emulsions alone within 12 hours of hanging the emulsion.
- If volume considerations require more time, the infusion should be completed within 24 hours.
- Complete infusions of blood or other blood products within 4 hours of hanging the blood.

- Clean injection ports with 70% alcohol or an iodophor before accessing the system.
- Do not use any container of parenteral fuid that has visible turbidity, leaks, cracks, or
- particulate matter or if the manufacturer's expiration date has passed.
- Use single-dose vials for parenteral additives or medications when possible.

PREVENTIVE BUNDLES FOR CATHETER RELATED BLOOD STREAM INFECTIONS

CENTRAL LINE BUNDLE

- Hand Hygiene
- Maximal barrier Precautions upon insertion/Manipulation
- PI/Alcohol / Chlorhexidine Skin Antisepsis
- Optimal Catheter site selection, with avoidance of the Femoral Vein for central venous access in adult patients
- Daily review of line necessity with prompt removal of unnecessary lines

Surveillance

- Monitor the catheter sites visually or by palpation through the intact dressing on a regular basis.

- If patients have tenderness at the insertion site, fever without obvious source, or other manifestations suggesting local infections or BSI, the dressing should be removed to allow thorough examination of the site

Hand hygiene

- Observe proper hand-hygiene procedures either by washing hands with conventional antiseptic containing soap and water or with waterless alcohol-based gels or foams.
- Observe hand hygiene before and after palpating catheter insertion sites, as well as before and after inserting, replacing, accessing, repairing, or dressing an intravascular catheter.

Catheter site care

Cutaneous antisepsis

- Disinfect clean skin with an appropriate antiseptic before catheter insertion and during dressing changes.
- Although a 2% chlorhexidine based preparation is preferred, tincture of iodine, an iodophor, or 70% alcohol can be used.
- Allow the antiseptic to remain on the insertion site and to air dry before catheter insertion. Allow povidone iodine to remain on the skin for at least 2 minutes, or longer if it is not yet dry.

Criterion	Laboratory-Confirmed Bloodstream Infection (LCBI) *Comments and reporting instructions that follow the site-specific criteria provide further explanation and are integral to the correct application of the criteria.* Must meet ***one*** of the following criteria:
LCBI 1	Patient has a recognized pathogen identified from one or more blood specimens by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (e.g., not Active Surveillance Culture/Testing (ASC/AST). **AND** Organism(s) identified in blood is not related to an infection at another site.(See Appendix 1 Secondary BSI Guide)

Central Line – Associated BSI (CLABSI): A Laboratory – confirmed blood stream infection where central line or umbilical catheter was in place for >2calander days on the date of event, with day of device placement being day 1

A Central Line or Umbilical Catheter was in place on the date of event or the day before. If a Central Line or Umbilical Catheter was in place for >2 calendar days and then removed, the date of event of the LCBI must be the day of discontinuation or the next day

LCBI 2	Patient has at least one of the following signs or symptoms: fever (>38.0°C), chills, or hypotension **AND** Organism(s) identified from blood is not related to an infection at another site (See Appendix 1 Secondary BSI Guide) **AND** the same common commensal (i.e., diphtheroids [*Corynebacterium* spp. not *C. diphtheriae*], *Bacillus* spp. [not *B. anthracis*], *Propionibacterium* spp., coagulase-negative staphylococci [including *S. epidermidis*], viridans group streptococci, *Aerococcus* spp., and *Micrococcus* spp.) is identified from two or more blood specimens drawn on separate occasions (see comment 5 below), by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (e.g., not Active Surveillance Culture/Testing (ASC/AST). Criterion elements must occur within the Infection Window Period (see Chapter 2), the 7-day time period which includes the collection date of the positive blood, the 3 calendar days before and the 3 calendar days after. (See complete list of common commensals by selecting the common commensal tab at the bottom of the Excel worksheet at http://www.cdc.gov/nhsn/XLS/master-organism-Com-Commensals-Lists.xlsx) **Note:** The matching common commensals represent a single element; therefore, the collection date of the **first** common commensal is the date of the element used to determine the Date of Event.

6/1/2014	6/2/2014	6/3/2014	6/4/2014	Date of LCBI Event = 6/1/2014
S. epidermidis (1 of 2)	*S. epidermidis* (2 of 2)	No LCBI elements	Fever > 38.0 °C	

SURGICAL SITE INFECTION

HIC.4.d

Definition:

Surgical site infection includes superficial surgical site infection, deep surgical wound infection and organ/space surgical site infection.

Inclusion:

a) Superficial surgical site infection must meet the following criteria: Infection occurs within 30 days after surgery and involves only skin and subcutaneous tissue of the incision and any of the following:

- Purulent drainage from the superficial incision.
- Organism isolated from an aseptically obtained culture of fluid or tissue from superficial incision.
- Surgeon deliberately opens wound because of pain or tenderness, localized swelling, redness or heat, unless wound is culture-negative
- Surgeons or attending physician's diagnosis of superficial incision infection.

b) Deep surgical site infection must meet the following criteria: Infection occurs within **30 days or 90 days** after surgery **and** involves deep soft tissues of the incision (Facial and Muscle layer) **and**

- Purulent drainage from deep incision but not from organ/space component of surgical

site.

- A deep incision spontaneously dehisces or is deliberately opened by surgeon when patient has fever (greater than38°C) and/or localized pain or tenderness, unless wound is culture-negative.
- An abscess or other evidence of infection involving deep incision found on direct examination, during reoperation, or by histopathologic or radiologic examination.
- Surgeons or attending physician's diagnosis of infection.

c) Organ/space surgical site infection must meet the following criteria:

Infection occurs within **30 or 90 days** after surgery and infection appears related to surgery and infection involves any part of body excluding the skin incision, fascia or muscle layers, that is opened or manipulated during surgery and any of the following:

- Purulent drainage from drain placed through a stab wound into the organ/space.
- Organism isolated from aseptically obtained culture of fluid/tissue in the organ/space.
- An abscess or other evidence of infection involving organ/space found on direct examination during reoperation, by histopathologic or radiologic examination.
- Surgeons or attending physician's diagnosis of infection.

30 Days Surveliance

Code	Operative Procedure	Code	Operative Procedure
AAA	Abdominal aortic aneurysm repair	LAM	Laminectomy

AMP	Limb amputation	LTP	Liver transplant
APPY	Appendix surgery	NECK	Neck surgery
AVSD	Shunt for dialysis	NEPH	Kidney surgery
BILI	Bile duct, liver or pancreatic surgery	OVRY	Ovarian surgery
CEA	Carotid endarterectomy	PRST	Prostate surgery
CHOL	Gallbladder surgery	REC	Rectal surgery
COLO	Colon surgery	SB	Small bowel surgery
CSEC	Cesarean section	SPLE	Spleen surgery
GAST	Gastric surgery	THOR	Thoracic surgery
HTP	Heart transplant	THYR	Thyroid and/or parathyroid
			surgery
HYST	Abdominal hysterectomy	VHYS	Vaginal hysterectomy
KTP	Kidney transplant	XLAP	Exploratory Laparotomy

	90-day Surveillance	
Code	**Operative Procedure**	
BRST	Breast surgery	
CARD	Cardiac surgery	

CBGB	Coronary artery bypass graft with both chest and donor site incisions
CBGC	Coronary artery bypass graft with chest incision only
CRAN	Craniotomy
FUSN	Spinal fusion
FX	Open reduction of fracture
HER	Herniorrhaphy
HPRO	Hip prosthesis
KPRO	Knee prosthesis
PACE	Pacemaker surgery
PVBY	Peripheral vascular bypass surgery
VSHN	Ventricular shunt

Specific Sites of an Organ/Space SSI.

Code	Site	Code	Site
BONE	Osteomyelitis	MED	Mediastinitis
BRST	Breast abscess or mastitis	MEN	Meningitis or ventriculitis
CARD	Myocarditis or pericarditis	ORAL	Oral cavity (mouth, tongue, or gums)
DISC	Disc space	OREP	Other infections of the male or female reproductive tract
EAR	Ear, mastoid	PJI	Periprosthetic Joint Infection
EMET	Endometritis	SA	Spinal abscess without meningitis
ENDO	Endocarditis	SINU	Sinusitis
GIT	GI tract	UR	Upper respiratory tract
IAB	Intraabdominal, not specified	USI	Urinary System Infection

Note: refere Infection control bundle for SSI Prevention

CRITERIA FOR DIAGNOSIS OF SURGICAL SITE INFECTION

CRITERIA	SUPERFICIAL INCISIONAL	DEEP INCISIONAL	ORGAN OR SPACE
Degree of involvement	Only skin or subcutaneous tissue of incision.	Deep soft tissues of the incision.	Any area other than the incision itself that is opened or manipulated during the operative procedure.
Criteria 1	Purulent drainage from the superficial incision.	Purulent drainage from the deep incision but not from the organ or space component of the	Purulent drainage from a drain placed through a stab wound into the

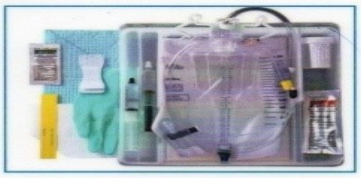
		surgical site.	organ or space.
Criteria 2	Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision.	Deep incision dehisces or is deliberately opened when a patient has at least one of the following signs or symptoms: fever>38° C, localized pain or tenderness. (unless culture of the incision is negative)	Organisms isolated from an aseptically obtained culture of fluid or tissue in the organ or space.

Criteria 3	At least one of the following signs or symptoms of infection: localized pain or tenderness, swelling, redness, or heat, and superficial incision is deliberately opened (unless the culture is negative)	An abscess or other evidence of infection involving the deep incision is found on direct examination, during re-operation, or by histopathologic or radiologic examination.	An abscess or other evidence of infection involving the organ or space on direct examination, during re-operation, or by histopathologic or radiologic examination.

Infection Control Bundles

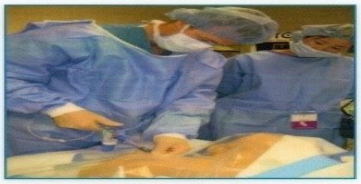
CAUTI (Catheter Associated Urinary Tract Infection) BUNDLES

1. Aseptic Precautions - Hand Hygiene
2. Secure the catheter
3. Urobag below the bladder/waist level
4. Empty the bag frequently
5. Closed sterile drainage circuit/continuous system of drainage
6. Daily review of catheter site
7. Early removal of catheter



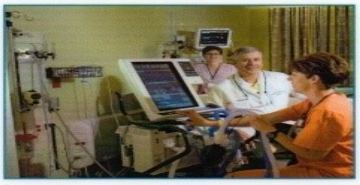
CLBSI (Central Line) BUNDLES

1. Aseptic Precautions - Hand Hygiene
2. Optimal catheter site
3. Transparent dressing
4. Maximum barrier precautions (cover the site with sterile towel)
5. Chlorhexidine skin antiseptic
6. Daily review of line site
7. Early removal of the line



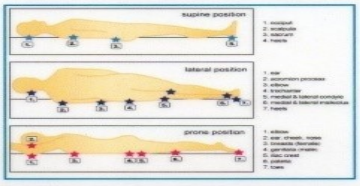
VAP (Ventilator Associated Pneumonia) BUNDLES

1. Head end elevation - 30 to 45 degree
2. Daily sedation vacation/ Early weaning
3. PUD (Peptic Ulcer Device) prophylaxis
4. DVT (Deep vein Thrombosis) Prophylaxis
5. Oral care
6. Early extubation



Pressure Ulcer Bundles

1. Positioning - 2nd Hourly in ICUs & 4th Hourly in wards
2. Back Care -2nd Hourly in ICUs & 4th Hourly in wards
3. Frequent checking/ changing of diapers & cozy sheets
4. Frequent check of alpha beds /nimbus beds
5. Frequent checking of urinary catheters
6. Immediate cleaning of excreta(urine/ stools)



Surgical Site Infection Bundles

1. Avoid the preparation (if possible)
2. If mandatory, please use clippers instead of razors.
3. Ensure the patient body temperature is normal.
4. Sugar levels should be controlled.
5. Antibiotic Prophylaxis (1 hour before) should be strictly followed.

Braden Scale for Predicting Pressure Sore Risk

Instructions:

Use the Braden Scale to assess the patient's level of risk for development of pressure ulcers. The evaluation is based on six indicators: sensory perception, moisture, activity, mobility, nutrition, and friction or shear.

Scoring:

The Braden Scale is a summated rating scale made up of six subscales scored from 1-3 or 4, for total scores that range from 6-23. A lower Braden Scale Score indicates a lower level of functioning and, therefore, a higher level of risk for pressure ulcer development. A score of 19 or higher, for instance, would indicate that the patient is at low risk, with no need for treatment at this time. The assessment can also be used to evaluate the course of a particular treatment.

1 Positioning-2nd hourly In ICU's & 4th hourly in wards
2 Back care-2nd hourly In ICU's & 4th hourly in wards
3 Frequent checking/Changing of cozy sheets
4 Frequent checking of Alpha beds/Nimbus bed
5 Frequent checking of Urinary Catheters
6 Immediate cleaning of excreta (Urine/Stools).

BRADEN SCALE FOR PREDICTING PRESSURE SORE RISK

Patient's Name _____ Evaluator's Name _____ Date of Assessment

SENSORY PERCEPTION ability to respond meaningfully to pressure-related discomfort	**1. Completely Limited** Unresponsive (does not moan, flinch, or grasp) to painful stimuli, due to diminished level of consciousness or sedation OR limited ability to feel pain over most of body.	**2. Very Limited** Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness OR has a sensory impairment which limits the ability to feel pain or discomfort over ½ of body.	**3. Slightly Limited** Responds to verbal commands, but cannot always communicate discomfort or the need to be turned OR has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.	**4. No Impairment** Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.				
MOISTURE degree to which skin is exposed to moisture	**1. Constantly Moist** Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	**2. Very Moist** Skin is often, but not always moist. Linen must be changed at least once a shift.	**3. Occasionally Moist** Skin is occasionally moist, requiring an extra linen change approximately once a day.	**4. Rarely Moist** Skin is usually dry, linen only requires changing at routine intervals.				
ACTIVITY degree of physical activity	**1. Bedfast** Confined to bed.	**2. Chairfast** Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	**3. Walks Occasionally** Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair.	**4. Walks Frequently** Walks outside room at least twice a day and inside room at least once every two hours during waking hours.				
MOBILITY ability to change and control body position	**1. Completely Immobile** Does not make even slight changes in body or extremity position without assistance.	**2. Very Limited** Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.	**3. Slightly Limited** Makes frequent though slight changes in body or extremity position independently.	**4. No Limitation** Makes major and frequent changes in position without assistance.				
NUTRITION usual food intake pattern	**1. Very Poor** Never eats a complete meal. Rarely eats more than ⅓ of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement OR is NPO and/or maintained on clear liquids or IVs for more than 5 days.	**2. Probably Inadequate** Rarely eats a complete meal and generally eats only about ½ of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement OR receives less than optimum amount of liquid diet or tube feeding.	**3. Adequate** Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products) per day. Occasionally will refuse a meal, but will usually take a supplement when offered OR is on a tube feeding or TPN regimen which probably meets most of nutritional needs.	**4. Excellent** Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.				
FRICTION & SHEAR	**1. Problem** Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction.	**2. Potential Problem** Moves feebly or requires minimum assistance. During a move skin probably slides to some extent against sheets, chair, restraints or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.	**3. No Apparent Problem** Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.					
				Total Score				

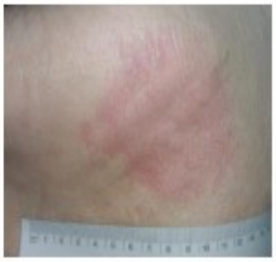
Pressure Ulcer Grading Chart

Pressure ulcer grading chart

NHS Midlands and East

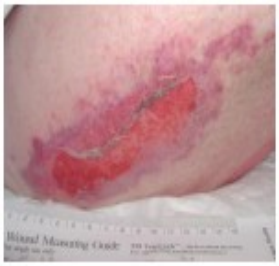
Adapted from EPUAP/NPUAP 2009

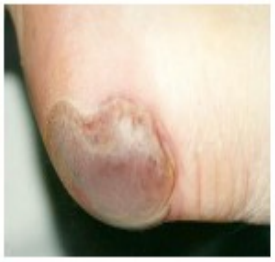
Superficial



EPUAP - Category/Grade I

- Non-blanchable erythema of intact skin: persistent redness in light pigmented skin.
- Discolouration of the skin: observe for a change of colour as compared to surrounding skin. In darker skin, the ulcer may be blue or purple.
- Warmth, oedema, induration or hardness as compared to adjacent tissue may also be used as indicators, particularly on individuals with darker skin.
- May include sensation (pain, itching).



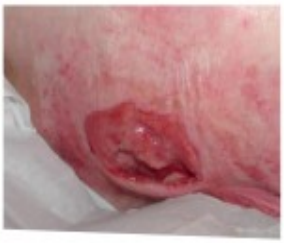


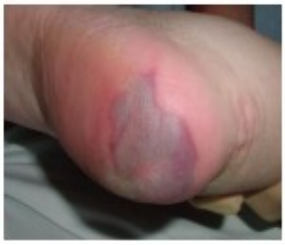
EPUAP System - Category/Grade 2

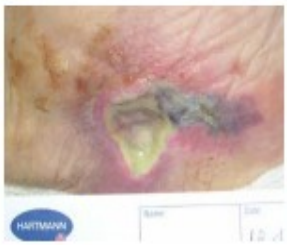
- Partial thickness skin loss involving epidermis, dermis or both.
- Presents clinically as an abrasion or clear blister.
- Ulcer is superficial without bruising*
- Check for moisture lesion.

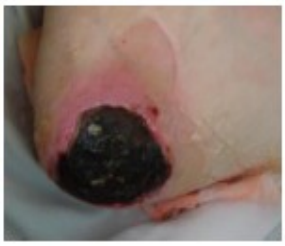
*Bruising appearance and blood filled blister would indicate deep tissue injury.

Deep







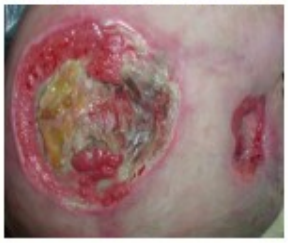


EPUAP - Category/Grade 3

- Full thickness skin loss. Subcutaneous fat may be visible but bone, tendon and muscle are not exposed.
- May include undermining and tunneling.
- The depth varies by anatomical location (bridge of the nose, ear, occiput and malleolus do not have (adipose) subcutaneous tissue and grade 3 ulcers can be shallow.
- In contrast area of significant adiposity can develop extremely deep grade 3 pressure ulcers.
- Bone/tendon is not visible or directly palpable.

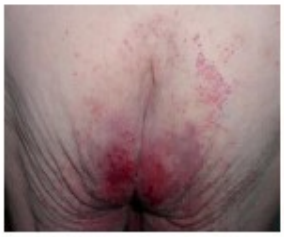
Plus: Unclassified PU - now Grade 3

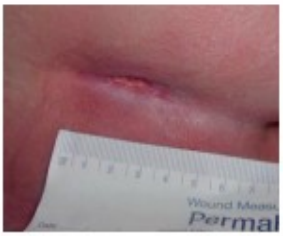
- Full thickness tissue loss in which actual depth of the ulcer is completely obscured by slough (yellow, tan, grey, green, brown, black, eschar) in the wound bed. Until enough slough is removed to expose the base of the wound, the true depth cannot be determined; but it will be either grade 3 or 4.
- Stable eschar (dry, adherent, intact without erythema or fluctuance) on the heels serves as 'the body natural (biological) cover' and should not be removed.
- Should be documented as grade 3 until proven otherwise.



EPUAP - Category/Grade 4

- Full thickness tissue loss with exposed bone (or directly palpable), tendon.
- Often include undermining and tunneling.
- The depth varies by anatomical location (bridge of the nose, ear, occiput and malleolus do not have (adipose) subcutaneous tissue and grade 4 ulcers can be shallow.
- Grade 4 ulcers can extend into the muscle and/or supporting structures (eg fascia, tendon or joint capsule).





Moisture Lesions

- Redness or partial thickness skin loss involving the epidermis, dermis or both caused by excessive moisture to the skin from urine, faeces or sweat.
- These lesions are not usually associated with a bony prominence.
- They can however be seen alongside a pressure ulcer of any grade.

SEPSIS BUNDLE

The **Severe Sepsis Resuscitation Bundle** describes seven tasks that should begin immediately, but must be accomplished within the first 6 hours of presentation for patients with severe sepsis or septic shock. Some items may not be completed if the clinical conditions described in the bundle do not prevail in a particular case, but clinicians must assess for them. The goal is to perform all indicated tasks 100 percent of the time within the first 6 hours of identification of severe sepsis.

The **Sepsis Management Bundle** lists four management goals. Efforts to accomplish these tasks should also begin immediately, but these items may be completed within twenty-four hours of presentation for patients with severe sepsis or septic shock.

1. Implement the Sepsis Resuscitation Bundle

   Reducing mortality due to severe sepsis requires an organized process that guarantees the early recognition of severe sepsis along with the uniform and consistent application of the best evidence-based practices.

2. Implement the Sepsis Management Bundle

   Reducing mortality due to severe sepsis requires an organized process that guarantees the early recognition of severe sepsis along with the uniform and consistent application of the best evidence-based practices.

3. Serum Lactate Measured

4. Corresponding Bundle Element:

Implications:

Given the high risk for septic shock, all patients with elevated lactate > 4 mmol/L (36 mg/dl) will enter the early goal-directed therapy portion of the Severe Sepsis Resuscitation Bundle, regardless of blood pressure.

Implement the Sepsis Resuscitation Bundle:

Blood Cultures Obtained Prior to Antibiotic Administration

Improve Time to Broad-Spectrum Antibiotics

Choice of Antibiotics:

The choice of antibiotics shall be guided by the susceptibility of likely pathogens in the community and the hospital, as well as any specific knowledge about the patient, including drug intolerance, underlying disease, the clinical syndrome. The regimen should cover all likely pathogens since there is little margin for error in critically ill patients. There is ample evidence that failure to initiate appropriate therapy promptly (i.e., therapy that is active against the causative pathogen) has adverse consequences on outcome.

48- to 72-Hour Re-evaluation:

Once the causative agent and antibiotic susceptibilities have been identified, restriction of the number of antibiotics and narrowing the spectrum of antimicrobial therapy is an important and responsible strategy for minimizing the development of resistant pathogens and for containing costs.

The antimicrobial regimen should always be reassessed after 48–72 hours on the basis of microbiological and clinical data with the aim of using a narrow-spectrum antibiotic to prevent the development of resistance, to reduce toxicity, and to reduce costs. Once a causative pathogen is identified, there is no evidence that combination therapy is more effective than monotherapy. The duration of therapy should typically be 7–10 days and guided by clinical response.

Dosing:

All patients should receive a full loading dose of each antimicrobial. However, patients with sepsis or septic shock often have abnormal renal or hepatic function and may have abnormal volumes of distribution due to aggressive fluid resuscitation. The ICU pharmacist should be consulted to ensure that serum concentrations are attained that maximize efficacy and minimize toxicity.

BACTERIOLOGICAL ANALYSIS OF WATER FROM DIALYSIS

WATER QUALITY TESTING RENAL REPLACEMENT, DETOXIFICATION AND APHERESIS

Bacteriology of product water

Sample shall be assayed within 30 minutes of collection or be immediately stored at a temperature between 1 and 5°C and assayed within 24 hours of collection. Total viable counts (standard plate counts) shall be obtained using conventional microbiology assay

procedure (pour plate, spread plate, membrane filter techniques including dip test devices, etc.). The calibrated loop technique is not accepted. Culture medical shall be tryptic soy agar or equivalent. Colonies shall be counted after 48 hours of incubation at 37 (+/-2) °C.

Plate count

With a sterile graduated pipette place 1 ml water in two sterile Petri dishes (4 inches in diameter) and add 9ml. media, melted and cooled to 50°C. Mix thoroughly and allow solidifying. The medial shall be as transparent as possible. Incubate at 37°C for 48 hours and taken the Readings.

Endotoxin assay.

Dialysis water is tested monthly for endotoxin levels.

R.O. Water

Total Viable Count (Standard Plate Count) shall be obtained using conventional microbiology

Assay procedure – pour plate technique

Miocrobiological Level	Water Standard	Water Action Level
Colony Forming Units	<100 CFU/mL	≥50CFU/mL
Endotoxin Units	<0.25EU/mL	≥0.125 EU/mL

(ANSI/AAMI13959 -2014 Guidelines)

BACTERIOLOGICAL ANALYSIS OF DRINKING WATER

Drinking Water & Cooking Water:

- Water samples are collected using standard techniques. The sample is then subjected for testing for Presumptive coliform Count.
- Water from different sources in the distribution system and prior to entry in to the distribution system shall be periodically tested bacteriologically. Water shall be collected in appropriate heat-sterilized bottles using standard techniques (Mackle & Me Cartney: Practical Medical Microbiology, Volume 2, 12th Ed) as below:
- "aseptically pipette one 50ml volumes and five 10ml volumes of the water into vessels containing corresponding 50ml and 10ml volumes of double strength medium" (Mac Conkey Broth with indicator).

- Such water sample shall be then subjected to multiple tube test methods for presumptive coliform count (MPN), Interpretation and determination of bacteriological standards applied are in keeping with those recommended by WHO (1971) and the European Community (1980) as below
- Grades of the quality of drinking water supplies determined by the results of periodic.

- Escherichia coli and coliform count.

Quality of Supply	Results From Coliform Count / 100ml	Routine Samples Count / 100ml	E.Coli Tolerance
Excellent Satisfactory	0 1-3	0 0	In all samples provided that coliform organisms do not occur in any sample.
Intermediate	4-9	0	E. Coli does not occur in consecutive samples or in more than 5% of samples.
Unsatisfactory	>10	10	Any coliform organisms present in consecutive samples (or) Pressure of any coliform organisms in more than 50% of routine samples.

- Information is transmitted and appropriate action is taken by relevant department.