Standard for the Management of Intravascular Device-related Bloodstream Infections

Protocol for Management and insertion of Central Venous Catheters (CVC)
Part I

About this presentation

- Designed to assist with training staff on the insertion and management of central venous catheters (CVC)

- Relates to prevention of intravascular device-related infections

- Read in conjunction with the Standard and Protocols For The Insertion and Management of:
  - Percutaneous Central Venous Catheters
  - Tunnelled Central Venous Catheters
  - Haemodialysis Catheters
  - Totally Implantable Central Venous Access Ports

About this presentation

- The training module is presented in two parts
  - Part I: Infection prevention strategies for insertion of a CVC
  - Part II: Infection prevention strategies related to management of CVC's and associated components
- An optional test is included to assess staff knowledge
- Whilst the presentation focuses on percutaneous (non-tunnelled, non-cuffed) CVC, the general principles are applicable to all types of central venous access devices

Outcome

- Upon completion of this presentation the learner will have a theoretical knowledge of strategies to prevent intravascular device-related infection

What is a CVC?

- A polyurethane or silicone, single or multi-lumen catheter inserted into central veins (e.g. subclavian, internal jugular, femoral) entering the superior vena cava or inferior vena cava

- Types of central venous access devices include:
  - Percutaneous (non-tunnelled, non-cuffed) CVC
  - Tunnelled CVC
  - Haemodialysis catheters
  - Totally implantable central venous access ports
  - Peripherally inserted CVC (PICC)

Indications

Intravascular Device Type	**Indications**
Peripheral Intravenous Catheter (PIVC)	•Short-term (<1-3 weeks) peripheral intravenous access •Non-irritating, non-vesicant solutions •Must be resited every 48-72 hours
Midline Catheter	•Not recommended
Percutaneous (non-tunnelled) Central Venous Catheter (CVC) -Single and multiple lumina	•Short-term (<1-3 weeks) central venous access •Irritating/vesicant solutions that require greater haemodilution •Haemodynamic monitoring

Indications

Intravascular Device Type	Indications
Peripherally Inserted Central Catheter (PICC) •Inpatients -Single and multiple lumina	•Intermediate-term (>7 days to 4-6 weeks) central venous access •Frequent or continuous vascular access •Limited peripheral access •Irritating/vesicant solutions that require greater haemodilution
Peripherally Inserted Central Catheter (PICC) •Outpatients -Single and multiple lumina	•Intermediate to long-term (>7 days) central venous access •Frequent or continuous vascular access •Irritating/vesicant solutions that require greater haemodilution

Indications

Intravascular Device Type	Indications
Tunnelled CVC +/- Anchoring Cuff -Single and multiple lumina	•Long-term central venous access (>3-4 weeks) •Frequent or continuous access •Irritating/vesicant solutions that require greater haemodilution
Totally Implantable Central Venous Access Port	•Long-term central venous access •Intermittent vascular access •Irritating/vesicant solutions that require greater haemodilution

CVC-related Infections

- Although CVCs provide necessary vascular access, their use puts patients at risk for local and systemic infectious complications and are an important cause of morbidity and mortality, as well as increased hospitalisation and healthcare costs

CVC-related Infections

- Risk factors for CVC-related bloodstream infections include:
  - Inexperience of the operator
  - Catheter insertion with less than maximal barrier precautions
  - Heavy colonisation of the insertion site
  - Contamination of the catheter hub
  - Increased frequency of catheter manipulation
  - Nurse to patient ratio
  - Type of device
  - Use of total parenteral nutrition
  - Patient characteristics
  - Contaminated equipment
  - Poor catheter management including lack of compliance with written Standard and Protocols

CVC-related Infection

CVC-related infection is caused by:

1. Colonisation of the external surfaces of the CVC by microorganisms from the patient’s skin.
   - This can occur through:
     - contamination of the catheter tip at the time of insertion
     - migration of skin organisms at the insertion site into the cutaneous catheter tract after insertion.[2]

CVC-related Infection

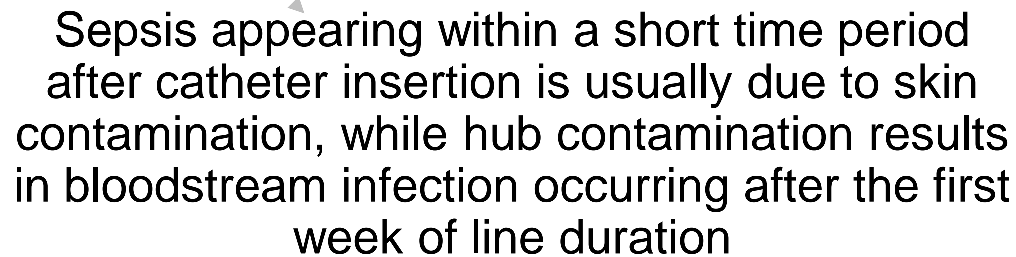
CVC-related infection is caused by:

2. Contamination of the catheter hub with distal spread of the organisms down the intraluminal surface.
   - This is largely thought to occur during handling of the connections at catheter junctions.[2]

CVC-related Infection

CVC-related infection is caused by:

3. Occasionally, the catheter becomes haematogenously seeded from another focus of infection.[2]
4. Rarely, by contamination of the fluid infusate.[2]

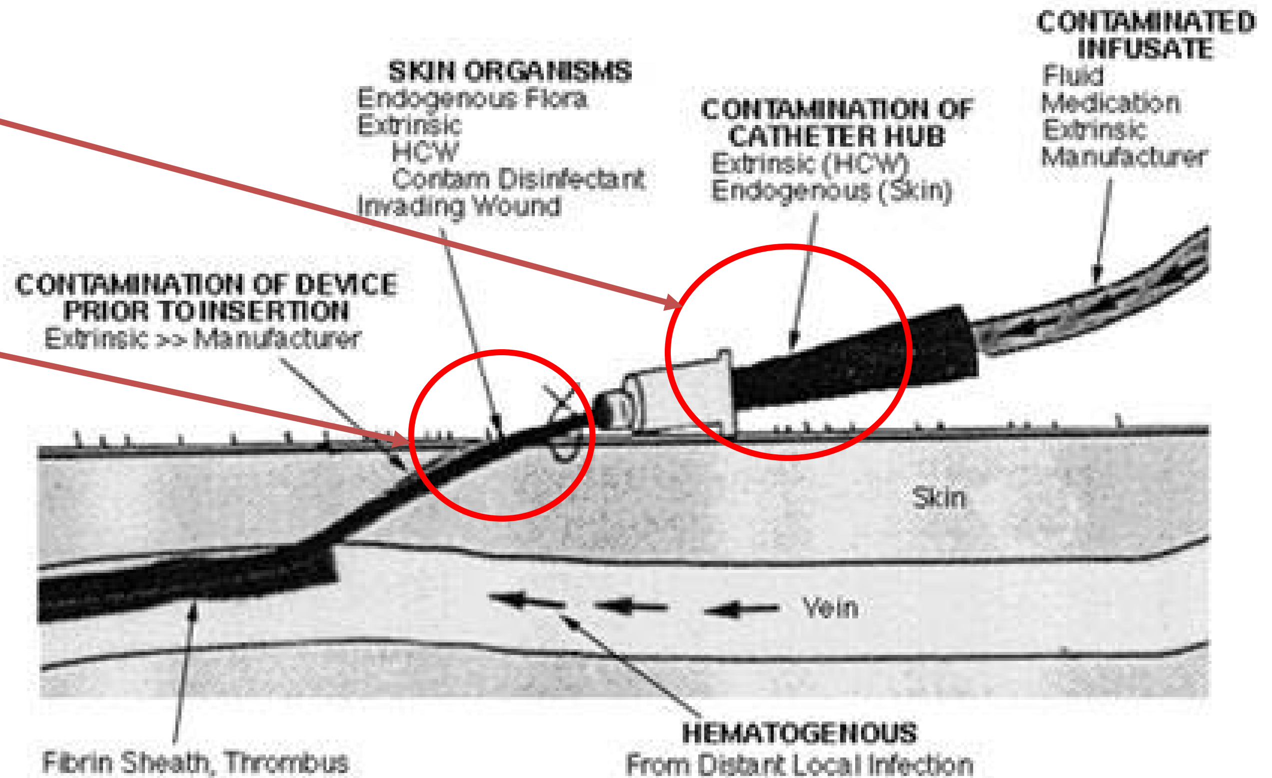


CVC-related BSI Prevention Strategies

- Maximal sterile barrier precautions
- Aseptic technique including hand hygiene
- Experience and knowledgeable personnel to insert
- Removal of the catheter when no longer needed
- Maintenance by IV Team or educated personnel
- Routine site care including type of dressing
- Routine replacement of IV administration sets and infusate
- Secure anchoring of the catheter
- Regular feedback of surveillance data

Consistent implementation of preventative strategies can reduce IVD-related BSI by 40%

Focus of prevention strategies



General Practices

- Only competent staff (or training staff supervised by competent staff) are to insert CVCs
- Insert CVC in an area where asepsis can be maintained
- A trolley/cart including all supplies necessary for inserting or rewiring a CVC including barrier precautions shall be dedicated for CVC insertion
- Set up sterile field immediately prior to the procedure

Hand Hygiene

- Perform hand hygiene with an appropriate product such as antiseptic-containing soap solution or alcohol-based waterless cleanser:
  - Before and after palpating catheter insertion sites
  - Before and after inserting an intravascular catheter
  - Before and after accessing, repairing, or dressing an intravascular catheter; including associated components such as administration sets and access ports
- Use of gloves does not obviate the need for hand hygiene

Maximal Barrier Precautions

- A key strategy to decrease the likelihood of CVC-related infection is to apply maximal barrier precautions:
  - the operator and any person who enters the sterile field to assist in the procedure, shall don a mask, sterile long-sleeved gown, sterile gloves and protective eyewear
    - A surgical cap shall be used to contain hair that may fall across the operator's face
  - Prep the catheter insertion site
  - Drape the entire body of the patient

Maximal Barrier Precautions

1. Don protective eyewear and surgical mask
   - The mask should cover the nose and mouth tightly

2. Wash hands and forearms for at least three minutes using an antiseptic soap solution
   - Dry thoroughly with a sterile towel

Maximal Barrier Precautions

3. Aseptically don sterile gown

4. Aseptically don sterile gloves
    - Ensure gloves cover cuff of gown

Maximal Barrier Precautions

- Prep insertion site with a solution containing 2% chlorhexidine gluconate (CHG) in ≥70% ethyl or isopropyl alcohol (unless contraindicated)

- Remove hair at the insertion site using clippers if required

- Physically clean the skin if necessary

- Don’t defat skin using alcohol, acetone or ether

Maximal Barrier Precautions

- Vigorously apply skin disinfectant to an area of skin approximately 30cm in diameter, in a circular motion beginning in the centre of the proposed site and moving outward, for at least 30 seconds
  - Repeat this step three times using a new swab for each application
  - Allow to air dry completely prior to inserting the catheter, do not wipe or blot

Maximal Barrier Precautions

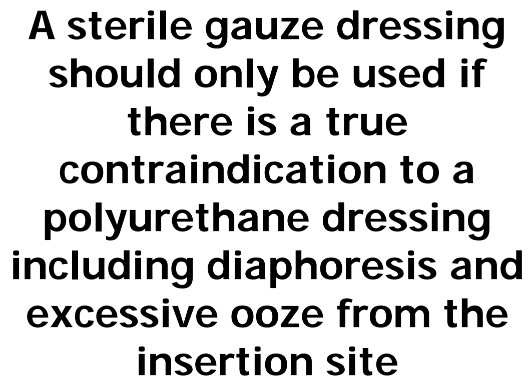
- Drape the entire body of the patient (while maintaining a sterile field) leaving only a small opening at the insertion site

Catheter Fixation

- Secure catheter to minimise to-and-fro pistoning of the catheter and subsequent catheter tract invasion by cutaneous microorganisms
- Do not apply antimicrobial ointments or creams to the insertion site

Catheter Dressing

- **Sterile, transparent, semi-permeable, self-adhesive, polyurethane dressings should be used**



Documentation

- Accurate documentation assists in patient safety, allows for audits, and assists to track any outbreaks of infection.

- Documentation should include:
  - Date and time of insertion
  - Type of IVD and gauge
  - Anatomical/insertion site
  - Name of operator
  - When device removed/replaced

References

1. Sansivero G. Venous Anatomy and Physiology: Considerations for vascular Access Device Placement and Function. *Journal of Infusion Nursing,* 1998 Sep/Oct; 21(5S): S107-S114.

2. Canadian Government Infection Control Guidelines, December 1997 http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/97vol23/23s8/iiadb_e.html#A (Internet access required)

You have now completed Part I
of this module

Please click here

to proceed to

Part II

I-Care is an initiative of the Centre for Healthcare Related
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