ASPs, PCT and Rapid Blood Culture ID to Rationalize Antimicrobial Therapy for Patients With Sepsis

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This quality improvement (QI) initiative assessed the impact of combining antimicrobial stewardship programs (ASP) with standardized procalcitonin (PCT) testing and rapid molecular blood culture identification (BCID) on clinical outcomes and health-resource utilization in critically ill adult patients with sepsis.

Methods

- Prospective, real-world, pragmatic pre- and post-implementation QI study.
- Between 2017 and 2018, adult patients with confirmed or suspected sepsis (Sepsis-3)[1] admitted to 2 academic, multidisciplinary ICUs in Canada, were prospectively enrolled.
- Each unit had a 12-week baseline period (phase 1) and an intervention period (phase 2).
- In ASP intervention, physicians and pharmacists conducted prospective audit and feedback (PAF) on all prescribed antimicrobials within 1-3 days of ICU admission and 3-5 days after.
- PCT levels were measured daily for up to 7 days or until ICU discharge. Clinical decision support with evidence-informed stopping and continuation rules were available.
- Rapid molecular BCID was performed on all positive blood cultures 7 days a week.
- **Primary outcome**: in-hospital mortality. **Secondary outcomes:** clinical outcomes, ICU antimicrobial utilization, and health-resource utilization.

Results

- A total of 727 patients were included (phase 1, n = 342 and phase 2, n = 385).
- No significant difference in hospital mortality between the phases (25.4% vs 26.5%; *p*=.75), nor for clinical outcomes, use of mechanical ventilation, vasoactive support, or RRT[2].
- ICU stay was similar, but hospital stay was significantly shorter in phase 2 (mean difference, 5.06; 95% CI, 4.46–5.84; *P* = .017).
- Antibacterial utilization was significantly lower in phase 2 (7.3% reduction; *P* = .010) and piperacillin-tazobactam use was reduced by 17.6% (*P* = .038).
- ASP assessments showed that antimicrobial usage could be optimized in 35% of patients.
- PCT testing helped clinicians make confident decisions on antimicrobial usage, with 36% discontinuation when levels were below 0.25 ng/mL.
- 6% of patients were bacteremic. BCID accurately identified the species in 76% of cases and 71% faster than standard lab protocols. Preliminary susceptibilities were available 28.6 hours sooner than standard laboratory testing, particularly for drug-resistant organisms.

Conclusions

Bundling ASP, PCT, and BCID did not impact sepsis mortality, but was found to be safe and acceptable, and led to a reduction in antimicrobial treatment and hospital length of stay.

> *"Based on these findings, we advocate for ASPs in all ICUs providing care for septic patients. Adjunctive PCT measurements may be useful in further risk-stratifying patients and increasing clinician confidence for antibiotic discontinuation."*

1. Sepsis-3: defined in The Third International Consensus Definitions for Sepsis and Septic Shock (SEPSIS-3) as an acute change in total SOFA score >2 points consequent to the infection.
2. RRT: Renal Replacement Therapy