Prevention of central line associated bloodstream infections by use of a checklist

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Introduction

Central line associated blood stream infections (CLABSI) are a major cause of sepsis in intensive care medicine.[1]
Checklists are standard tools to improve safety and maintain quality in high risk field like aviation and nuclear power plants.[2,3]
The objective of this study was to test if using checklists to help with adherence to hygiene standards may reduce central venous associated blood stream infections.

Methods

Between October 2011 and September 2012, patients with an indication for a central venous lines (CVL) were allocated either to the checklist group or to the control group in a 1:2 ratio. In a patient with a new onset of sepsis and a CVL as potential focus:
- proven CLABSI
was defined as corresponding positive microbiological cultures for the explanted device and a blood culture taken from a peripheral site at the time of the device explantation.
- probable CLABSI
was defined as a positive micro-biological culture for the explanted device but a negative blood culture taken from a peripheral site at the time of the device explantation.

Results

Proven CLABSI could be identified in 39 of 1,518 patients contributing 11,540 catheter days (3.8 per 1,000 catheter days) in the checklist group and in 127 of 2,898 patients contributing 21,349 catheter days (5.9 per 1,000 catheter days) in the control group (IRR 0.57, 95% CI 0.39 - 0.82, P = 0.001).
Probable CLABSI we detected in 245 patients in the checklist group (21.2 per 1,000 catheter days) and in 776 patients in the non-checklist group (36.3 per 1,000 catheter days) (IRR 0.58, 95% CI 0.50 - 0.68, P < 0.001).
The distribution of pathogen isolated in proven and probable CLABSI in the checklist- and non-checklist.group are displayed in Fig. 1.

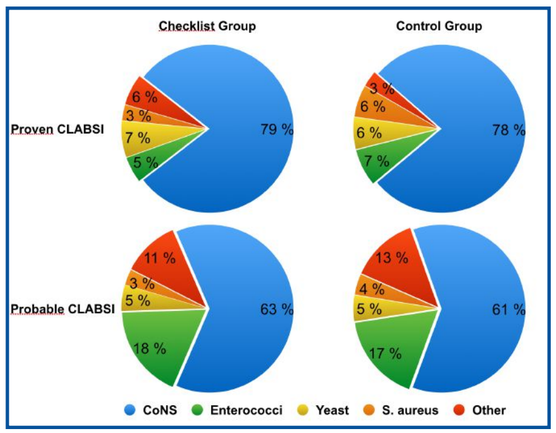

Fig. 1 Distribution of isolated pathogenese according to patient group and CLABSI definition; CoNS: coagulase negative staphylococci

Data for the insertion site were available for n = 1249 catheters; jugular vein (n = 710), subclavian vein (n = 272), femoral vein (n = 267). No significant differences in the rates were detected. Jugular vein catheters compared to all other sites had an infection rate ratio of 1.33 (95% CI 0.60 - 3.02, P 0.23), subclavian vein catheters of 1.04 (95% CI 0.40 - 2.43, P = 0.45) and femoral vein catheters of 0.58, 95% CI 0.15 - 1.67, P = 0.16) respectively.
When analyzing potential effects of the setting in which the catheter was placed (emergency vs routine) no significant differences were detected for both CALBSI definitions Fig. 2.

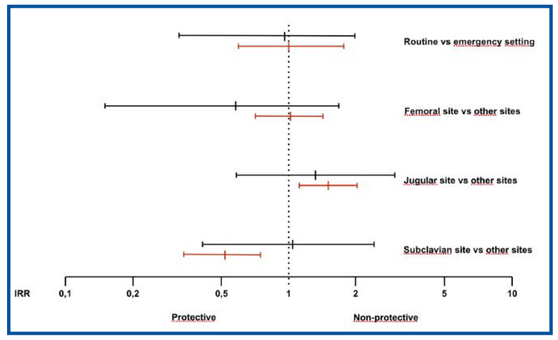

Fig. 2 Incidence rate ratios (central vertical line) and 95% confidence intervals (horizontal lines) for various catheter placement sites compared to their comparators. Values for proven CLABSI are displayed in black, values for probable CLABSI in red. Values smaller “1” demonstrate a protective effect, larger “1” a non-protective. Incidence rate ratios for emergency vs routine setting are shown accordingly.

Limitations

This is a single center experience of a high-volume ICU without specialized “CVL teams”, where all participants were instructed on the content of the checklist even if the CVL was implanted without using it. To this end, we may have underestimated the effect of the observed intervention.

Conclusion

In our study the use of the checklist to improve the compliance with hygiene standards while placing a CVL was associated with a significant reduction in CLABSI independent from the:

- **Catheter insertion site**
  (jugular / subclavia / femoral)
- **Setting of device placement**
  (emergency /routine) or
- **CLABSI definition**
  (proven / probable)

References

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