STUDY PROFILE

Use of a central venous line bundle can reduce catheter-related bloodstream infections

Intervention Study
performed by the Los Angeles County (LAC) and University of Southern California (USC) Medical Center

WHAT WAS INVESTIGATED?

- Evaluation of the implementation of a **"central venous line (CVL) bundle"** (bundle of measures) on intensive care units (ICU) regarding:
  - **Reduction of the rate of catheter-related blood stream infections (CRBSIs)**
  - **Any changes in the flora of CRBSIs**
  - **Impact on health care costs**

WHAT WAS THE RESULT?

Significant reduction of CRBSIs

Decrease of Gram-positive infections and an increase in fungal infections

Total excess cost of CRBSI calculated: $32,254

The implementation of a CVL-bundle can help to prevent CRBSIs and improve patient care by shortening length of stay, reducing costs and possibly lowering mortality.

Research for infection protection

Source: Kim JS *et al.* (2011) Reduction of catheter-related bloodstream infections through the use of a central venous line bundle: epidemiologic and economic consequences. Am J Infect Control. 39(8): 640-646.

SP100060EN_0621_2

BACKGROUND

Central venous lines (CVLs) are a common way of administering medication, fluids or blood in intensive care units (ICUs). However, there is always the risk of catheter-related bloodstream infections (CRBSIs), which lead to an increase in morbidity, healthcare costs and presumably also mortality. There are numerous studies on ways to prevent CRBSIs, e.g. with appropriate hygiene measures, the use of checklists and training of staff. These possibilities have been validated in the literature and have been brought together in a "bundle" by the Institute for Healthcare Improvement. The single items of the "bundle" are clearly defined and can therefore easily be checked and documented for compliance or non-compliance.

GOAL

The goal of the study was to evaluate a "CVL bundle" in ICUs by investigating the impact on the CRBSI rate, the changes in the flora of CRBSIs and the possible reduction of health care costs.

DESIGN AND METHODS

The “bundle” was used in all patients admitted to an ICU of the Los Angeles County (LAC) and University of Southern California (USC) Medical Center from January 2008 until March 2009. The existence of CRBSIs has been determined according to clear definitions of the Infectious Disease Society of America and Centers for Disease Control and Prevention. The various interventions to reduce the CRBSI rate included:

- compliance with strict hygiene standards in the preparation of the procedure (such as cap, face mask, sterile gown, sterile gloves and sterile preparation of the site)
- sterile performance of the procedure
- checking the correct position of the catheter
- review of the continued need for CVLs on a daily basis
- an education program to nursing staff and fellows in the ICU.

To compare the CRBSI rate, hospital data from 2006 to 2007 were pooled and a relative risk reduction was determined. The costs were forecasted by multiplying the extension of the hospital stay with other costs, such as material, medication and costs of replacement of CVL.

RESULTS

The infection rate decreased significantly on all participating ICUs, especially on the medical ICU. The total number of CRBSIs was significantly reduced from 9.0 to 2.7 per 1,000 catheter-days ($P < 0.00001$) (see figure 1). Significant reduction results were also achieved for the medical ICU ($P = 0.0001$), the surgical ICU ($P = 0.01$) and the burn unit ($P = 0.02$). Regarding the corresponding organisms, a constant proportion of Gram-negative infections, a decrease in the proportion of Gram-positive infections and an increase in fungal infections were observed. The total excess cost (TEC) per organism was calculated according to the following formula: TEC = excess length of stay + replacement of CVL + drug administration + antibiotic cost. Hereby, the TEC of any given CRBSI was estimated at $32,254 (see possible cost reduction in figure 1).

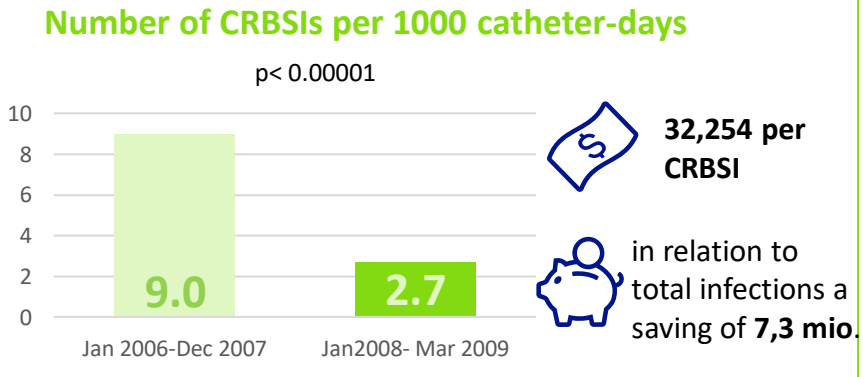

Figure 1: Modified from Kim *et al.* (2011)

CONCLUSION

CRBSIs are a known and relevant problem in the clinical setting, as they cause an increase in morbidity, hospital stay, costs and possibly mortality. The study indicates, that the prevention of CRBSIs can improve patient care and can reduce healthcare costs. Interventions to improve hygiene and quality, such as the used CVL-bundle, should integrate in any sustainable plan.

Research for infection protection

Source: Kim JS *et al.* (2011) Reduction of catheter-related bloodstream infections through the use of a central venous line bundle: epidemiologic and economic consequences. Am J Infect Control. 39(8): 640-646.

SP100060EN_0621_2