

# PREVENTION OF CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS (CLABSI)

Corporate CLABSI Prevention Team

Target Audience: All healthcare workers inserting or managing central lines.

# Course Navigation

Advance through the course using the navigation bar on the bottom of the screen.

Just click the forward button (*shown below*)



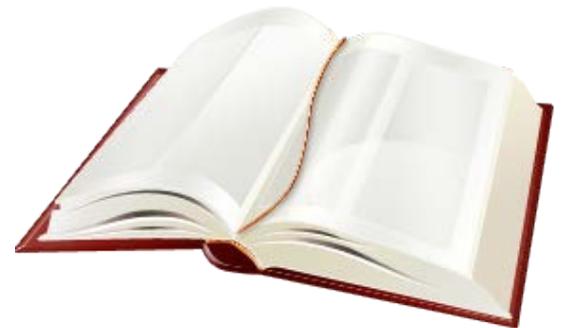
# Objectives

- Know the definition of a central line catheter
- Identify the classifications and types of central line catheters
- Discuss risk factors and sources of central line associated bloodstream infections (CLABSI)
- Understand management of central lines during and after insertion
- Identify clinical signs and symptoms of central line associated bloodstream infection (CLABSI)
- Describe interventions designed to prevent central line associated bloodstream infections. (CLABSI)



# Terms

- BSI – bloodstream infection
- CDC = Centers for Disease Control & Epidemiology
- CHG – chlorhexidine
- CVC = central venous catheter
- CLABSI = central line associated bloodstream infection



# General Information



- **48% of ICU patients have central venous catheters (CVCs)**, accounting for 15 million CVC-days per year in ICUs.
- The CDC estimates the attributable treatment costs associated with a bloodstream infection range from **\$35,000 to \$56,000/infection** and increase length of stay by an average of **7 days**.
- **>250,000 CVC-related infections per year.**
- **Mortality may be up to 35%.**

[CDC. Guidelines for the prevention of intravascular catheter-related infections. MMWR 2002;51\(No. RR-10\).](#)

# How do central lines cause bloodstream infections?

- Central venous catheters (CVCs) disrupt the integrity of the skin allowing bacteria and/or fungi to enter.
- Infection can spread to the bloodstream (bacteremia)
- Hemodynamic changes and organ dysfunction (sepsis) may ensue.

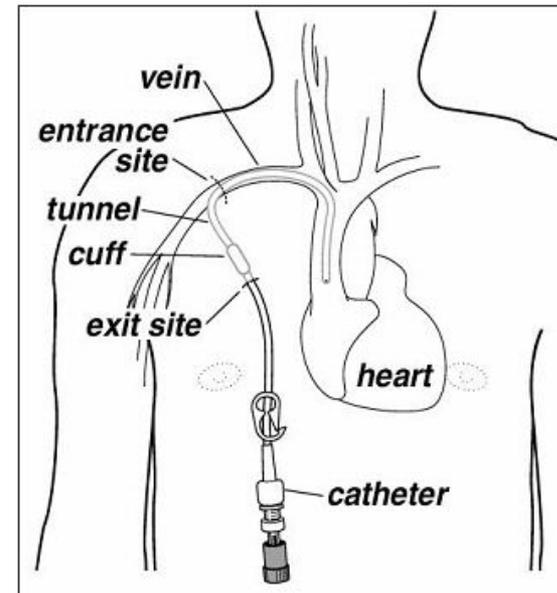
# CLABSI Definition



- A CLABSI is a primary bloodstream infection (BSI) in a patient that had a central line *within* the 48-hour period before the development of the BSI.
- For the Infection Preventionist to classify a CLABSI, nationally accepted criteria from the CDC should be met.

# What is a central line?

- An intravascular catheter that terminates at or close to the heart or in one of the great vessels. This line is used for infusion, withdrawal of blood, or hemodynamic monitoring.
- Great Vessels include:
  - Aorta
  - Superior vena cava
  - Inferior vena cava
  - Brachiocephalic vein
  - Internal jugular vein
  - Subclavian vein
  - Pulmonary artery
  - External iliac vein
  - Common femoral vein
  - *In Neonates* count, Umbilical Vein
- Note: insertion site and/or type of device does not define a central line.



# The following classify as Central Lines

(may not be all inclusive) . . .

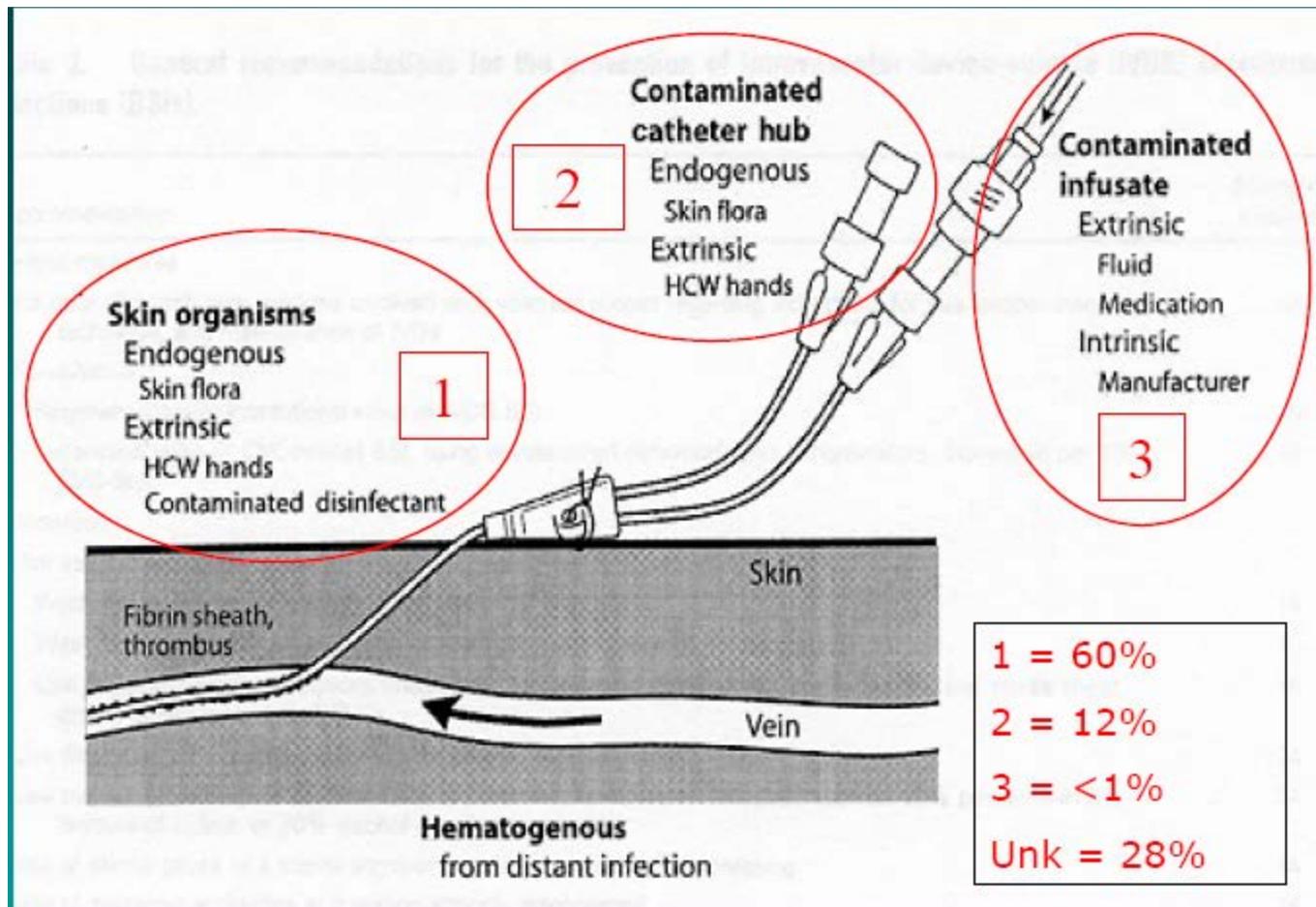
- ❑ Subclavian, Femoral or Internal Jugular (single, double, triple or quad)
- ❑ Introducer [Cordis]
- ❑ Swan Ganz catheter
- ❑ PICC
- ❑ Hemodialysis Vas-Caths (tunneled and non-tunneled)
- ❑ Implanted ports (i.e., Port-a-caths)
- ❑ Umbilical (UVC)



# Sources of CLABSI's

- Migration of skin organisms at the insertion site into the cutaneous catheter tract with colonization of the catheter tip is the most common route of infection.
- Contamination of the catheter hub also contributes to intraluminal colonization of long-term catheters.
- Rarely, contamination of the infused fluid leads to infection.

# Pathogenesis



Safdar N, Maki DG. The pathogenesis of catheter-related bloodstream infection with noncuffed short-term central venous catheters. *Int Care Med* 2004;30:62-7.

# Clinical Features of Line Sepsis

## □ *Nonspecific*

- Fever
- Chills, shaking rigor
- Hypotension, shock
- Hyperventilation
- Gastrointestinal
  - abdominal pain
  - Vomiting
  - Diarrhea
- Neurologic
  - confusion
  - seizures

## □ *Highly Suggestive of Line Sepsis*

- Source of sepsis unapparent
- Patient unlikely candidate for sepsis
- Intravascular line in place (or recently in place)
- Inflammation or purulence at site
- Abrupt onset, with shock
- Sepsis response to antimicrobial therapy or dramatic improvement after removal of device

# What can we do to prevent a CLABSI?

## Patient/Family Education Prior to Central Line Insertion

- ❑ Ensure the patient (and family as needed) are educated about central line infection prevention prior to the procedure being performed.
- ❑ Document the education on the patient's medical record.
- ❑ Patient education flyer can be obtained by going to the Novant Health Intranet PATIENT EDUCATION SITE >>PATIENT INSTRUCTIONS >>SPECIFIC FACILITY(IES) >>INFECTION CONTROL >>SPECIFIC PATIENT INSTRUCTION DOCUMENT IN ALPHABETICAL ORDER

# Central Line Bundle Compliance

- The central line bundle is a group of **evidence based interventions** for patients with intravascular central catheters that, when implemented together, result in better outcomes than when implemented individually.
- The science behind the bundle is so well established that it should be considered standard of care.
  
- Key Components:
  1. hand hygiene
  2. maximal barrier precautions (both for the patient and the inserter) when placing a central line
  3. chlorhexidine skin antisepsis
  4. optimal catheter site selection (subclavian preferred site)
  5. daily assessment of line necessity with prompt removal of unnecessary line

# Prior to Insertion

## Demand Strict Hand Hygiene



Observe proper hand washing procedures either with conventional antiseptic-containing soap and water or with alcohol-based hand rub.

# Insertion:

- The person inserting the central line should:  
**Select an optimal catheter site**, with subclavian vein as the preferred site for non-tunneled catheters in adults (if not contraindicated).



# Insertion:

The person inserting & those assisting should don maximal barrier precautions.



Head cover

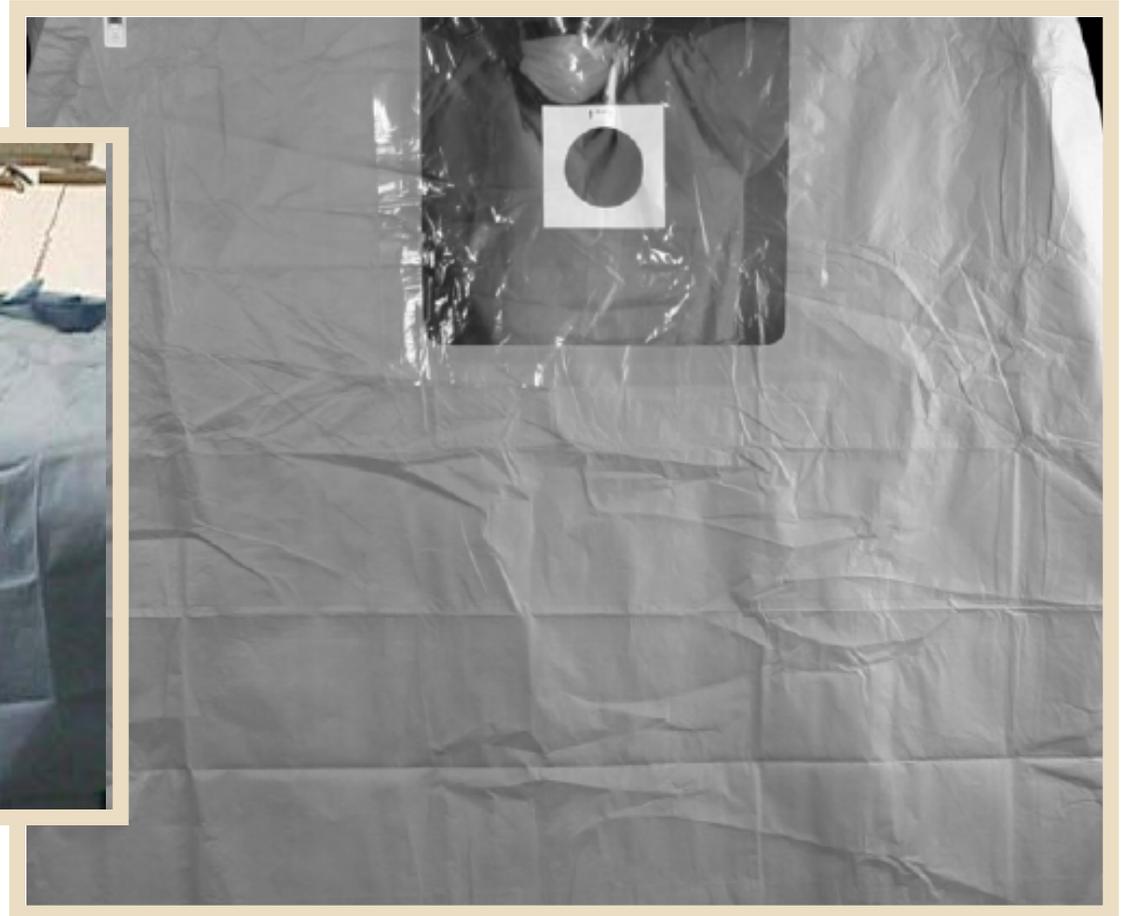
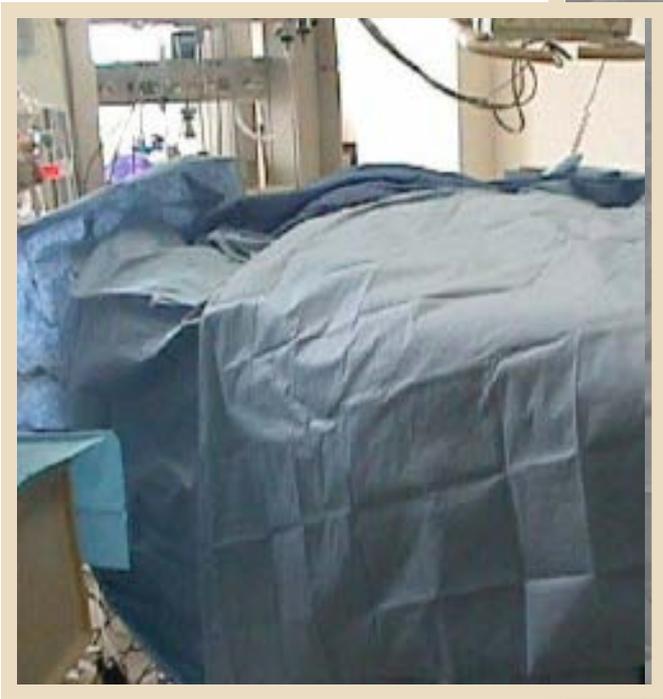
Mask

Sterile Gloves

Sterile Gown

# Maximal Patient Barrier:

- ▣ Drape the patient with the full body drape (head-to-toe).



# Maintain a Sterile Field

During the Insertion:



# Insertion:

The person inserting the central line should:

Use chlorhexidine skin prep in a back-and-forth friction scrub.

- ▣ For the so-called dry sites (**subclavian or jugular**), prep for at least 30 seconds – allowing a **30 second dry time**.
- ▣ For the wet sites (**femoral or groin**), prep for at least **2 minutes with a 1 minute dry time**.
- ▣ Ensure that solution dries completely before attempting to insert the central line.

# Chlorhexidine Alert . . .

## Chlorhexidine should not be used on:

- Infants less than 2 months of age

*(unless approved by your facility)*

or

- Anyone with a chlorhexidine sensitivity or allergy.
  - ▣ For those meeting the above alerts, 10% povidone-iodine or 70% alcohol may be used as an alternative skin prep.
  - ▣ If inserting an umbilical central line, avoid tincture of iodine because of the potential effect on the neonatal thyroid. Other iodine-containing products (e.g., povidone-iodine) can be used.

# After Initial Insertion

- Apply occlusive sterile dressing per your facility's policy.
- Use existing order set (if available) or obtain MD order for a chest x-ray to verify central line catheter tip placement.
- No fluids/medications should be administered via the line until verification of placement is done unless in an emergent situation.
- After placement has been verified
  - ▣ Connect **NEW** administration sets and fluids to ports
  - ▣ **NEVER** connect previously used IV tubing to the new central venous access line.



# Line Necessity

- Daily review of **central line necessity** may prevent delays in removing lines that are no longer needed.
- Many times, central lines remain in place simply because of their reliable access and because personnel have not considered removing the line.
- However, it is clear that the risk of infection increases over time as the line remains in place and that the risk of infection is decreased if removed.

# Daily Review of Line Necessity

- Every day, ask the following:
  - Does the patient still need the line?
    - If yes, can a less risky catheter be used? (e.g., triple lumen to a peripheral)?
    - If no, can we remove the line today?
- **A central line may be considered necessary for the following:**
  - long-term antibiotics,
  - multiple IV antibiotics,
  - multiple blood / blood products,
  - vesicant drugs (Dopamine, Dilantin, Vancomycin) or irritant drugs (Cefoxitin, Fortaz),
  - TPN,
  - chemotherapy,
  - hemodynamic monitoring,
  - reliable access (IV fluid therapy, frequent blood draws, pain management).

# Daily Review of Line Necessity

Daily, the RN is to document the line's necessity on the Central Line Necessity / Daily Review tool.

## CENTRAL LINE NECESSITY / DAILY REVIEW:

**Goal: To reduce central line associated infections and other complications**

Insertion Unit Location(s): \_\_\_\_\_

To be completed by RN caring for the patient daily for as long as the line is in place.

Review line necessity daily and check appropriate box.

**A central line may be considered necessary for the following:** (1) long-term antibiotics, (2) multiple IV antibiotics, (3) multiple blood / blood products, (4) vesicant drugs (Dopamine, Dilantin, Vancomycin) or irritant drugs (Cefoxitin, Fortaz), (5) TPN, (6) chemotherapy, (7) hemodynamic monitoring, (8) reliable access (IV fluid therapy, frequent blood draws, pain management).

Date	RN Initials	YES Line continues to be necessary.	If yes, list the reason number(s) from above.	NO Line is not necessary & can be discontinued.
		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>		<input type="checkbox"/>
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		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>		<input type="checkbox"/>

❖ DATE CENTRAL LINE REMOVED or patient discharge (which ever comes first): \_\_\_\_ / \_\_\_\_ / \_\_\_\_

PATIENT Label

**NOVANT HEALTH**  
Central Line Necessity

# Dressing Changes

- ❑ Replace catheter-site dressing if it becomes damp, loosened, or visibly soiled or when inspection of the site is necessary.
- ❑ Dressing changes are to be done based on your facility's policy and line type.
- ❑ Chlorhexidine is the preferred cleansing agent. When cleansing the dressing site, use chlorhexidine (CHG) swab or other approved agents per your facility's policy.



# Dressing Changes (continued)

- ❑ Do not use topical antibiotic ointment or creams on insertion sites (**except dialysis catheters**).
- ❑ Do not submerge the catheters under water.
- ❑ Visually inspect site for swelling, erythema or drainage. If any of these symptoms are present notify physician.
- ❑ Do not use acetone or adhesive remover to remove old dressings.
- ❑ Transparent dressing material will release when stretched.

# Administration Sets

- Replace administration sets, including secondary sets & add-on devices, no more frequently than at 72-hour intervals, unless CLABSI is suspected or documented.
  - ▣ Exception: Administration sets that have been intermittently disconnected from the patient (open system) shall be changed every 24 hours and immediately upon suspected contamination or when the integrity of the product or system has been compromised.
- Replace tubing used to give blood/blood products after each unit of blood/blood product is given.

# Provide optimal care for IV Injection Ports



- Prior to accessing the port, clean it per the manufacturer's guidelines (**10 twists with 70% alcohol**) and allow to air dry before accessing the system. (No blowing or fanning).
- Cap all central line ports when not in use.
- Change caps no more frequently than every 72 hours and at least every 7 days or according to the manufacturer's recommendations.

**EXCEPTION: Change the cap when:** it has been removed for any reason or any time the cap appears damaged, is leaking, blood is seen in the catheter without explanation, blood residue in the cap or when cap has been laid down on a non-sterile surface.

# Hemodialysis Catheters

- Do not use hemodialysis catheters for blood drawing or applications other than hemodialysis except during dialysis, under emergency circumstances or with MD order.
- Use povidone-iodine antiseptic ointment at the hemodialysis catheter exit site after catheter insertion and at the end of each dialysis session only if this ointment does not interact with the material of the Hemodialysis catheter per manufacturer's recommendation.



# References

- [http://www.cdc.gov/nhsn/PDFs/pscManual/4PSC\\_CLABScurrent.pdf](http://www.cdc.gov/nhsn/PDFs/pscManual/4PSC_CLABScurrent.pdf)
- <http://www.ihi.org/IHI/Programs/Campaign/CentralLineInfection.htm>
- CDC. Guidelines for the prevention of intravascular catheter-related infections. *MMWR* 2002;51(No. RR-10)

CONGRATULATIONS!

You have now completed  
Prevention of CLABSI

*Please continue to the test instructions on the next slide*

# Post Test

**1. The CDC estimates the attributable treatment costs associated with a bloodstream infection range from \$35,000 to \$56,000/infection and increase length of stay by an average of 7 days. (Circle one)**

True      or      False.

**2. A CLABSI is a primary bloodstream infection (BSI) in a patient that had a central line *within* the 48-hour period before the development of the BSI. (Circle one)**

True      or      False

**3. A central line is an intravascular catheter that terminates at or close to the heart or in one of the smaller peripheral vessels. (Circle one)**

True      or      False

**4. Which of the following classify as a central line?**

- a. Subclavian, Femoral or Internal Jugular (single, double, triple or quad)
- b. Introducer / Cordis
- c. Swan Ganz catheter
- d. PICC
- e. Hemodialysis Vas-Caths (tunneled and non-tunneled)
- f. Implanted Ports (i.e., Port-a-caths)
- g. Umbilical (UVC)
- h. All of the above

## Post test (Cont'd)

### 5. Sources of central line infections are:

- a. Migration of skin organisms at the insertion site into the cutaneous catheter tract.
- b. Contamination of the catheter hub.
- c. Contamination of the infused fluid.
- d. All of the above

### 6. The central line bundle is a group of evidence based interventions for patients with intravascular central catheters that, when implemented together, result in better outcomes than when implemented individually. *Circle one*

True                      or                      False

### 7. Key components of the evidence based central line insertion checklist includes:

- a. hand hygiene
- b. maximal barrier precautions (both for the patient and the inserter) when placing a central line
- c. chlorhexidine skin antisepsis
- d. optimal catheter site selection (subclavian preferred site in an adult)
- e. daily assessment of line necessity with prompt removal of unnecessary line
- f. All of the above

### 8. Prior to the insertion of the central line the patient should be:

- a. Educated about the central line and how to prevent infection.
- b. Draped with a full body drape (head to toe).
- c. Given a pair of sterile gloves.
- d. All of the above.
- e. A and B

# Answer Key

1. True
2. True
3. False
4. H
5. D
6. True
7. F
8. E

Certificate of Completion  
is hereby granted to

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to certify that he/she has completed

Prevention of  
Central Line-Associated Bloodstream  
Infections (CLABSI)