Original Article

Impact of an intensive surveillance on central line associated blood stream infections at an Indian trauma center

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ABSTRACT

Background: Central line associated blood stream infections (CLA-BSIs) are a leading cause of health care associated infections. There is paucity of data on the actual magnitude of CLA-BSIs in most hospitals of developing countries due to lack of surveillance. This study reports the impact of an intensive surveillance, training and feedback on the rates of CLA-BSIs at an Indian trauma center.

Methods: The study was conducted at a level 1 trauma center from June 2010 to January 2013. The clinical details of all patients and microbiology culture reports who were admitted for more than 48 h were recorded in a pre-designed pro forma. These details were further entered in an automated software based upon CDC NHSN's definitions of device associated infections. The CLA-BSI rates in a previous pilot study in 2010 were found to be very high. Intensive surveillance, education and training drive was initiated along with better hand hygiene and device care as a part of hospital infection control measures.

Results: During the study period, a total of 2969 patients were followed up for CLA-BSIs. These patients amounted to a total of 27,394 ICU days and 15,443 CVC days. A total of 93 episodes of CLA-BSI occurred during the study, amounting to a CLA-BSI rate of 6.02/1000 CVC days. *Staphylococcus aureus* (27; 27.5%) was the most common isolate. A total of 101 episodes of secondary BSIs were also observed during the study. Of these, 70 (69%) were secondary to VAP, 18 (18%) were secondary to wound infections and 13 (13%) were secondary to UTI. Of the 92 patients who accounted for the 93 episodes of CLA-BSIs, a total of 20 (21.7%) had a fatal outcome.

Conclusions: Thus, with the help of the intensive surveillance, using this software, we have been able to monitor the impact of training, surveillance and interventions on the rates of CLA-BSI, which have reduced from 27.6 to 6/1000 CVC days within a span of 2 years at our institute. Although these measures require a dedicated team effort, they are easy and cost

1. Introduction

Central venous catheters have become indispensable devices for the management of critically ill patients; however, their use is often complicated by central line associated blood stream infections (CLA-BSIs). CLA-BSIs are a leading cause of health care associated infections (HCAIs), accounting for almost 5–6% of them.[1] They are associated with increased morbidity, length of stay, mortality and health care costs. Majority of these infections are potentially preventable by better infection control practices.

Catheter related BSIs (CRBSI) is a clinical definition, used when diagnosing and treating patients, that requires specific laboratory testing that more thoroughly identifies the catheter as the source of the BSI. It is not typically used for surveillance purposes. It is often problematic to precisely establish if a BSI is a CRBSI due to the clinical needs of the patient (the catheter is not always pulled out), limited availability of microbiologic methods, and procedural compliance by direct care personnel (labeling must be accurate). Therefore, simpler definitions like CLA-BSI are often used for surveillance purposes.[2]

There is a wide variation in the CLA-BSI rates in the developed and developing countries. In the developed countries, there has been a steady decline in the rates of CLA-BSIs due to an integrated surveillance, education and preventive programme. There is paucity of data on the actual magnitude of CLA-BSIs in most hospitals of developing countries due to lack of surveillance.

2. Aims and objectives

To strengthen education and surveillance activities of CLA-BSI and other health care associated infections at our center and undertake measures to control these infections.

3. Materials and methods

Prior to 2010, there was no surveillance activity for CLA-BSIs at our center. In 2010 we conducted a pilot study from January to April 2010 to assess the baseline level of CLA-BSI, the rates of which were found out to be 27.6/1000 CVC days.[3] This rate was very high as compared to the developed countries. Since then, we have initiated an intensive surveillance of CLA-BSI at our 182 bedded, level 1 trauma center. The foundation of this programme has been based on defining each infection as per the CDC's definition, tracking the source of BSIs, educating the health care workers and providing feedback of the rates to each unit. The surveillance has been automated with the development of an indigenously developed software, ASHAIN (**A**utomated **S**urveillance of **H**ospital **A**cquired **IN**fections). The software has been designed based upon algorithms according to CDC NHSN's guidelines to diagnose HCAIs.[4] This study reports the impact of an intensive surveillance, training and feedback on the rates of CLA-BSIs. The study was approved by the Institute's ethical committee.

As part of the surveillance, our six dedicated Hospital Infection Control Nurses visit all ICUs and wards and collect information from each patient, presence of central lines, the date of insertion and removal, adherence to central line bundles, treatment regimens and culture reports of various clinical samples. We also undertake multiple training sessions on hand hygiene, central line bundle practices, standard precautions and hospital infection control for all cadres of health care workers. All new recruits of nursing staff are given weekly lectures for three months on infection prevention. We spread information by putting up hand hygiene and central line bundle posters on walls in all patient care areas. Videos are displayed regarding hand hygiene practices based upon WHO's five moments of hand hygiene[5] in all clinical areas, serving as constant reminders. They are also supplemented by direct one to one reminders by our HICNs to all health care workers (HCWs). The hand hygiene compliance is monitored every week for two hours as per WHO's recommendations.[5] The hand hygiene compliance is also monitored via CCTVs, the monitors of which are installed in the HIC room. The compliance to central line bundles is measured by standard protocols. The central line bundle consists of the following elements: hand hygiene during line insertion and maintenance, maximal barrier precautions upon insertion, chlorhexidine skin antisepsis, optimal catheter site selection with avoidance of the femoral vein for central venous access in adult patients and daily review of line necessity with prompt removal of unnecessary lines.[2]

Monthly, ward wise reports regarding total number of admissions, device days, compliance to hand hygiene, episodes of CLA-BSIs & bundle compliance rates are prepared and sent to respective administrative heads and nursing superintendents. Feedback and suggestions regarding further necessary preventive actions are constantly provided to various clinical areas.

For the purpose of surveillance, the following definitions were used:

CLA-BSI was defined as a primary BSI in a patient that had a central line within the 48-h period before the development of the BSI and was not blood stream related to an infection at another site.[2,6]

Secondary blood stream infection:[2,6] Was defined as a culture-confirmed BSI associated with a documented HAI at