

NEWSLETTER

Best Practices in Blood Culture Collection

Blood Culture *Contamination*

A positive blood culture either establishes or confirms that there is an infectious etiology for the patient's illness. Moreover, it also provides the etiologic agent for antimicrobial susceptibility testing which, in turn, allows optimization of antibiotic therapy. Unfortunately, blood culture contamination is a common occurrence and may lead to confusion regarding the significance of a positive blood culture. Gander et al¹ found that false-positive BCs may increase the patient's length of stays by 1 day and increased patient financial charges by \$8,700, on average, related to the increase length of stay.

A. Blood volumes

The overall blood culture contamination rate is inversely correlated with the volume of blood collected for culture; the larger the volume, the lower the rate ($P < .001$). However, they hypothesised that the likelihood of acquiring contaminating skin microflora during venipuncture is independent of the volume of blood collected and that larger collection volumes simply dilute any contaminants in the culture bottle, making them less likely to be detected during the 5 to 7 days when culture bottles are incubating.⁴ This was similarly supported by Gonsalves *et al*⁵. Even so, we can't deny the fact that the figures proved that higher blood volumes inoculated into blood culture bottles leads to lower contamination rates.^{4,5}

B. Sites of draw

When comparing sites of draw between catheter and peripheral veins, it is no doubt that catheter drawn cul-

tures are most likely to be contaminated^{6,7,9}. Despite superior sterile precautions, cultures taken at the time of central line insertion had a higher contamination rate than did either peripheral or arterial line blood cultures⁷. Hence a Differential Blood Culture should be collected as recommended by Quilici *et al* on ICU patients whereby a set of

blood culture is drawn from both the catheter and peripheral vein for a comparison⁸.

However, blood cultures obtained at the time of central line insertion were superior to those obtained from venepuncture for the detection of true pathogens at most time points⁷. Nonetheless, please take note that the longer time it takes for central line insertion also increases exposure to the environmental (airborne) contaminants¹⁰.

C. Use of dedicated phlebotomy team

A study conducted in the emergency depart-

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- A. Blood Volume^{4,5}
- B. Sites of draw^{6,7,8,9,10}
- C. Use of Phlebotomy team⁴
- D. Monitoring Program^{4,11,12}

ment found that blood cultures collected by a phlebotomy team has a contamination rate of 3.1% compared to 7.4% by nonphlebotomists ($P<.001$) as depicted on table 1.0⁴. This relationship may reflect the special training dedicated phlebotomy staffs receive, skill acquired with repeated practice, nurses' increased propensity to draw blood from intravenous catheters, the distractions and clinical pressures ward-based staff experience, or some combination of these factors.⁴

Total No. of blood cultures	No. (%) of positive blood cultures	No. (%) of contaminated blood cultures		
		Collected by Phlebotomists	Collected by nonphlebotomists	Total
3,662	503 (13.7)	62 (3.1)	122 (7.4)	184 (5.0)

Table 1.0 Comparison of blood cultures collected by phlebotomists to those collected by nonphlebotomists⁴.

D. Monitoring program

The most encouraging findings of Bekeris *et al* was that continued participation in the Q-Tracks monitoring program was associated with progressive decline in blood culture contamination⁴.

What is the Q-Tracks monitoring program?

The College of American Pathologists (CAP) Q-Tracks program, initiated in late 1998, was designed to satisfy accreditation requirements for continuous monitoring and benchmarking in clinical and anatomic pathology. Q-Tracks became an ORYX-approved indicator monitoring system for the Joint Commission on Accreditation of Healthcare Organizations in 1999. This Q-Tracks approach to longitudinal tracking of key indicators of quality was developed from experience gained in the groundbreaking Q-Probes program. The precursor Q-Probes program was founded in 1989 to establish key benchmarks and standardized approaches to measurements of laboratory quality. The Q-Probes program of time-limited monitors has resulted in more than 100 peer-reviewed publications, defining pre-analytic, analytic, and post-analytic

benchmarks for quality improvement in all disciplines of pathology and laboratory medicine.¹³

It is found that institutions that had longer lengths of participation in the Q-Tracks program had progressively lower rates of contamination; in fact, the largest decreases were observed in the fourth and fifth year of participation. This observation suggests that the act of monitoring produces benefits beyond the so-called Hawthorne effect, in which subjects under observation perform better than unobserved subjects⁴. It is not certain whether monitoring over time increases compliance with practices known to reduce contamination, promotes acquisition of phlebotomy skills, encourages the adoption of unmeasured practices that reduce contamination, or works through some other mechanism. Whatever the reason, the benefits observed from continuous monitoring of blood culture contamination have been reported for other quality indicators in the laboratory, such as correct patient identification and receipt of specimens meeting criteria for acceptability¹².

References

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The best practice benchmark for BC contamination is 3% or less.^{2,3}



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