Reduction of Blood Culture Contamination Using Initial Specimen Diversion Device

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INTRODUCTION

Contaminated blood cultures remain a significant problem at our institution despite repeated efforts focusing on training and education and other preanalytical variables that increase contamination. Our historical average blood culture contamination (BCC) rate is 2.8% (about 250 contamination events/year), with higher rates (~4%) in some months. False-positive blood culture results can lead to unnecessary antibiotic treatment, longer stays, and increased costs (estimated $3,500/event). The Steripath Initial Specimen Diversion Device® (ISDD) (Magnolia Medical Technologies) is designed to reduce contamination by diverting and isolating the initial 1.5-2.0 mL of blood, which is most likely to contain skin contaminants.

The device comes pre-assembled sterile with a butterfly needle attached to the top of the diversion chamber and a blood culture bottle adapter attached to the bottom. The device is easy to use with one-handed operation. After venipuncture, the device assembly is pushed forward, drawing approximately 2 mL of blood into a chamber. Once the chamber is full, the device is pushed further forward which sequesters that initial volume of blood into its chamber while opening a second chamber through which the remaining sample flows into the culture bottle. Beebe Healthcare instituted a trial of this device in an effort to reduce the incidence of contamination events.

METHODS

The trial was conducted at Beebe Healthcare over 16 weeks. Blood cultures drawn in the ED, ICU, and other areas of the hospital by the phlebotomy team were collected using either the ISDD device or standard method (SM). SM is defined as venipuncture collection with a butterfly needle using ChloraPrep for skin disinfection and 70% alcohol for blood culture bottle top disinfection. Contamination events were recorded.

During the evaluation period, all blood cultures received in the laboratory were recorded and the method of collection indicated (ISDD or SM). Cultures collected with the ISDD device were identified by the inclusion of the device packaging inside the bag with the blood culture bottles. Bottles received without the device packaging were assumed to be collected by SM. All results were monitored and recorded for each blood culture received during the trial period, and all contamination events were noted.

A contamination event is defined as the recovery of a bacterial species commonly considered commensal skin flora (Corynebacterium species, Micrococcus species, Staphylococcus species, and Propionibacterium species) in only one set of blood cultures collected during a three-day time frame.

RESULTS

The trial period was conducted from 5/30/2017 through 9/16/2017. The total number of blood cultures collected during this period was 2639. The laboratory noted 38 contamination events during this period (1.44%). Of those 38 contamination events, 14 were collected using the ISDD and 24 were collected using the standard method. The contamination rate for specimens collected with the ISDD was 0.76% (14/1847), while the contamination rate for specimens collected using standard method was 2.95% (24/832). The laboratory rate a 75% reduction in the blood culture contamination rate when specimens were collected using the ISDD compared to specimens collected using the standard method (p=0.0002).

CONCLUSIONS

Use of the ISDD device led to a significant decrease in the BCC rate in all groups that participated in the trial: ED, ICU, and phlebotomy team. The contamination rate for specimens collected with the ISDD was 0.76%, which is a 75% reduction compared to the historical rate of 2.8%. The overall contamination rate for the 16-week period was 1.44% (a blended rate looking at both ISDD and SM), a 49% reduction compared to the historical rate. These results led us to adopt the ISDD device as standard practice and gradually train the other areas of our hospital, such as Oncology, Dialysis, Home Health, and specialized teams such as the Vascular Access Team and the Early Nursing Intervention Team. With ISDD, the hospital has maintained an average BCC rate of 1.3% (blended rate including ISDD and SM draws) in the months following the study.

REFERENCES


