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CENTRAL LINE ASSOCIATED BLOOD STREAM INFECTION: HOW IT CAN BE PREVENTED?

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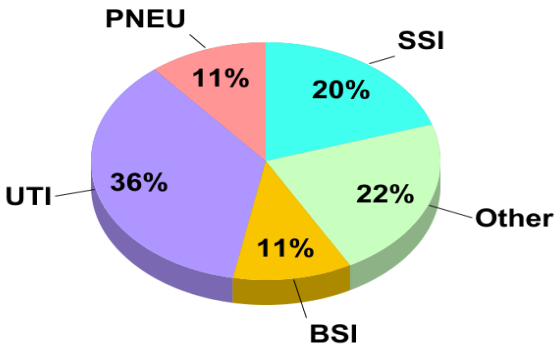
ABSTRACT
Central line associated blood stream infection is the blood stream infection after insertion of central venous catheter. Catheter related blood stream infection is leading cause of blood stream infection particularly in ICU where it is leading cause of mortality and morbidity as well as increased health care cost. Many guidelines have given central line care bundles for prevention of central line based blood stream infection. However most of the caregivers are unaware of the guidelines for caring the central venous line.

INTRODUCTION

A central line is a vascular infusion device that terminates at or close to the heart or in one of the great vessels. It is used in inpatient and outpatient clinical setting for long term venous access for patients with a variety of illness and conditions. The catheters are now in common use in variety of health care settings more commonly in high dependency areas. Approximately 48% of the patients in intensive care units have a central line, accounting for 15 million central line days per year.

Healthcare-associated infections (HAIs) are infections acquired during the course of receiving treatment for other conditions within a healthcare setting. HAIs are one of the top 10 leading causes of death in the United States, according to the Centers for Disease Control and Prevention (CDC), which estimates that 1.7 million infections annually were reported among patients.



Catheter related blood stream infection is leading cause of blood stream infection particularly in ICU where it is leading cause of mortality and morbidity as well as increased health care cost.[2]

Central line-associated BSI (CLABSI): A laboratory-confirmed bloodstream infection (LCBI) where central line (CL) or umbilical catheter (UC) was in place for >2 calendar days on the date of event, with day of device placement being Day 1.

Indications for placement of central line:

- Monitoring of central venous pressure in acutely ill patients to quantify fluid balance.
- When venous access is poor.
- When embarking on prolonged intravenous chemotherapy and/or Total Parenteral Nutrition(TPN)
- For repeated administration of blood products
- When intravenous therapy involves drugs known to be venous sclerosants.
- When ambulatory chemotherapy is to be given as an outpatient
- In the situation of repeated sampling or venesection.
- Long term pain medication

Of the approximately 249,000 BSIs that occur in U.S. hospitals each year, 80,000 (32.2%) occur in intensive care unit (ICU) settings according to a study conducted by Sazman M B etal in the year 1995.[3] Because CVCs are more frequently used in ICUs than in other areas of the hospital, and the strongest predictor of developing a Blood stream infection is the presence of a central venous catheter, the epidemiology of CLABSI has traditionally focused on the critically ill.

With over 15 million catheter days in ICUs annually, the potential impact of CLABSI is substantial in this population alone. A recent analysis estimated that each CLABSI episode independently increases length of hospitalization from 7 to 21 days. Totally implantable central venous catheters may be associated with a lower risk of infection. Coagulase-negative staphylococci are the predominant cause and account for about one third of episodes of catheter-related bloodstream infection.

According to 2011 Center for Disease Control (CDC) guidelines and central line care bundles by the institute for healthcare improvement (IHI), prevention measures for catheter-related bloodstream infections include the following: hand hygiene, maximal barrier precautions insertion, chlorhexidine skin antisepsis, optimal catheter site selection, proper catheter maintenance, insertion site care, and daily review of line necessity, with prompt removal of unnecessary lines.

The diagnosis of catheter-related bloodstream infection is often difficult because there are frequently no signs of inflammation around the catheter. Most catheter-related infections occurring shortly after catheter insertion probably gain access to the bloodstream by extraluminal migration along the catheter from the skin at the catheter insertion site. When catheters are in place for extended periods, especially greater than 30 days, the catheter hub probably plays a major role in microorganisms gaining access and then migrating endoluminally until reaching the bloodstream.

Care of the central venous line catheter:
The main objective of central line care is to reduce the catheter related blood stream infection. The patients with central line should be closely monitored for any signs of infection. This ultimately helps in reducing health care cost. Research studies shows that CVC-ABSIs rates are increasing and more than 85% of CVC-ABSIs occur in the non-ICU setting, accounting for 33% of largely preventable CVC-ABSIs with the implementation of a multifaceted infection control programme.[6]

Recently employed strategies for the prevention of catheter-related infections include topical antibiotics or antiseptics at the catheter insertion site, flush solutions containing vancomycin, and bonding antimicrobial agents to the catheter.[2]

S. aureus more commonly inhabits the skin and thus might be a more common cause of insertion-related infections; therefore, the smaller reduction among other pathogens suggests a need for improved implementation of post-insertion line-maintenance practices and strategies to ensure prompt removal of unneeded central lines. In addition, reductions in *S. aureus* CLABSIs likely were enhanced by widespread efforts to interrupt transmission of methicillin-resistant *S. aureus*. Implementation of CDC-recommendations to maintain central lines, remove them promptly when they are no longer needed, and interrupt transmission of resistant bacteria. Hand hygiene is the most effective way to prevent transmission of infection. Healthcare workers' hands are the most common vehicle for the transmission of health care associated pathogens from patient to patient and within the healthcare environment. Hand hygiene is the leading measure for preventing the spread of antimicrobial resistance and reducing HAIs. In 2005, WHO introduced the first Global Patient Safety Challenge "Clean Care is Safer Care (CCiSC)" In 2006, advanced draft guidelines on "Hand Hygiene in Health Care" were published and a suite of implementation tools were developed and tested.[8]

In a study conducted by Leon C et al in 2003, it was found that new antiseptic chamber containing hub is effective in preventing endoluminal bacterial colonization and blood stream infection from hub contamination in patients with CVC for more than 6 days.[4]

According to another study by Chopra V et al, in the year 2013 the mean incidence of catheter-related bloodstream infection in hospitalized pediatric patients is 2.4 episodes per 1,000 days.[2]

Infection of peripheral and central venous catheters generally resolves after catheter removal. For tunneled silicone catheters, most episodes of catheter-related infection can be initially managed with antimicrobial therapy infused through the catheter without catheter removal. Staphylococcus aureus is generally more aggressive and associated with more complications than coagulase-negative staphylococci.[2]

Daily bathing of critically ill patients with the broad-spectrum, topical antimicrobial agent chlorhexidine is widely performed and may reduce health care–associated infections. One study was conducted by Climo MW et al in the year 2013 in which they found that Daily bathing with chlorhexidine-impregnated washcloths significantly reduced the risks of acquisition of MDROs and development of hospital-ac quired bloodstream.[5]

Two studies assessed the variable for the fixation of dressing, one of which assessed gauze and tape fixation and the other assessed the fixation of the chlorhexidine dressing. Clinical trial assessing gauze and tape dressing shows that 50% of the dressings used in the analyzed catheters presented poor fixation and required early changing. In study, the rates of poor fixation found for both the gauze and tape and chlorhexidine dressings were lower than that reported in the literature. Both technologies are effective in covering central venous catheter.[9]

Through disinfection of intravenous access points the CLBBSI can be prevented. The literature suggests that

placing disinfectant caps over needleless connectors decreases risk of central line based blood stream infection. In one study by Merill CK et al in Dec 2014, in addition to an existing standard central line bundle, a new intervention consisting of a luer-lock disinfectant cap with 70% alcohol was implemented in all intravenous (IV) needleless connectors on patients with peripheral and central lines. Use of a disinfectant cap on IV needleless connectors in addition to an existing standard central line bundle was associated with decreased CLABSI and costs.[10]

Central line care bundle can effectively reduce the rate of CLBBSI. In another study by Tung HJ et al in the year 2014 in Taiwan, the rate of CLABSI significantly declined from 1.65 per 1000 catheter-day during the pre-intervention (of care bundle) period to 0.65 per 1000 catheter-day post-intervention period.[11] Effectively preventing central venous catheter-related bloodstream infections can enhance care quality and move healthcare closer to achieving the goal of zero tolerance.[11]

CONCLUSION

Many of these patients develop central line based blood stream infection which one of the unwanted and fatal hospital Acquired Infections. This apart from bringing physical discomfort, affecting the quality of life of patients also lays a heavy financial burden on the patient and his family and puts a constant challenge on the health care professionals to remove its untoward effects from their patients.

Often health care providers tend to ignore the care of central venous lines which is an important portal of entry of the microbes. However it is an important and simple step in the prevention of Catheter associated blood stream infection when a central venous catheter is in place. Through extensive research it was found out that the maintaining the central line care bundles which comprises hand hygiene, maximal barrier precautions insertion, chlorhexidine skin antisepsis, optimal catheter site selection, proper catheter maintenance, insertion site care, and daily review of line necessity, with prompt removal of unnecessary lines the CLBBSI can be prevented to a large extent.

REFERENCES

1. Singh VS, Dutta M(2014). “Care of central line” in. Kaur S(ed).Clinical neurosciences & critical care nursing. New Delhi: JAYPEE, 162-71.
2. Chopra V, Krein SL, Omsted RN, Safdar N, Saini S. Prevention of central line associated blood stream infection: brief update review. Making health care safer: an update of critical analysis of evidence based practice, 2013.
3. Sazman MB, Rubin LG. Intravenous catheter-related infection. Adv pediatric infection disease, 1995; 10: 337-68. (accessed on 20/01/15)
4. Leon C et al. Antiseptic chamber–containing hub reduces central venous catheter–related infection: A prospective, randomized study. Crit Care Med., 2003; 31: 1318-24.
5. Climo MW et al. Effect of daily chlorhexidine bathing on hospital acquired infection. The new England journal of medicine, 2013; 6: 533-6.
6. Rolls K. Currey J. Final version of CDC guidelines: nursing care of central venous catheters in adult intensive care, 2010.
7. Guidelines for the Prevention of Intravascular Catheter related Infections, 2011(centres for disease control and prevention.
8. World Health Organization. WHO guidelines for hand hygiene in health care (Advanced draft). Geneva: WHO; 2006. Available from: http://www.who.int/gpsc/tools/en/, accessed on Jan, 2015.
9. Pedrolo E, Tannia M. Danski M, Vayego SA. Chlorhexidine venous catheters gauze and tape dressing for central venous catheters: a randomized clinical trial. Rev Latino AM. Enfermagem, 2014; 22: 764-6.
10. Meryll CK. Luer lock National nosocomial infection National nosocomial infection surveillance system report data. American journal of Infection control, 2004; (32): 470-80.
11. TungHG et al. The impact of central line insertion bundle on central line-associated bloodstream infection. BMC Infectious diseases, 2014; 14: 356.
12. Lu SF, Chen JH, Shang WM, Chou SS. Prevention & nursing care of central line associated blood stream infection in critically ill patients. Hu Li Za Zhi., 2012; 59: 5-11.
13. Wheeler DS etal. A Hospital wide Quality improvement collaborative to reduce catheter associated blood stream infections pediatrics. American Academy of pediatrics, 2011.