REVIEW ARTICLE

SUSTAINING A ZERO CENTRAL LINE ASSOCIATED BLOOD STREAM INFECTION RATE OVER A PERIOD OF 7 MONTHS – INTERVENTIONS BEYOND CLABSI BUNDLE

*,1Dr. Sonal P. Karpe, 2Dr. Sanjith Saseedharan and 3Dr. Manisha Sahu

1Senior ICU Registrar, Fortis S. L.Raheja Hospital, Mumbai, India
2Head of Department of Critical Care, Fortis S. L. Raheja Hospital, Mumbai, India
3Head of Microbiology, Fortis S. L. Raheja Hospital, Mumbai, India

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ABSTRACT

Central Line Associated Blood Stream Infection (CLABSI) contributes to a small but significant cause of inpatient morbidity. Globally evidence based approaches are practiced to target a zero CLABSI rate. A prospective study was conducted in our hospital over a period of two years. The incidence of CLABSI was studied per 1000 central lines days for initial 5 months. This was followed by phase wise introduction of the CLABSI reduction program. When all the three interventions implemented the CLABSI rates were sustained at zero over duration of 7 months. Thus the strict implementation of Central Line bundle, Infection Control Team and Staff Education are the corner stones of safe and aseptic precautions being followed and adhered to for bringing down not just the CLABSI but also other hospital acquired infections.

INTRODUCTION

Central Line Associated Blood Stream Infection (CLABSI) contributes to a small but significant cause of inpatient morbidity. Globally evidence based approaches are practiced to target a zero CLABSI rate. We implemented the Central Line Care Bundle as per CDC guidelines along with other interventions over a period of 2 years and studied the declining trend in the rate of CLABSI infection as a direct result of it.

MATERIALS AND METHODS

A prospective study was conducted in our hospital over a period of two years. The incidence of CLABSI was studied per 1000 central lines days for initial 5 months. This was followed by phase wise introduction of the CLABSI reduction program. The first step was introduction of the Central Line Bundle which was to be strictly followed by the Vascular Assess Team which comprised of ICU Registrar and the Nursing Team Leader. It consisted of the following 5 measures.

1. Hand hygiene.
2. Maximum barrier precautions, which included a mask, cap, surgical gown and gloves.
3. Chlorhexidine skin antiseptic.

Corresponding author: Dr. Sonal P. Karpe
Pulmonary Medicine, Grant Medical College and Sir J J Group of Hospitals, Mumbai, India.

4. Optimal site selection.
5. Daily review of line insertion site.

The CLABSI rates were then studied for duration of 6 months post introduction of the Central Line Bundle. The second step was introduction of Infection Control Team. This comprised of auditors appointed specifically for monitoring the adherence of the Vascular Access Team to the Central Line bundle. They were available round the clock to supervise every central line insertion in the hospital. They were provided with a checklist to note down all the aseptic precautions observed. The third step was regular and rigorous staff education regarding the importance of the Central Line Bundle. To reinforce the third party supervision technique there were also silent observers who reported and surveyed the central lines. The CLABSI rates were studied again for 6 months post auditor intervention. Finally CLABSI rate was analyzed 7 months after introduction of all the three specific interventions.

RESULTS AND OBSERVATIONS

1. There were total of 7446 Central Line days over 2 years.
2. The incidence of CLABSI prior to any intervention for 5 months was 7.02 per 1000 central line days (May 2012 – September 2012).

3. The incidence of CLABSI post the Central Line Bundle approach implementation was for 6 months was 1.26 per 1000 central line days (October 2012 – March 2013).
4. The incidence of CLABSI post the Infection Control Team introduction was for 6 months was 0.74 per 1000 central line days (April 2013 – September 2013) which was at par with NHSN (National Healthcare Safety Network) benchmark 0.8.
5. The incidence of CLABSI post introduction of all three interventions for 7 months was 0 per 1000 central line days (October 2013 – April 2014).

cultures drawn through central lines can have a higher rate of contamination than blood cultures collected through peripheral venipuncture (Baron *et al.,* 2005; Datta *et al.,* 2014). All positive blood cultures, regardless of the sites from which they were collected, were included when conducting in-plan CLABSI surveillance. Surveillance for CLABSI was done using NHSN standardized definitions and methods. There have been very few Indian studies reporting the incidence of CLABSI.CLABSI was found to be 13.86/1000 central line days by a study conducted by Datta *et al.* (2014). As per our results the initial assessment revealed a far less incidence of
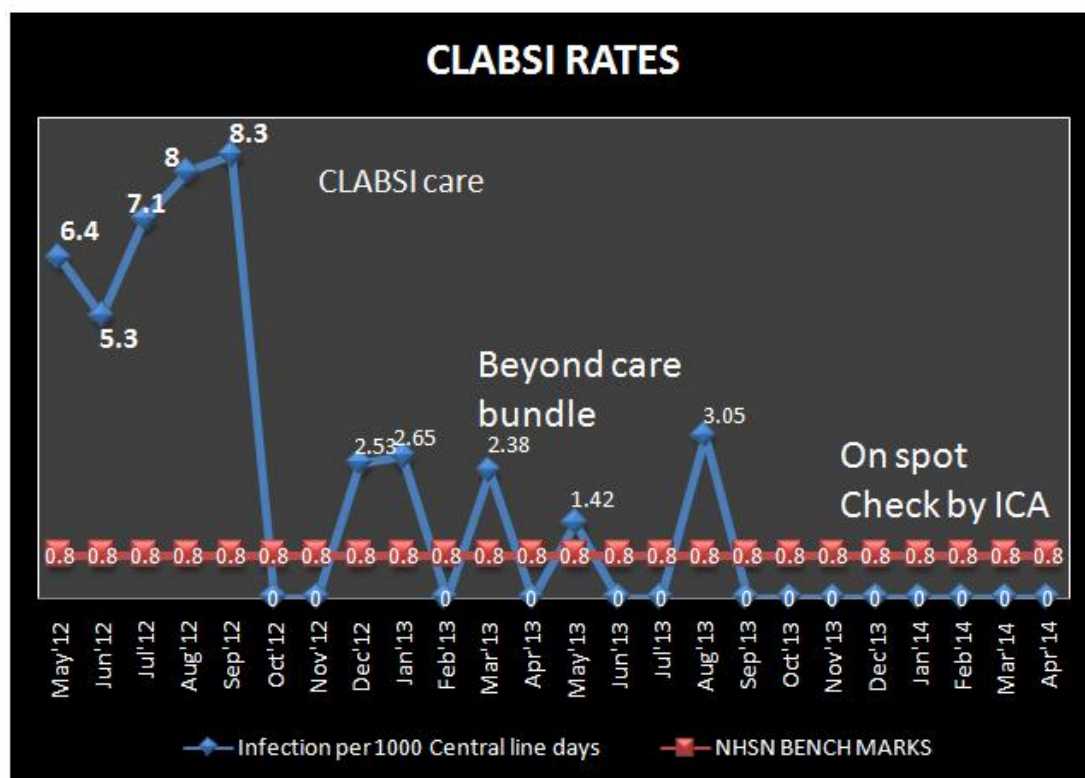
DISCUSSION

Central line-associated BSI (CLABSI) is defined as 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, and a CL or UC was iplace on the date of event or the day before. If a CL or UC was in place for >2 calendar days and then removed, the LCBI criteria must be fully met on the day of discontinuation or the next day. If the patient is admitted or transferred into a facility with a central line in place (e.g., tunneled or implanted central line), and that is the patient's only central line, day of first access as an inpatient is considered Day1.

CLABSI can be prevented through proper insertion techniques and management of the central line. These techniques are addressed in the CDC's Healthcare Infection Control Practices Advisory Committee (CDC/HIPAC) *Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011* (O'Grady *et al.,* 2011). A prospective surveillance was carried out in our hospital to decrease the incidence of CLABSI. Blood

CLABSI at our hospital. This was followed by the Central Line Bundle approach. A bundle consists of a group of practices with high level of effectiveness which when applied together produce synergistically greater improvements. The Institute for Healthcare Improvement (IHI) prospective introduced IHI bundle for Central Line Insertion Practices (CLIP). It comprised of five practices supported by high-level evidence.

1. Hand Hygiene
2. Maximal barrier precautions
3. Chlorhexidine skin antisepsis
4. Optimal catheter site selection
5. Daily review of line necessity

Our institute followed the five measures after the initial surveillance of 5 months. These five simple techniques followed religiously over a period of 6 months significantly reduced the CLABSI rates to 1.26 per 1000 central line days from 7.02 per 1000 central line days. However the intervention that contributed the most to the further reduction of CLABSI rates was introduction of an Infection Control Team and Staff Education. The Infection Control team had members who were solely dedicated to monitoring and supervising a central line

placement. They were provided with a checklist, which they marked right from the beginning of the procedure till the end. Several previous studies (Berenholtz *et al.,* 2004; Tsuchida *et al.,* 2007; Gozu *et al.,* 2011) indicate that checklists have been suggested to ensure optimal insertion practices. If used, the documentation should be done by someone other than the inserter. Also the observation of Central Line insertion by a nurse, physician, or other healthcare personnel who has received appropriate education to ensure that aseptic technique is maintained should be empowered to stop the procedure if breaches in aseptic technique are observed. Thus the doctor and the nursing staff assisting the procedure were held accountable during the monthly dashboard meetings if the standard protocol was not followed. They were educated about the correct methods and precautions to be followed.

The existence of Infection Control Team comes from the idea that people by nature are more vigilant and perform better when they know that every act of theirs is noted and is accountable. Third party supervision imbibes a sense of responsibility and prevents the setting in of complacency. This is imperative in a critical care set up where in the sheer number of patients and procedures leave a lot of room for cross patient infections via a health care personnel. The fact that these patients already have a compromised immune system or receiving multiple high generation antibiotics further complicates the situation and makes them more susceptible to infections by resistant organisms. More often than not CLABSI is a product of human error, which is preventable. One of the ways to reduce morbidity by CLABSI apart from awareness is vigilance, if not by the primary care giver then by the people solely appointed and dedicated for the same. The role of the Infection Control Team in bringing down the CLABSI rate is extremely crucial. The incidence of CLABSI post the Infection Control Team introduction was for 6 months was 0.74 per 1000 central line days (April 2013 – September 2013) which was at par with National Healthcare Safety Network (NHSN) benchmark 0.8.

When all the three interventions implemented the CLABSI rates were sustained at zero over duration of 7 months. Thus the strict implementation of Central Line bundle, Infection Control Team and Staff Education are the corner stones of safe and aseptic precautions being followed and adhered to for bringing down not just the CLABSI but also other hospital acquired infections.

Conclusion

The innovations like the Vascular Access Team, round the clock auditors (Infection Control Assistants) at the time of insertion, vigorous staff education introduced into the facility coupled with the Central Line Care Bundle has shown to sustain the best outcome of zero CLABSI rates.

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