Performance of the SteriPath Device in Removing Skin Contamination from Blood Culture Samples

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Background

Contaminated blood cultures remain a challenge for patients, physicians, and microbiology laboratories, often leading to unnecessary antibiotic treatment. One suggested approach to reduce contamination is to avoid culturing the initial blood sample that can contain a contaminated plug of skin from the needle stick. Recently, a new device was developed that automatically diverts the initial 1-2ml blood so as to remove any potential skin plug with contaminants from entering the blood culture bottle. Our hypothesis was that this diverted blood should be culture positive at a rate expected in contaminated blood culture collections (e.g., 1-3%), and the accompanying blood culture would remain sterile. Therefore, we performed a pilot using the SteriPath device and accompanying bottle cultures to prove our hypothesis.

Materials and Methods

- **Specimen:** The SteriPath device is a closed-system, individually packed, sterile blood collection system that diverts 1-2ml of the initial venipuncture blood into an isolated diversion chamber and then allows pure venous blood to flow into culture bottles. Blood culture samples collected via peripheral venipuncture using the SteriPath device were cultured to prove our hypothesis.

- **Methods**
  - SteriPath device was prospectively used to randomly collect one of the two blood culture sets from each patient as part of a larger study.
  - Culture was performed on diverted blood by injecting one ml Tryptic Soy Broth (TSB) into the diversion chamber and mixing it with the blood.
  - The blood/TSB mixture was incubated for 24 hours at 35-37°C then plated to blood agar.
  - Agar plates were incubated at 35°C and examined daily for 4-5 days before finalizing as negative.
  - Identification of any isolate was performed according to standard microbiology procedures.

Results

- A total of 182 SteriPath device diverted blood samples were cultured and compared to the laboratory standard blood culture collected for routine testing.
- 15 patients had a positive SteriPath device diverted sample or laboratory standard blood culture result and 167 were negative.
- Of those 15 positive:
  - Five patients were SteriPath device diverted blood positive (four with coagulase negative staphylococci and one with Bacillus species) and laboratory standard blood culture negative, for an avoided contamination rate = 2.75%.
  - Seven patients were SteriPath device diverted blood negative but laboratory standard blood culture positive with a pathogen (giving an expected frequency of bacteremia detection <50% when only 1-2ml diverted blood is cultured).
  - Two patients were SteriPath device diverted blood and laboratory standard blood culture positive with the same pathogen.
  - One patient was SteriPath device diverted blood culture positive with coagulase negative staphylococci and laboratory standard blood culture positive with MRSA.

Conclusions

- Our results demonstrate that diversion of the first 1-2 ml of blood can help to lower the blood contamination rate by capturing likely skin contaminants.
- Assessment of SteriPath device should approach clinical trials with the hypothesis that very low rates of contamination are achievable using diversion devices.

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