



Implementation of central venous catheter bundle in an intensive care unit in Kuwait: Effect on central line-associated bloodstream infections



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Summary Central line-associated bloodstream infection (CLABSIs) is an important healthcare-associated infection in the critical care units. It causes substantial morbidity, mortality and incurs high costs. The use of central venous line (CVL) insertion bundle has been shown to decrease the incidence of CLABSIs.

Our aim was to study the impact of CVL insertion bundle on incidence of CLABSI and study the causative microbial agents in an intensive care unit in Kuwait.

Surveillance for CLABSI was conducted by trained infection control team using National Health Safety Network (NHSN) case definitions and device days measurement methods. During the intervention period, nursing staff used central line care bundle consisting of (1) hand hygiene by inserter (2) maximal barrier precautions upon insertion by the physician inserting the catheter and sterile drape from head to toe to the patient (3) use of a 2% chlorohexidine gluconate (CHG) in 70% ethanol scrub for the insertion site (4) optimum catheter site selection. (5) Examination of the daily necessity of the central line.

During the pre-intervention period, there were 5367 documented catheter-days and 80 CLABSIs, for an incidence density of 14.9 CLABSIs per 1000 catheter-days.

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After implementation of the interventions, there were 5052 catheter-days and 56 CLABSIs, for an incidence density of 11.08 per 1000 catheter-days. The reduction in the CLABSI/1000 catheter days was not statistically significant ($P=0.0859$).

This study demonstrates that implementation of a central venous catheter post-insertion care bundle was associated with a reduction in CLABSI in an intensive care area setting.

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Introduction

Central venous catheters (CVCs) are increasingly used in inpatient and outpatient settings to provide long-term venous access. CVCs disrupt the integrity of the skin, leading to bacterial and/or fungal infections. Infection may spread to the bloodstream (bacteremia) with the possibility of consequent hemodynamic changes and organ dysfunction (severe sepsis), leading to death.

Approximately 90% of catheter-related bloodstream infections (CRBSIs) occur with CVCs [1]. Forty-eight percent of intensive care unit (ICU) patients have CVCs, accounting for 15 million central venous catheter-days per year in ICUs. Studies of catheter-related bloodstream infections (CRBSIs) suggest that they are among the most common healthcare-associated infections (HAI) and that they appear to control the underlying severity of the illness [2]. A report in 2013 by the Center for Disease Control and Prevention (CDC) National Health Safety Network (NHSN) indicates that CRBSI in ICUs ranges between 0.9 and 2.4 (mean 1.1) per 1000 catheter days in major teaching medical/surgical ICUs, which matches our ICU classification [3]. The pooled rate of CLABSI that was reported by the International Nosocomial Infection Control Consortium (INICC) is 4.9/1000 catheter days according to their 2014 report. This is nearly 5-fold higher than the rate reported from comparable US ICUs that was included in their last report. The INICC study was conducted from January 2007 to December 2012 in 503 intensive care units in Latin America, Asia, Africa, and Europe. Using the Center for Disease Control and Prevention's (CDC) U.S. National Healthcare Safety Network (NHSN) definitions for device-associated health care-associated infections, the authors collected data from 605,310 patients who were hospitalized in ICUs over 3,338,396 days [4]. Other studies have reported significant increases in the attributable mortality for these infections [5,6] as

well as remarkable increases in the hospital length of stay and hospital cost [7,8]. It has been estimated that between 500 and 4000 US patients die annually because of bloodstream infections [9].

According to Eggimann et al. [10], a comprehensive infection control program including the meticulous sterile insertion technique and post-insertion care was associated with a 67% reduction in CLABSI incidence at a single center. In support of the 5 Million Lives campaign in the US, the Institute for Healthcare Improvement (IHI) (<http://www.ihl.org/ihl>) recommends that all ICUs should implement a central line bundle in an attempt to reduce the incidence of CLABSI to zero [11]. The concept of "bundles" that was developed by the IHI was to help healthcare providers more reliably deliver the best possible care for patients undergoing particular treatments with inherent risks. A bundle is a structured method of improving the processes of care and patient outcomes: a small, straightforward set of evidence-based practices—generally three to five—that, when performed collectively and reliably, have been proven to improve patient outcomes [12]. The science supporting the bundle components is sufficiently established to be considered the standard of care.

The purpose of this study was to evaluate the effectiveness of a "Central Venous Line bundle" (CVLB) implementation in our main ICU on the outcome of CLABSI and to establish the causative microorganisms.

Subjects and methods

Setting

The study was conducted between January 2010 and February 2012 in the main ICU of a general teaching hospital, a Ministry Of Health-run hospital affiliated with the Health Sciences Center of Kuwait University. The adult medical–surgical ICU consists

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