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Letters to the Editor

Reducing blood culture contamination in an intensive care unit through weekly reports and feedback

To the Editor:

We read with great interest the article by Garcia et al[1] regarding a national survey of interventions and practices to prevent blood culture contamination (BCC) and associated adverse healthcare events. Strategies to control contamination rates were initiated and included: identifying specific indicators for cultures, reviewing collection methods and handling of specimens, nursing education and training programs, as well as a review of hospital policy. Rates of contamination for individual nurses obtaining the specimens were calculated and shared with them.

This quality improvement (QI) project used a pre-post intervention design and was undertaken in a 32-bed intensive care unit (ICU) of an 8,000-bed university-affiliated hospital in Wuhan, China. Project approval was obtained from the hospital ethics committee. The preintervention period was January-December 2017.

Beginning in January 2018, weekly reporting on blood cultures by personnel from the department of infection control included: number, rate of BCC, type of contaminant microorganism, and number of discarded cultures. This information was provided to the ICU staff at each Monday conference. The BCC rate for each nurse was calculated but presented to only the head nurse, who then shared this with each nurse individually. These included a discussion of the nurses' blood culture collection techniques and revisions needed to reduce the BCC rate. The intervention period included 8 weeks. The postintervention period was March-June 2018.

Contamination was defined based on the time to report positive and type of organisms, that is, coagulase-negative *Staphylococcus* spp, alpha- or beta-hemolytic, and others.[2,3] If multiple cultures were obtained from a patient, all were included. Culture specimens were discarded if the blood volume was not within laboratory guidelines: 10 mL per culture bottle or at least 5 mL for a patient having a body mass index of <18.5. Each culture was collected in 2 vials at different sites through venous puncture. The BCC rate was calculated by dividing the number of contaminated specimens by the total number of valid blood cultures obtained.

Data were obtained from patients' electronic hospital records and included: blood cultures ordered, reports of contamination organisms, specimens discarded, and the name of the individual who collected the specimen. Quantitative data analysis were completed using SPSS version 23.0 (IBM Corp, Armonk, NY). The χ^2 test was used to compare the BCC rate during the pre-, post-, and intervention periods. Statistical significance was indicated by $P < .05$.

From the total of 4,198 samples collected during the preintervention period, 4.0% (165 of 4,126) cultures were contaminated and 1.7% (72 of 4,198) were discarded. In the intervention and postintervention period, 1,597 cultures were obtained and 14 (0.9%) were discarded; 26 (1.6%) of the valid cultures (n = 1,583) contained contaminants. The BCC rate decreased to 2.9% (14 of 481) in the intervention period and 1.1% (12 of 1,102) in the postintervention period. The postintervention period was statistically significant compared to the preintervention period. There was also an obvious reduction in the rate of discarded specimens from 1.7%-0.9%. Table 1 presents comparisons of the pre-, post-, and intervention periods.

Results of this study indicate that weekly reports and individualized discussion of blood culture collection procedures with nurses are effective in reducing BCC and ultimately reducing adverse healthcare events. Rates of BCC decreased during both the intervention and postintervention periods. Limitations of this QI project includes the use of a pre-post intervention design as confounders, as work volume may influence the findings. In this study, a reduction in the number of blood cultures was congruent with the BCC rate. A previous study found that patient volume was positively related to BCC rate in emergency department.[4] Patient volume may be an indicator of a crowed environment or workload. A potential confounder makes the conclusion of this study uncertain. The fact that this QI project was conducted in one ICU limits the generalizability of the findings to other clinical settings. Results of this study found that a weekly report and individualized feedback was associated with BCC reduction in an ICU. The intervention could result in a reduction in costs, unnecessary antibiotics therapy and work volume both for nurses and laboratory personnel.[5-7]

Table 1
Comparison between pre-, post-, and intervention periods

	Contaminated n (%)	Uncontaminated n (%)	Valid	*P*
Preintervention	165 (4.0%)	3961 (96.0%)	4126	
Intervention	14 (2.9%)	467 (97.1%)	481	.242*
Postintervention	12 (1.1%)	1090 (98.9%)	1102	.000†

*Comparison between preintervention and intervention period.
†Comparison between preintervention and postintervention period.

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Conflicts of interest: None to report.

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