

Abstract: Overview and Specific Aims

Delays in implementing effective therapy for sepsis are associated with increased mortality.¹ Conversely, optimal timing of antibiotic administration in sepsis and intensive fluid resuscitation including early goal-directed therapy (EGDT) are associated with improved outcomes in severe sepsis and septic shock in the emergency department (ED).¹⁻³ The Institute for Healthcare Quality Improvement recommends that antibiotics should be administered to ED patients with severe sepsis and septic shock within 3h of presentation.⁴ However, a number of ED barriers make it difficult to implement timely and effective sepsis therapies including: confirmatory laboratory testing, and delays in antibiotic ordering, procurement and administration, and competing patient care priorities in a busy ED setting. In recent years, electronic notification system (ENS) technology has been investigated to improve early detection of critical illnesses, including severe sepsis.⁵ Pharmacists also have been working in the ED, serving as safety oversight personnel and medication experts, and facilitating timely drug procurement.⁶ It is unknown however, if ED pharmacists, utilizing an ENS and participating in a multidisciplinary ED team can optimize initiation and implementation of effective therapies for severe sepsis and septic shock. Thus, there is an *urgent need* to determine if the introduction of both a sepsis-dedicated ENS and an ED pharmacist can contribute to early detection of severe sepsis/septic shock and traverse existing barriers to bring timely and effective antibiotic therapies to the bedside in this setting, thereby improving patients' outcomes.

Our *central hypothesis* is that adding a dedicated pharmacist to the ED multidisciplinary team will reduce the door to antibiotic initiation time in ED patients with severe sepsis/septic shock. By responding to electronic notification of a sepsis-related biomarker (elevated lactate levels), the pharmacist will be able to facilitate the immediate prescribing and administration of appropriate antibiotics. The *rationale* for the proposed research is that pharmacist intervention will result in early initiation and administration of appropriate antibiotics thus, overcoming obstacles to early identification and treatment of severe sepsis/septic shock in the ED. Our hypothesis has been formulated from preliminary data produced collectively by the research team, including implementation of ED and ICU sepsis bundles; development of institutional sepsis response teams (SRTs); methodological identification of sepsis process and formal training of ED personnel in teamwork.

We plan to test our central hypothesis and accomplish the primary objective of this application by pursuing the following *specific aims*:

- 1. Demonstrate that adding an ED Pharmacist and ENS will reduce the door to antibiotic time to at least 3hrs in all ED patients with severe sepsis and septic shock.**
During the time of this intervention, we aim to increase from 85% to near 100% the proportion of patients with severe sepsis and septic shock in whom antibiotic coverage is initiated within 3hrs of presentation to the ED. Currently, 15% of ED patients with this diagnosis do not meet the criterion for time of antibiotic administration.
- 2. Demonstrate that the ED Pharmacist will increase appropriateness of empiric antimicrobial therapy according to institutional protocols.**

Our working hypothesis is that an ED Pharmacist will increase appropriateness of empiric antimicrobial therapy from a baseline of 70% to 90% during the time of this intervention.

This project is *innovative* because we will be the first to specifically address the contribution of an ED pharmacist improving timely antibiotic administration use process in ED patients with severe sepsis/septic shock. The combination of work proposed in aims 1 and 2 is expected to have a critical impact on medication use processes in the ED patients with severe sepsis/septic shock. It is expected that the results will fundamentally advance the methods by which EDs can overcome barriers to improving compliance with sepsis bundles in this setting and advance the practice, scope and role of pharmacists in the ED. We anticipate this model can be emulated by or disseminated to EDs using broad staffing models.

References

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