

Reducing False – Positive Blood Cultures in Adult A & E using a Initial Specimen Diversion Device

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1. Introduction

Blood cultures are the gold standard for obtaining important diagnostic information to enable detection of the presence of a bacteraemia. The Clinical and Laboratory Standards Institute recommend that hospitals achieve a contamination rate of < 3 %¹ though rates are estimated to range from 2% to over 10%. Economically false positive blood culture results are estimated to cost between £2,000 – £4,200 and have a significant negative impact on patients¹. These costs include delays in diagnosis, unnecessary administration of intravenous antibiotics, increased risk of complications related to unnecessary intravenous cannulation, unplanned removal of central venous access devices, additional laboratory testing, and delayed discharge by 2 days² resulting in an overall increase in the cost of hospitalisation. Additionally, there are time and costs pressures associated with the manpower required to investigate each false positive blood culture. In our trust the contamination rate of blood cultures has consistently averaged 6% for many years despite prior quality improvement projects that included the introduction of blood culture collection packs and refresher training on how to take a blood culture at every new doctor induction. The highest number of contaminated specimens are associated with A & E. The use of a cannula for blood culture sampling is associated with increased risk of contamination¹ and against our Trust intravenous access guideline. Despite this, we are aware, through bacteraemia investigations, that in A & E, blood cultures are taken from cannulae. Our project was to determine if the introduction of an initial specimen diversionary device (ISDD) that automatically side-line's the first flash of blood during the routine process of drawing a blood culture will reduce the number of false positives in this department.

2. Methods

- The diversionary device was introduced into our central London A & E that sees 400 - 450 patients / day.
- Introduction and training on the use of the device was provided at weekly early morning educational sessions by the company
- The ISDD diverts the first 0.15 ml of blood that may contain skin contaminants and “locks” it into a small chamber is available in two versions: a traditional style butterfly needle and an extension set that attaches to an intravenous cannula (Images 1 and 2)
- The ISDD was the only change in practice implemented for the duration of the study
- The PDN and 2 research nurses provided ongoing support and promotion of the project
- All A & E staff members were involved in the study
- The current phlebotomy equipment was removed from the cannulation trolleys located across the adult A & E
- Bags containing all the equipment required for blood culture collection were prepared by the department research nurses and centrally located at the staff desk in Majors
- Data collection was totally anonymised with the only question asked, on a form included in the bag, was if the blood culture was taken from a cannula or using a butterfly
- Staff members collected a bag prior to taking a blood culture then returned the completed form to a box co – located with the equipment
- The completed forms were collected weekly and the data reviewed to determine the number of contaminated samples
- The project is reaching its conclusion and the final results will be reviewed by a Trust microbiologist, an A & E research consultant and the Lead IV Practitioner representing Infection Prevention and Control

Image 1 – Standard butterfly needle



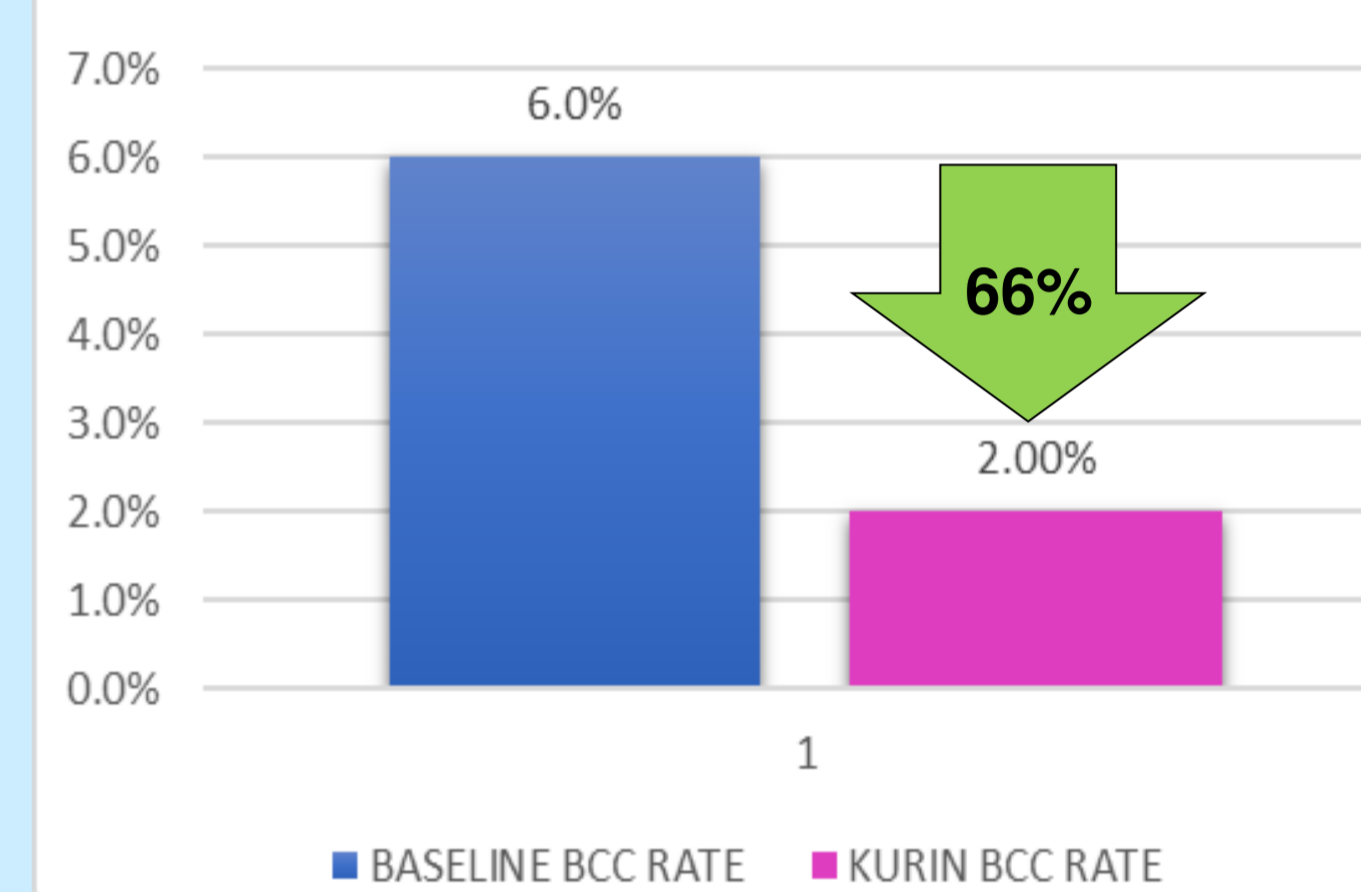
Image 2 – Extension set for cannula



3. Results

- The project has run over 5 months, May - Sept 2021
- Data has been collected on approximately 500 specimens using the ISDD
- The initial calculation demonstrates that the current contamination rate is <2%
- An overall reduction of 66%
- There was no difference in the rate of false positive results between the cultures taken from a cannula and those done from a direct stab using a butterfly.

IMPACT OF ISDD (KURIN) ON BLOOD CULTURE CONTAMINATION RATE - GSTT A&E



4. Discussion

The project has demonstrated a significant reduction in the number of false – positive blood cultures using the ISDD. The staff in A & E embraced the project. They found the ISDD very simple to use as it required no change in their current practice. The results of the weekly data collection was fed back to the A & E research nurses to share with the department. The project made clear despite a cannula being used regularly for blood culture collection, use of the ISDD mitigated the increased risk of contamination. The decrease in false positives encouraged A & E staff to continue to use the ISDD. All current stock has been used and they are eager to continue using the product. A report on the project will be presented at the next Trust Infection Control Committee with a view to endorse adoption of the ISDD Trust – wide. Initial plans for roll out are in the early stages. Following on from A & E the adult intensive care unit will be the next department to adopt use of the device. Further roll out to specialist areas will then follow. Currently the ISDD is not available in a blood culture pack which is our current practice. Plans are in place to include it in a pack as our usage increases. The ISDD as a stand alone item is expensive so the project was slow to start. Based on the estimated costs of a false – positive blood culture savings are estimated to be £28 – 72K for this initial sample. This has been an exciting project for all of those involved. The reduction in contamination rates were evident from the beginning. The ISDD has the potential to not only reduce false – positive blood culture contamination rates and thus generate savings for the Trust but also to have a positive impact for our patients in their hospital journey.

References

1. Dempsey C, Skoglund E, Muldrew KL, Garey KW Economic health care costs of blood culture contamination: A systematic review. *American Journal of Infection Control* 47 (2019) 963 -967
2. Geisler BP, Jilg N, Patton RG, Pietzsch JB Model to evaluate the impact of hospital-based interventions targeting false-positive blood cultures on economic and clinical outcomes. *Journal of Hospital Infection* 102 (2019) 438 -444