Background

Accurate detection of blood stream infections (BSI) is critical for effective treatment and management of a variety of childhood infections. We sought to establish the impact of introducing a weight-based pediatric blood culture collection protocol at BCCH on the mean volume of blood collected, the BSI pathogen yield, and blood culture contamination rates. The new protocol also recommended using the “discard” for blood culture collection when obtaining a sample from a central venous line; therefore, blood culture contamination rates were assessed over two time periods for Oncology/Hematology/BMT patients.

Methods

- Education sessions were held for BCCH nurses and phlebotomy staff prior to implementation of the new protocol. Laminated lanyard cards were developed that summarized the new collection guidelines.
- Mean blood volume collected was defined as total blood volume collected for blood culture in a 24 hour period from a single patient. The volume was determined by weighing blood culture bottles before and immediately after collection with a calibrated scale accurate to 0.1g, and then normalized to unit weight by dividing by the patient’s weight in kg.
- BSI pathogen yield (number of collections positive for ≥1 pathogen/total number of collections) was compared for the year pre vs. post protocol implementation.
- Contamination rate was calculated for Oncology/Hematology/BMT patients and defined as growth of a generally non-pathogenic skin organism (e.g. Coagulase negative staphylococci, Micrococcus spp., Bacillus spp.) from a single blood culture bottle according to previously defined criteria.

Methods (cont’d)

- Continuous variables were compared with a t test and categorical data were compared with a Mantel-Haenszel chi² test (OpenEpi™ version 3.01).

Results

- For the mean blood volume evaluation, there were 139 collections evaluated in the pre-period vs. 110 collections in the post-period.
- Mean blood volume collected per kilogram patient weight increased by 165% (0.26ml/kg vs. 0.69ml/kg, p<0.00001) - see Figure 1

Results (cont’d)

- For the pathogen yield evaluation, a total of 6605 blood culture collections from 2986 patients were evaluated from the pre-implementation phase (July 1, 2017 to June 20, 2019), and 6254 blood culture collections from 3012 patients were evaluated in the post-implementation phase (July 8, 2018 to July 7, 2019). Total pathogen yield per collection increased 22% for all collections (231/6605 vs. 269/6254, p = 0.02) - see Figure 2.
- Largest increases in pathogen yield were seen in the Oncology/Hematology wards (44% increase), followed by the Emergency Department (38% increase).
- Contamination rates for the Oncology/Hematology/BMT patients remained similar (0.73% vs. 0.89%, p = 0.61).

Conclusion

- Implementation of a weight-based institutional blood culture collection guideline including use of “discard” blood resulted in significant increases in blood volume collected per kilogram of patient weight
- This was also associated with improved BSI pathogen yield and similar rates of blood culture contamination.

Reference