Reducing False Positive Blood Cultures in an Adult NHS Emergency Department using an Kurin

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April 2022

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 approx. £5,000 and have a significant negative impact on patients[2] . 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 5 days[2] 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 including additional lab testing and radiological investigation. At King's Princess Royal Hospital (PRUH), BC contamination rate consistently average at 6%. The highest number of contaminated specimens are associated with the emergency department (ED) where there is a widely adopted practice of collecting BC samples from newly inserted peripheral intravenous cannulae (PIVC) and injecting into the BC bottles with a needle. This practice is associated with an increased risk of sample contamination, and other complications.

At the PRUH a project was implemented in the ED to trial the Kurin Lock® to determine, if the introduction of an initial specimen diversionary device that automatically side-lines the first flash of blood on cannulation of the vein, will reduce the number of false-positive blood cultures.

2. Method

Kurin Lock® diverts the first 0.15 mL of blood that may contain skin contaminants and 'locks' it into a small diversion chamber. The device is available in two versions: a traditional style butterfly needle, and an extension set that can be attached to a newly inserted PIVC (images 1 & 2).

After consultation and agreement on trial stock, training, start date, and duration, the Kurin diversionary device was introduced to the ED staff.

- Information and training on the use of the device was provided by the Kurin representative; most of the training was done at early morning handover. Early morning was agreed as it allowed more staff to be informed, made aware of the trial, and be familiarised with the device.
- Kurin units were provided for the trial over a four-week period, this was the only change in practice implemented for the duration of the trial
- Kurin devices was made available alongside the current blood collection equipment as it was not possible to completely remove all the equipment form phlebotomy trolleys within the department
- All ED staff were involved in the trial, with two practice development nurses (PDN), and one ED technician provided ongoing support
- All BC were in the numbers including those collected by femoral stab not using the Kurin device
- Weekly report for number of BC collected in the department was provided by the surveillance team

Image 1 – Standard butterfly needle

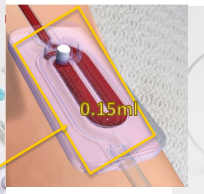


Image 2 – Extension set for cannula

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

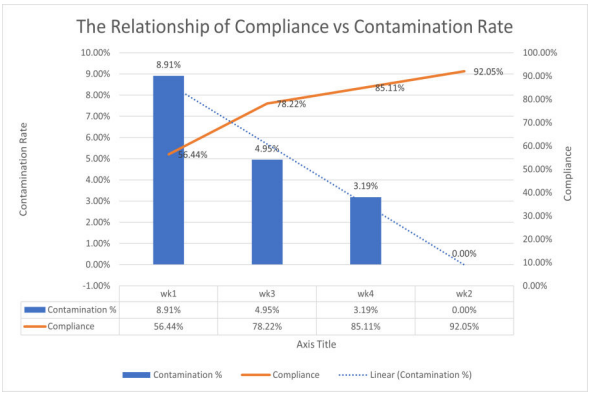
2.Alahmadi YM, et al., Clinical and economic impact of contaminated blood cultures within the hospital setting, Journal of Hospital Infection (2010), doi:10.1016/j.jhin.2010.09.03

3. Results

The baseline contamination rate for the PRUH ED was 9%.

Data was collected and analysed for 381 blood culture samples that utilised a Kurin device. The results demonstrated a decrease in blood culture contamination to 3.1%.

A reduction of **65.5%** (see graph below) vs the baseline.



4. Discussion

The trial has demonstrated a significant reduction in the number of false-positive BCs using the Kurin device. Result of the weekly data was fed back to the PDNs to share with department leads and the wider staff group.

Staff in the department embraced the project. There was no change to current practice, and staff found the Kurin device easy and simple to use. Using Kurin mitigates the increased risk of contamination, and the demonstrated decrease in numbers of false positives encouraged the ED staff to follow best practice. All the trial stock were used, and staff expressed a keen interest to continue using the device.

If endorsed, initial roll-out would start in ED, followed by the adult intensive care unit and other specialist areas.

Kurin as a stand-alone item is expensive, however, based on the estimated cost of false-positive blood cultures, savings are estimated to be £4.6M for the Trust as a whole and £1.3M in PRUH ED. Additionally, adoption could potentially free up 1,444 bed-days at the PRUH, and 5,041 trust-wide. The reduction in contamination rates becomes evident when there is 80% compliance utilising the device. Kurin is proven not only to reduce false-positive blood culture contamination rates significantly and thus generate savings, but also have a positive impact on patients in their hospital journey.