Blood volume collected for blood cultures in infants with suspected neonatal sepsis in the NICU

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Background

- Blood cultures have high sensitivity to detect bacteremia in neonates when ≥1 ml of blood is collected.
- Low confidence in microbiologic sampling leads to prolonged courses of antimicrobial therapy without a focus of infection.

Objectives

1. Describe the blood culture sample volumes in NICU patients.
2. Identify factors associated with sample volumes <1ml.
3. To compare the sample volumes of patients treated for culture-negative sepsis with those with bloodstream infections and those treated for a ≤72-hour sepsis rule-out.

Methods

- Observational cohort study
- Retrospective and prospective data collection.
- NICU patients with blood cultures collected (Sept 2018 to Nov 2019).
- Demographic, clinical, and treatment data were collected through chart review.
- All inoculated cultures bottles were weighed for volume calculation.
- We determined the association of weight, age, source of sample, gender and time of collection with volume <1mL.
- Continuous variables were analyzed using Wilcoxon-Mann-Whitney, and categorical variables using Pearson chi-squared test.
- The volumes of the groups for aim 3 were converted to logarithmic scale for normalization and compared using analysis of variance test.

Results

- 708 blood cultures identified (292 patients)
- Median inoculated volume was 1ml (IQR: 0.6-1.5).
- Median volume of blood was 1 ml (0.6-1.5) for sepsis rule-out, 1 ml (0.6-1.5) for bloodstream infection, and 1 ml (0.6-1.5) for culture-negative sepsis. (p=0.56)

Results

Figure 1: Blood cultures by positivity and clinical indication

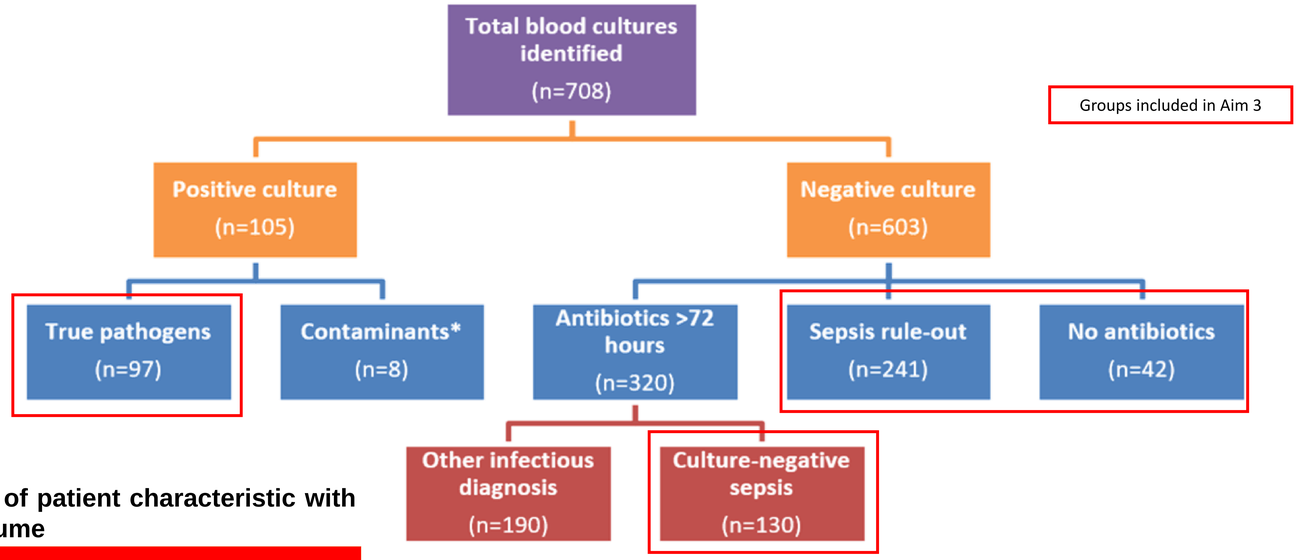

Table 1: Association of patient characteristic with inoculated blood volume

Patient Characteristics	< 1 ml	≥ 1 ml	p value
Weight, kg (mean)	2.54	2.63	0.39
Age, days (mean)	41.1	44.6	0.15
Source of sample (n)			0.69
Peripheral	204	377	
Central	39	86	
Gender (n)			0.17
Female	106	194	
Male	138	170	
Time of collection			**0.023**
Day shift	132	292	
Night shift	112	172	

Conclusions

- In this single center study, the blood volume collected for cultures from NICU patients is consistent with recommendations.
- Collection of blood cultures during the night shift is associated with lower than recommended sample volumes.
- The volume of blood sampled does not differ in patients with culture-negative sepsis, bloodstream infection and sepsis rule-out, and should not be a justification for longer duration of antibiotic therapy.

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