REDUCING CENTRAL LINE INFECTIONS In Post Operative Cardiac Surgery Patients

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Background information

- National Patient Safety Goal is to reduce the risk of healthcare associated infections
- Over 250,000 Central Line Associated Bloodstream Infection occur in the United States every year
- Approximately 90% of the catheter-related bloodstream infections (CLABIs) occur with central lines
- Approximately 5.3 central line infections occur per 1,000 catheter days in ICUs
- Average cost of patient care with BSI is $45,000 meaning that annual costs could reach $2.3 billion
Incidence

- Catheter Related Blood Stream Infections occur in 3-7% of catheters
- Affecting more than 200,000 patients in the United States annually
- CR-BSI are associated with a 25% mortality rate in ICU patients infected
Adverse Outcome Associated with CLABIS

- 12-15% estimated mortality rate
- Increase length of stay
- Average cost of $25,000 per episode
What Is CLABSI?

- Bacteremia/fungemia in a patient with an intravascular catheter
- with:
  - At least one positive blood culture obtained from a peripheral vein
  - Clinical manifestations of infection (i.e., fever, chills, and/or hypotension)
  - No apparent source for the bloodstream infection except the catheter
- BSIs are considered to be associated with a central line if the line was in use during the 48-hour period before the development of the bloodstream infection
- If the time interval between the onset of infection and device use is greater than 48 hours, there should be compelling evidence that the infection is related to the central line”

(Centers for Disease Control and Prevention. Guidelines for the Prevention of Intravascular Catheter-Related Infections. MMWR 2002;51(No.RR-10):[p. 6].)
Risk Factors

- Prolonged hospitalizations
- Heavy microbial colonization at insertion site and/or catheter hub
- Neutropenia
- TPN
- Substandard care of Central Line
Potential Causes:

**Line Maintenance**
- Line not changed on timely basis
- Line in for too long
- Dressing not changed using aseptic techniques
- IV tubing not labeled properly to change
- Line not manipulated appropriately

**Technique not adequate**
- Not compliant with hand hygiene
- Line inserted w/o sterile technique
- Inadequate use of maximal barrier precautions
- Inadequate prep before insertion
- Femoral line chosen instead of sub clavian

**Lack of Education and Staffing**
- Inexperienced residents and clinicians
- Clinicians not knowledgeable about Central Line Bundle
- Nurses do not properly know how to change dressings
- MD does not get someone to assist with line insertion
- Nurses too busy to check & change dressings

Central Line–Associated Bloodstream Infection
Beginning Oct. 1, 2008, the Centers for Medicare and Medicaid Services (CMS) will no longer provide reimbursement over and above the typical Inpatient Prospective Payment System (IPPS) rate for care required to battle several types of healthcare-associated infection, also referred to as hospital-acquired infection (HAI).

CMS collaborated with the Centers for Disease Control and Prevention and other healthcare groups to identify a number of hospital-acquired conditions that were high volume, high cost, or both and “could reasonably have been prevented through the application of evidence-based guidelines.
Increasing Importance of CLAB Cost

October 2008 - lack of reimbursement for hospital acquired bloodstream infection

Estimates a cost range of $34,000 to $56,000 per each CLAB

Medicare estimates savings of $20 million per year

Estimate of cost per CLAB at AMC $45,000
The IHI recommends the implementation of a BSI “Bundle” which includes:

- Hand Hygiene before and after the procedures.
- The use of maximal sterile barriers for insertion which include: a cap covering all hair, a mask with eye protection, sterile gown, sterile gloves and a large sterile drape to be placed over the patient. The sterile drape should cover the patient from head to toe.
- Skin antisepsis with 2% chlorhexidine. Chloroprep is the approved antiseptic agent at AMC.
- Daily, assessment of the need for the central line with prompt removal of unnecessary lines.
What are Central Line Bundles?

1. Optimal Selection of insertion site
2. Hand Hygiene
3. Maximal Barrier Precautions
4. Chlorhexidine Skin Antisepsis
5. Daily review of Central Line necessity
AMC has implemented components of the BSI bundle in 2008/2009 and have revised the Insertion and Management of Central Vascular Catheters policy (IC23A) to include IHI bundle recommendations.
Analysis of AMC data indicates that 17% of the bloodstream infection develop within the first two days after insertion and 83% after the first two days. This suggests contamination during line access or site care rather than insertion as the source of contamination (AMC, Department of Epidemiology 2007). **Nurses can make a significant impact on the infection rate!**
Why Is This Important?

- Quality of care:
  - CLABIs increase morbidity and mortality of patients
- Increase LOS
- Compromise patient safety
- Eliminating CLABIs improves patient satisfaction and final patient outcome
PREVENTING CATHETER RELATED BLOODSTREAM INFECTION

AACN: Expected Practice:

- Cleanse hands with waterless cleaning solution or, if visibly soiled, with soap and water before and after patient contact.
- Disinfect clean skin utilizing friction with an appropriate antiseptic (preferably 2% chlorhexadine) before catheter insertion and during site care.
- Utilize full barrier precautions when inserting central venous access devices.
- Educate all staff inserting and caring for intravascular catheters, assess competency of same at regular intervals, advocate adherence to standards of care.
- Replace peripheral IV sites in the adult patient population at least every 96 hours but no more frequently than every 72 hours. Leave peripheral venous catheters in children until IV therapy is completed, unless complications (e.g., phlebitis and infiltration) occur.
- Replace IV tubing as indicated in VAD Protocol.
A substantial proportion of hospital-acquired infections result from cross-contamination from the hands of healthcare workers. Alcohol-based hand rub, compared with traditional handwashing with unmedicated soap and water or medicated hand antiseptic agents, may offer better results because it requires less time, acts faster, and is less likely to irritate skin. Thus, the CDC recommends the use of alcohol-based hand rubs between patient contacts as an adjunct to traditional handwashing alone.

**Chlorhexidine gluconate** solutions utilized for vascular catheter site care reduce catheter-related bloodstream infections and catheter colonization more effectively than povidone-iodine solutions. Moreover, 80% of resident and transient skin flora are found in the first five epidermal layers of the skin. There is clinical evidence to support the efficacy of applying antiseptics with sufficient friction to assure that the solution reaches into the cracks and fissures of the skin. There is no evidence that supports use of traditional concentric prepping technique. Although a 2% chlorhexidine-based preparation is preferred, tincture of iodine, an iodophor, or 70% alcohol can be used. Allow any solution used to dry before the catheter is inserted.

Compared with peripheral venous catheters, CVCs carry a substantially greater risk for infection; therefore, the level of barrier precautions needed to prevent infection during insertion of CVCs should be more stringent. Maximal sterile barrier precautions (e.g., cap, mask, sterile gown, sterile gloves, and full body sterile drapes) during the insertion of CVCs substantially reduce the incidence of CRBSI compared with standard precautions (e.g., sterile gloves and small drapes). There are some studies that demonstrate infection rates are lower when the subclavian site is used. Selection of central line insertion site, however, is based on patient risk factors.
Time Out

**JCAHO Requirement**

- 2 health care professionals must be present at all times during the insertion
- Limit traffic into and out of the room while a central line is being inserted, maintained or removed
Implications for Nursing: Insertion

- New Insertion packs have been developed which will include all the required barriers for central line insertions.
- A second person (a second resident or RN) is to be present during insertion to support the patient and the practitioner performing the insertion.
- Remember: **TIME OUT** before this and every invasive procedure. Stop the procedure if all requirements are not met.
- The nurse has the authority and responsibility to **HARD STOP** the insertion or replacement of a central line if they identify failure to comply with hand hygiene, chlorhexidine (CHG) for skin prep (unless contraindicated) or maximal sterile barriers.
Assessment & Care

- **Dressing changes:** to be done according to the Vascular Access Device (VAD) Management Protocol (Revised 4/27/07).

- VAD dressing changes are done using **aseptic technique and 2% Chlorhexidine Gluconate**

- **Cleanse** positive pressure valve devices with **70% alcohol** before accessing the system. (“Scrub the Hub”)

- Daily assessment of the need for the central line.

- Limit breaking open closed system (i.e: administering medications, changing shirts, etc..)
Remember: Prevention is Key!

- Hand Hygiene is Important!!
- Maintain aseptic technique
- Dressing changes according to VAD protocol
- “Scrub the hub”
- Ensure that everyone within 3 feet of patient receiving a dressing change is wearing a mask-
Chlora Prep

Do not blot or wipe away
Use a back-and-forth motion(>FRICITION) to prep the site for at least-30 seconds, then continue to work outward to the peripheral area
Dry time: Allow the area to air-dry for approximately 30 seconds on dry sites and approximately one (1) minute on moist sites
Line Access

- Blood specimen collection
  - **SCRUB** (not swab) the hub with alcohol (The current needleless system required the access port be scrubbed with alcohol prior to use.)
Blood Cultures

- Routine BC require two peripheral blood specimens drawn from separate physical sites in immediate sequence.
- If peripheral BC can not be obtained then ONLY with a prescriber’s order can a BC be drawn from a VAD/central line.
CLABSI Action Plan initiated on CPS/C8 in 12/2008

- CHG protection- CABG patients used a 3M tegaderm CHG dressing for TLC catheters in place of the Biopatch
- Decrease unnecessary IV connections/disconnections
- **New 3 Port Adapters for the maintenance lines:**
  - connect the maintenance IV to the middle port
  - connect potassium, calcium, and magnesium to the outer ports & keep connected until maintenance IV DC’d (piggy back either the calcium or magnesium to the potassium tubing)
  - connect IV Insulin directly to the maintenance line

- When detangling IV lines—for all meds except pressors, place IV pump on hold, clamp the IV tubing, remove tubing from the pump, & detangle lines without disconnecting IV tubing from the patient
Additional Practice Changes

- Two staff members to change a central line dressing
- Vascular Access Device competency
- Avoid the use of stopcocks, whenever possible
- Use a sterile drape when changing PICC lines
- Wrap an ABD pad around the connection sites of the IJ TLC/PA catheter to provide a barrier from patient secretions (saliva, sputum, or emesis)
One study has shown that proper hand washing and other simple procedures can decrease the rate of catheter-related bloodstream infections by 66 percent.
Germ Farm

Scrub'em!

www.1st-in-handwashing.com
Quality Improvement Initiative

- Importance of the practice changes
- Implementation of practice changes for nursing
- Comparative data before and after nursing implementation of practice changes
- IRB
DATA

- IRB approval
- Quality Improvement award post op cardiac units
- Dialysis patient
REFERENCES


References
