

Implementation Science for Fast Diagnostics for Bloodstream Infections and the Role in Antimicrobial Stewardship Programs

Maureen Spencer, M.Ed, BSN, RN, CIC, FAPIC, Clinical Implementation, Accelerate Diagnostics, Tucson, AZ

Introduction

A substantial proportion of antibiotics used in healthcare may be inappropriate or altogether unnecessary, which can lead to adverse drug reactions, Clostridium difficile infection, and antibiotic resistance. One of the major contributing factors is the delay in standard lab procedures for positive blood cultures from 2 to 4 days, resulting in overuse of empiric therapy. New faster diagnostic tests can provide these same results in less than 7hrs. Effective clinical adoption can be done using implementation science, which provides action-oriented and mission-driven teamwork and enhanced communication among diverse members.

Objectives

- Describe three tools used in clinical implementation stages
- Describe how antimicrobial stewardship programs can be more effective with the use of implementation science
- Describe how fast phenotypic diagnostics for bloodstream infections can play a significant role in reducing the inappropriate use of antibiotics and adverse outcomes

Description of the Project

- Antimicrobial stewardship programs (ASPs) have been at the forefront of the effort to curtail inappropriate antibiotic use.
- With faster blood culture diagnostics for organism identification and antibiotic susceptibilities, clinicians can de-escalate or target appropriate antibiotic therapy; thereby reducing days of therapy, costs, mortality, adverse outcomes and length of stay.
- The use of implementation science can be an effective method to guide clinicians in clinical adoption sessions for successful use of molecular diagnostics for blood cultures in septic patients.

Elements of robust product management for the evaluation and implementation of new technologies or processes



Project management: Identify required resources and timing of tasks and deliverables

- **Retrospective Chart Review:** Targeted review of 25-30 cases of current patient care continuum overlaid with the opportunity for intervention and associated impact
- **Evaluation and Performance Data:** Provide post evaluation and verification data review
- **ID/Pharm Consultancy:** Provide an expert consultancy on antibiotic best practices
- **Process Analysis:** Provide an expert consultancy regarding operational/information flows that impact the way antibiotics are utilized
- **Clinical/Business Justification:** Provide performance data, literature, quote/contract, glossy presentation, and deliverables for the clinical coach to share within their organization
- **Clinical Adoption:** Guide clinical practice in the adoption of fast phenotypic diagnostic technologies and associated work and information flows

Methods/approaches

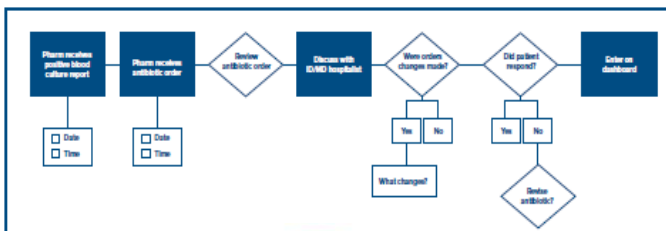
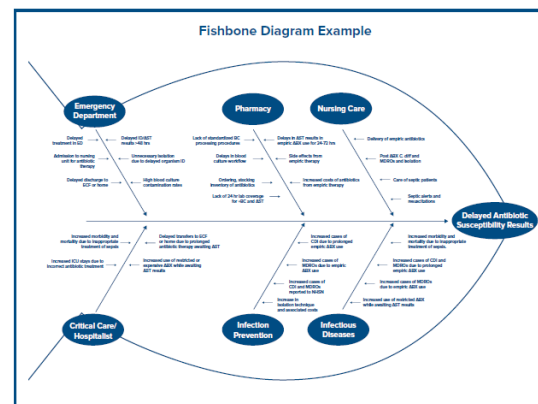
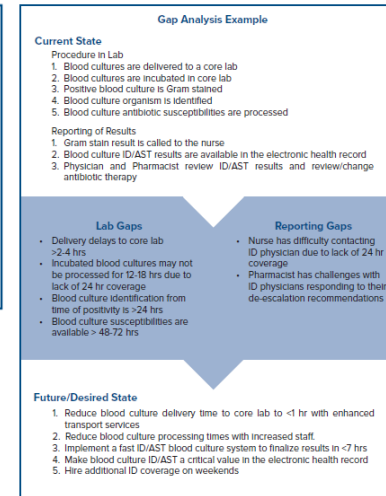
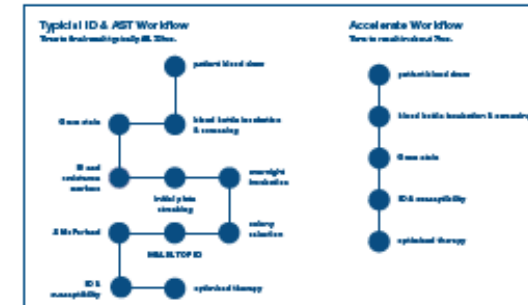
During the exploration stage, readiness is assessed by a clinical intervention solution team and includes:

1. a retrospective chart of current lab procedures for 30 positive blood cultures
2. a process analysis of the lab, pharmacy, infectious disease and infection prevention response to blood cultures
3. a business analysis using publicly reported metrics, such as length of stay, mortality, sepsis readmissions, *C difficile* infections and CMS (Center for Medicare and Medicaid Services) penalties for healthcare associated conditions (HACs)

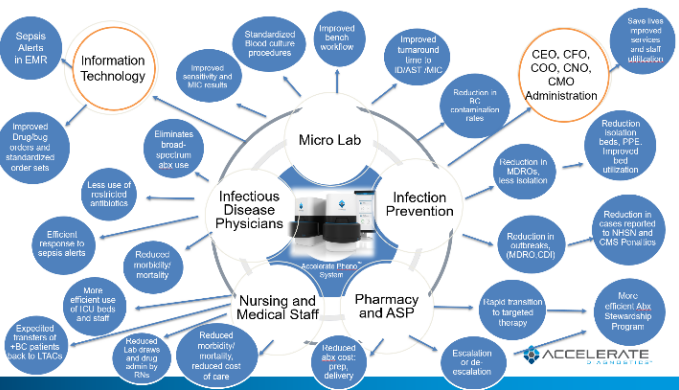
Following the analysis a diverse group of clinicians are invited to the session, including infectious disease physicians, pharmacists, infection preventionists, microbiologists, nursing staff, sepsis coordinators, information technology specialists and administrators.

• Implementation tools that may be used include:

- mind-mapping session (Figure 1)
- process pathway analysis (Figure 2)
- developing a fishbone diagram (Figure 3)
- determining a gap analysis (Figure 4)
- developing an action plan and participating in follow-up sessions to assure full clinical implementation.



ID and AST with MICs in less than about 7 hours from positive blood culture



Lessons learned

- The adoption of faster phenotypic diagnostic technologies can decrease the time to critical lab results
- The use of implementation science can maximize the benefits of obtaining ID and AST results for optimizing antibiotic therapy and instituting isolation precautions for MDROs.