Prevention of Central Line-Associated Bloodstream Infections at MGH

Resident Training

Select contents adapted from a presentation developed by Brigham & Women's Hospital
AGENDA

- Educational Objectives
- Background & Impetus
- Pathogenesis of Central Line Infections
- Preventing Central Line Infections
- Post Test
# Educational Objectives

What should the viewer know after completing this presentation?

- Describe the significance & pathogenesis of line infections
- List at least four interventions that decrease line infection rates
- Describe the key aspects of the standard aseptic technique for line insertion at MGH
- Describe at least three violations of aseptic technique with the appropriate corrective actions
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## BACKGROUND

<table>
<thead>
<tr>
<th>What is the impact of Line Infections?</th>
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</thead>
<tbody>
<tr>
<td>● CVCs are a common medical device in ICUs</td>
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<tr>
<td>● CVCs cause an estimated 80,000 blood stream infections (BSI) each year in the U.S.</td>
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</tbody>
</table>
| ● The costs associated with a catheter related blood stream infection are high:
  | ○ Human - up to 28,000 deaths in ICUs with an attributable mortality as high as 35% |
  | ○ Financial - average incremental cost $45,000 per infection |
  | ○ Reputation – hospital specific infection rates are now public soon |

Why are we focusing on this?

- Recent evidence that a goal of zero central line related blood stream infections is achievable
- Consistent with MGH focus on evidence-based practice & high reliability care
- Internal mandate:
  - Charge from MGH Senior Leadership: reduce central venous catheter related BSI
  - Partners High Performance Medicine Goal
  - MGH Quality & Safety Goal
  - Infection Control Program Goal
- External Pressures:
  - increased visibility due to public reporting
  - Included as a National Patient Safety Goal by The Joint Commission
  - Payment withhold for healthcare-associated infections
AGENDA

- Educational Objectives
- Background & Impetus
- Pathogenesis of Central Line Infection
- Preventing Central Line Infections
- Additional Information
**PATHOGENESIS**

<table>
<thead>
<tr>
<th>Where do central line infections come from?</th>
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<tbody>
<tr>
<td>• Subcutaneous skin tract colonization</td>
</tr>
<tr>
<td>• Contamination of catheter hub or stopcock by patient flora or by healthcare workers (common)</td>
</tr>
<tr>
<td>• Contamination of infusate (rare)</td>
</tr>
<tr>
<td>• Seeding via the blood from a remote site</td>
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</tbody>
</table>
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- Pathogenesis of Central Line infection
- Preventing Central Line Infections
- Post Test
PROVEN TO MAKE A DIFFERENCE

Elements proven to reduce central line infections

- Hand hygiene with alcohol based hand rub
  - Before gloving and after removal of gloves
- Chlorhexidine skin prep
  - 30 second friction rub and must allow to air dry
- Maximum sterile barrier technique
  - Hat and mask for everyone in room
  - Sterile gloves and sterile gown for all operators
  - Head to toe sterile drape
- Avoiding femoral site
- Strict maintenance of sterile field during insertion
  - Technique must be monitored during placement via use of standardized checklist and presence of a monitor
  - Procedure is stopped and protocol violation corrected as needed during insertion – any member of the team can identify a violation
- *Daily assessment for removal of line*
### MGH CENTRAL LINE INSERTION POLICY

#### Components of the MGH central line insertion policy

- Line placement team include a **monitor** who watches for breaches in aseptic technique and stops the procedure if one occurs.
- All team members **empowered to stop the procedure** if aseptic technique is broken.
- Use of a **standardized kit or cart** with all components required to comply with infection prevention practices.
- **Use of a check list** during placement of all non-emergent central lines that documents aseptic technique requirements.
- Communication of compliance with aseptic technique during line placement by placing **checklist in medical record**.
- Use of a color coded sticker (red or green) as part of a **handoff procedure** to highlight lines placed using the aseptic technique practices above and those placed under emergent conditions.
- **CVC Insertion Policy** is located in the Infection Control Manual on the MGH Intranet in the Trove Library of Hospital Policies and Procedures.
# PROCEDURE FOR USING THE CHECKLIST

## Planning for a successful line insertion

- **Coordinate time for line placement with patient’s nurse or other designated monitor**
- Confirm consent present
- Complete “Time Out/Universal Protocol” per MGH policy
- Monitor: Observes sterile technique during placement of central line
- Monitor: Completes the central line insertion checklist
- Monitor and operator both sign checklist
- Checklist is placed in the progress notes section of the chart
- Courtesy and team work is expected and required from all members of the team
STANDARD ASEPTIC TECHNIQUE

Practices required by the central line insertion policy

- Hand hygiene with alcohol-based hand rub (Antimicrobial soap— as in a pre-op scrub is also acceptable. Soap on inpatient units is NOT antimicrobial, therefore alcohol-based hand rub is required.)
  - Before gloving
  - After removal of gloves
- Site preparation with chlorhexidine
  - 30 second friction rub
  - Must allow to air dry
- Maximum sterile barrier technique
  - Hat and mask for everyone in room
  - Sterile gloves & sterile gown for all operators
  - Full body drape (head to toe coverage)
- All equipment maintained on a sterile field & replaced if contaminated
- Sterile occlusive dressing applied
How to use the green & red stickers

- If all elements of the checklist are completed without a breach in aseptic technique (all boxes are marked ‘yes’):
  - Apply a **GREEN** sticker to the pigtail portion of the line

- If there has been an uncorrected breach in aseptic technique during any portion of the line placement:
  - Apply a **RED** sticker to the pigtail portion of the line
  - The sticker cues the receiving clinician to assess the risks and benefits of replacing the line

- Place the checklist in the patient’s medical record. It is helpful reference for making decisions regarding the circumstances of line placement

- A line with a **RED** sticker should be assessed for potential replacement within 24 hours
**BREAKS IN STERILE TECHNIQUE**

<table>
<thead>
<tr>
<th>Process for managing a break in sterile technique</th>
</tr>
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<tbody>
<tr>
<td>- The monitor, or any other team member, will state that there is a break</td>
</tr>
<tr>
<td>- Stop the procedure</td>
</tr>
<tr>
<td>- Agree upon corrective actions</td>
</tr>
<tr>
<td>- Execute corrective actions</td>
</tr>
<tr>
<td>- Resume procedure after all agreed upon corrective actions have been completed</td>
</tr>
</tbody>
</table>
# HANDLING BREAKS IN STERILE TECHNIQUE: EXAMPLES

<table>
<thead>
<tr>
<th>Break</th>
<th>Appropriate Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Guide wire tip touches non sterile object</td>
<td>● Remove contaminated wire from field and replace it with a new wire</td>
</tr>
<tr>
<td>2 Gloved hand touches non sterile object but no other part of field is contaminated</td>
<td>● Remove glove &amp; replace with new sterile glove</td>
</tr>
<tr>
<td>3 Patient becomes agitated &amp; sterile drapes are dislodged</td>
<td>● Take down all drapes &amp; equipment&lt;br&gt;● Attend to the patients needs, then start over</td>
</tr>
<tr>
<td>4 Non sterile object falls or is dropped onto sterile field</td>
<td>● Sterile field &amp; all associated equipment must be replaced</td>
</tr>
<tr>
<td>5 Operator uses hand hygiene prior to entering the room, repositions the bed &amp; side table, then dons sterile gloves</td>
<td>● Remove gloves&lt;br&gt;● Repeat hand hygiene immediately before donning sterile gloves</td>
</tr>
</tbody>
</table>
Sources: The checklist can be found in the central line kit, can be ordered from Standard Register (order # 85428) or found on the MetaVision system (for OR Anesthesia)

Destination: The completed checklist should be placed in the progress note section of the patient’s medical record.
**Common Questions & Answers**

<table>
<thead>
<tr>
<th>Q: What is the recommended method for drawing blood cultures?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A:</strong> Draw blood cultures through a peripheral stick. Blood cultures drawn through lines have an increased false positive rate.</td>
</tr>
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<tr>
<th>Q: When should guide wires be exchanged?</th>
</tr>
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<tr>
<td><strong>A:</strong> Guide wire exchange may be used to replace a mechanically defective line when there is no suspicion of infection. Scheduled guide wire exchange has not been shown to prevent central line infections and should not be used for that purpose. Guide wire exchange should not be used for a hemodynamically unstable patient when a catheter-related blood stream infection is suspected.</td>
</tr>
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<tr>
<th>Q: How should code &amp; emergency lines be handled?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A:</strong> During a code or emergency situation, it may be necessary to obtain central access without full adherence to aseptic technique. Lines must be flagged with a red sticker included in the standard line placement kit. Catheters placed using less than full aseptic technique should be assessed for replacement within 24 hours.</td>
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</table>
## Common Questions & Answers

<table>
<thead>
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<th>Q: What is the recommended method for skin prep with chlorhexidine?</th>
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<tr>
<td><strong>A:</strong> Scrub vigorously using a “back &amp; forth” motion for 30 seconds. To promote a persistent antimicrobial effect, apply friction to penetrate the epidermal layer. Be sure to cover a field larger than the insertion site. Allow the area to dry for 30 seconds prior to proceeding with line placement.</td>
</tr>
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<th>Q: How are central line infections coded and reported?</th>
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<tr>
<td><strong>A:</strong> The Infection Control Staff review all positive blood cultures and apply infection definitions from the Centers for Disease Control to determine if the infection is a central line infection. Central lines are catheters that terminate in the right atrium or great vessels. Central venous catheter blood stream infections are reported per 1000 line days for all ICUs.</td>
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<th>Q: Are line infections preventable?</th>
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<tr>
<td><strong>A:</strong> Yes, line infections are preventable. It requires 100% adherence to best practice guidelines. This level of adherence is achievable when the team is focused on patient safety.</td>
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1. Washing hands with plain soap prior to entering the room is appropriate aseptic technique prior to line placement:
   True  False

Answer - False: Hand-washing with plain soap alone is not sufficient: an alcohol-based rub, e.g., Cal Stat, or antimicrobial soap must be used. Hands must be disinfected upon entering the room and just prior to donning sterile gloves.
2. When using chlorhexidine, widely prep the target area with vigorous back and forth scrub for 30 seconds and allow the area to air dry (min. 30 seconds) before starting insertion:

True   False

Answer- **True**: Chlorhexidine binds to skin squames and provides persistent antibacterial activity when applied in this manner.
3. If the observer notes a breach in sterile technique, he/she should alert the team immediately so that the issue can be corrected in real-time if possible:

True False

Answer- True: See examples in presentation.
4. Every person entering the room during central line placement must wear a hat and mask:

True  False

Answer- True: Hats and mask reduce risk of airborne contaminants potentially compromising sterile field
5. Maximal sterile barrier means draping a sterile half sheet over insertion site.
   
   True False

   Answer - False: Maximal sterile barrier means that the patient is covered from head to toe with a sterile drape.
Thank you for your attention