

Implementing Criteria to Reduce Blood Cultures Ordering: A Pre-and Post-Intervention in a Critical Access Hospital

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BACKGROUND

Typically, clinicians order blood cultures in patients whom bacteremia is suspected. Recently, we have seen the significant increase orders of the blood cultures in our community hospital which some of those orders did not have clear indications. More than 25% increase of blood cultures were requested in the first quarter of 2019 when compared to 2018. Our previous study showed that 35% of blood cultures performed in May 2019 could have been prevented since they did not meet the certain criteria.

OBJECTIVE

Our study sought to examine the outcomes after education intervention by implementing criteria of blood culture ordering whether it could reduce unnecessary blood cultures in our hospital.

METHODS

- **Study design: A retrospective electronic medical records review**
- **Study population:**
 - All adult patients who had blood cultures done in the month of May 2019 and March 2020 (6 weeks after intervention).
- **Confounding and significant covariates:**
 - Demographic data, clinical presentation, vital signs, location, quantities and sites of blood cultures were obtained.
 - The measurement of qSOFA, SIRS and severe sepsis criteria were collected on the presentation.
- **Criteria for blood cultures:**
 - No absolute indication to determine appropriateness of blood cultures in the literature, clinical judgement is likely required.
 - In our study, we used the criteria of **at least 2 SIRS and/or at least one of the qSOFA criteria or severe sepsis** to be a minimum indication for ordering blood cultures (1-2).
- **Interventions:**
 - Providers educations and implement criteria in electronic medical orders (T-system).
- **Statistic analysis:**
 - Chi-square to determine the difference between pre- and post-intervention.
 - Stata v 14.2 (Stata Corp, College Station, Texas)

Table 1: Baseline characteristic of patients who had blood cultures

	Pre-intervention N= 112	Post-intervention N=53
Age (median, IQR)	68 (55.5, 77)	63 (51, 74)
Female	54 (48.2%)	24 (45.3%)
People with injected drug (PWID)	6 (5.5%)	1 (1.9%)
Nursing home resident	100 (89.3%)	49 (92.5%)
Location of BCx drawn		
- ED	104 (92.9%)	49 (92.5%)
- Inpatient	7(6.3%)	4 (7.5%)
- other	1 (0.9%)	0 (0%)
Pneumonia	45 (40.2%)	22 (41.5%)
Cellulitis	17 (15.2%)	7 (13.2%)
Disposition		
- Discharge from ED	29 (26.6%)	16 (30.2%)
- Admit to medical floor	51 (46.8%)	22 (41.5%)
- Admit to ICU	8 (7.3%)	10 (18.9%)
- Transfer to tertiary care	21 (19.3%)	5 (9.4%)
Met qSOFA criteria	47 (42%)	31 (58.5%)
Met Severe Sepsis criteria	9 (8.0%)	9 (17%)
More than 2 SIRS criteria	52 (46.4%)	14 (26.4%)
Growth on the final Bcx	12 (10.7%)	6 (11.3%)
Organisms growth in final Bcx		
- Gram positive	10 (83%)	6 (100%)
- Gram negative	2 (17%)	0 (0%)
Contaminated cultures	3 (25%)	3 (50%)

CONCLUSION

Our study found that implementation of criteria for blood cultures successfully reduces the unnecessary blood cultures orders approximately 20% without missing true bacteremia in suspected patients. The long-term effect is still uncertain. Limitations of this study include the nature of retrospective study and small sample size.

BIBLIOGRAPHY

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RESULTS

Fig 1: Blood cultures orders in 2019 vs 2020

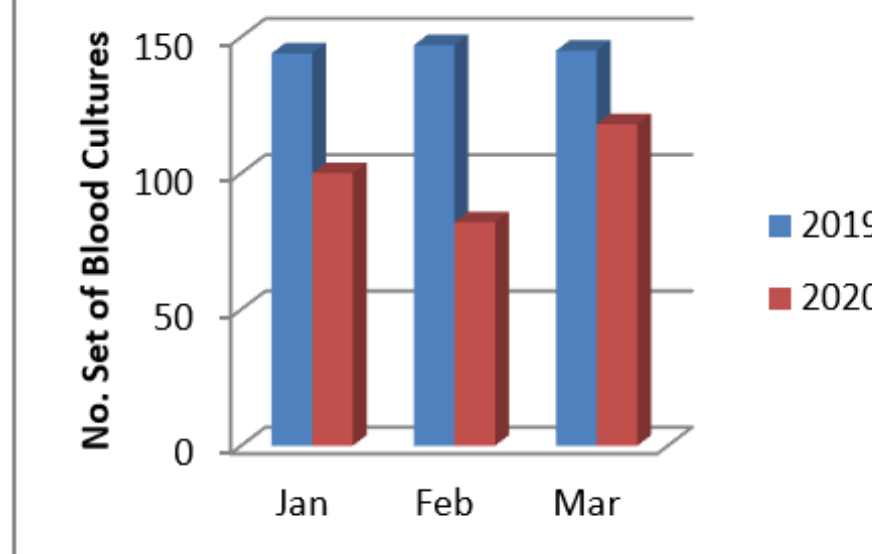
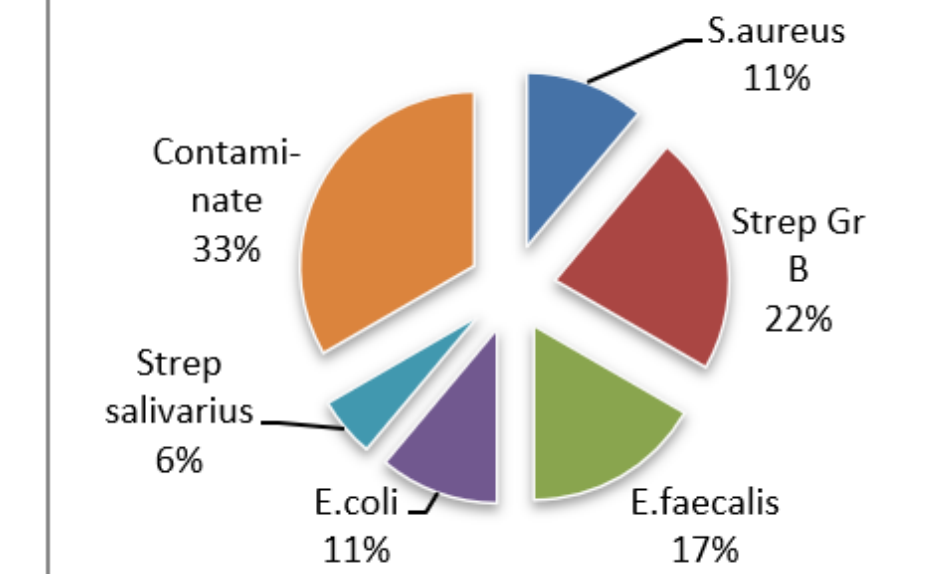


Fig 2: Growth of Bacteria in Postive BCx



Overall, blood cultures orderings had been decreased since the beginning of this year after implementing criteria and providers education. (Figure 1).

There were a total of 165 patients included in our study (112 in pre- and 53 in post-intervention group). The age range from 19 to 98 years old (mean age 64, SD 16). 47% were female. 92% of blood cultures were done in ED. There was no different of baseline characteristics of patients between pre-and post-intervention group (Table 1).

There were 18 patients with positive blood cultures (12/112; 10.71% in pre-intervention gr. vs 6/53; 11.32% in post-intervention gr., χ^2 0.01, p=0.91). Six out of 18 (33%) were deemed to be contaminated (3/12; 25% vs 3/6; 50%, χ^2 1.12, p=0.29). Gram positive cocci were the most common organisms of the true positive blood cultures (10/12; 83%) (Figure 2).

Of 165 patients, 78 (47%) had at least one of qSOFA (47/112; 41% vs 31/53; 58%, chi 3.94, p=0.05), 18 (11%) had met severe sepsis criteria (9/112; 8% vs 9/53; 17%, χ^2 2.96, p=0.09). There were 47 (28%) patients who had less than 2 criteria of SIRS and did not meet either criteria of qSOFA or severe sepsis. We found that there was a significant decreased of blood cultures in patient who did not meet criteria when compare pre- to post-intervention group (39/112; 35% vs 8/53; 15%, χ^2 6.87, p<0.01). There was no true bacteremia in the patients who did not meet our criteria for blood cultures (2 of positive cultures were contaminated).