

Preventing Blood Culture Contamination using a Novel Engineered Passive Blood Diversion Device

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Association for Professionals in Infection Control, June 13-15, 2018 Minneapolis, MN



Introduction

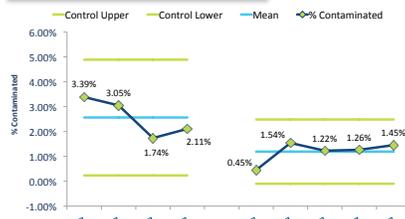
Blood culture contaminants lead to increased empirical antibiotics usage, contributing to antibiotic associated colitis, multi-drug resistant bacteria, and increased risks for drug interactions. Quality improvement programs have led to complex costly blood culture collection bundles, including sterile kits, blood diversion tubes, and advanced skin preps, all with the goal of reducing blood culture contaminants. Despite current interventions contamination continues to occur because bacteria reside deep in the dermis where antiseptics cannot penetrate. This study investigates the efficacy of an engineered passive blood diversion device in preventing blood culture contamination.

Methods

This quasi-experimental study focused on blood cultures collected by phlebotomy and the emergency department between January and September 2017 (Pre: Jan – April, Post: May – September). The ratio of contamination was evaluated using a chi-square test at a 0.05 alpha level. The intervention was only indicated for vacutainer draws during the study period, but stratifying the pre-intervention data for vacutainer collections was not possible. For this reason, this study focuses on total blood culture contaminants, and not just vacutainer collections. Without stratification, the mentioned results are what a user could expect to reproduce in a “real world” scenario.

Results

Blood Culture Contaminant Control Chart



Intervention Design Variations



Initial intervention only indicated for vacutainer draws during the first three months of the study period.



Intervention redesigned after the first three months of the study to allow for syringe draws, and draws off fresh peripheral IVs.

Intervention Cost Analysis

ROI	PBE	POST
# of Cultures	4,220	4,220
Cost of Kit	\$ 1.00	\$ 15.00
Cost of Cultures	\$ 4,220	\$ 63,300*
Contaminant Rate	0.0256	0.0119
Predicted Contaminants	108.04	50.26
Cost per Contaminant	\$ 7,500	\$ 7,500
Contaminant Cost	\$ 810,292	\$ 376,952
Total Cost	\$ 814,512	\$ 440,252
ROI		\$ 374,260

*assuming 100% utilization

Results from 4220 blood cultures were analyzed. The pre-intervention period included 1953 cultures with a contamination rate of 0.025, 95% CI [0.019, 0.033]. The post-intervention period included 2267 cultures and a contamination rate of 0.012, 95% CI [0.008, 0.017]. A chi-square statistic was calculated to examine if the intervention reduced blood culture contamination. The test was found to be statistically significant, $\chi^2(1, N = 2852) = 10.979, p < 0.05$.

Conclusion

The results suggest that there is a relationship between the proportion of a blood culture contaminants and the type of device used. This may be more apparent given that the intervention was not indicated for all types of blood draws during the study period. It appears that this product can potentially reduce blood culture contaminants, but more research is required.

Study Limitations

- The studied intervention is not indicated for use for all types of blood draws.
- Intervention was utilized in 50% of blood draws during the post intervention period.
- During the first 3 months of post intervention period, the trial device was not indicated for use in 8 out of 9 contaminated cultures.
- In the post study period, the device was redesigned to allow for different types of blood cultures (ex. draws from a freshly placed IV).

References

- Bohler, Lorenz G., et al. "Prevalence of blood culture contamination in a College of American Pathologists Q-Probe study of 100 institutions." *Archives of Pathology and Laboratory Medicine* 120.12 (2005): 1222-1225.
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Abstract: EI - 101

Nothing to Disclose

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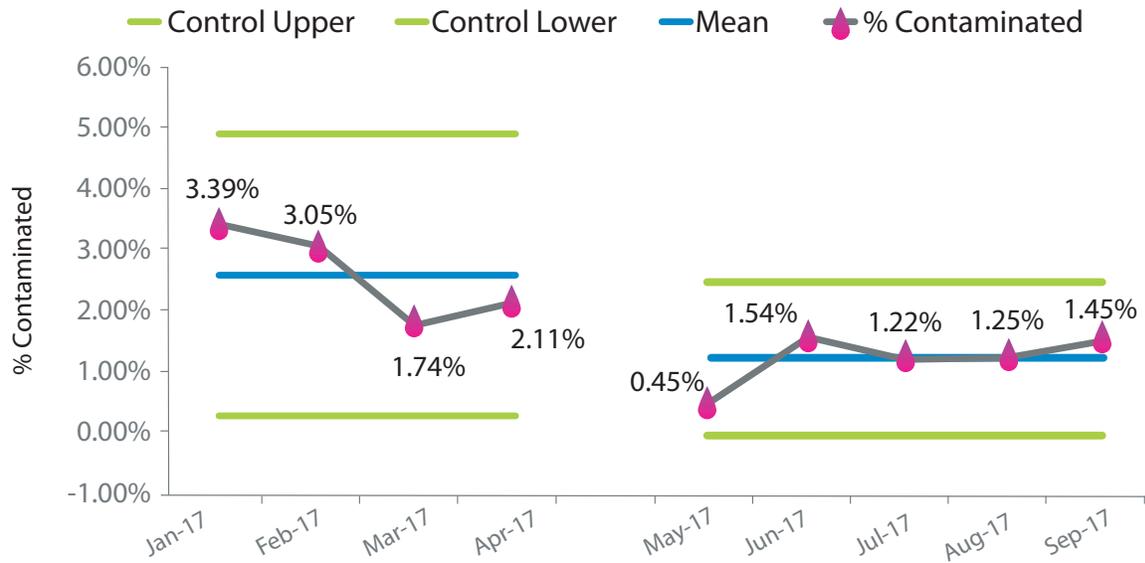


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Bekeris, Leonas G., et al. "Trends in blood culture contamination: A College of American Pathologists Q-Tracks study of 356 institutions." *Archives of Pathology and Laboratory Medicine* 129.10 (2005): 1222-1225.

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