Effects of pharmacist-driven molecular diagnostic alerts on clinical outcomes

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BACKGROUND

Bloodstream infections and septicemia have been associated with high rates of mortality. In the United States, it is estimated these infections cause up to 600 deaths per day.[1] Empiric coverage of septicemia with broad spectrum antibiotics is recommended by current practice guidelines, however may still result in treatment failure due to issues such as rising antimicrobial resistance. Inappropriate empiric antimicrobial coverage occurs up to 15-30% resulting in a 2-5 fold increase in negative patient outcomes, including mortality.[2]

In the 2018 Surviving Sepsis campaign bundle, it is stated that empiric antibiotics should be initiated within 1 hour of sepsis recognition.[3] Within the initial 6 hours of sepsis, survival rate decreases on average 7.6% for each hour appropriate antibiotic therapy is delayed.[4] Therefore, many publications stress the importance of prompt targeted therapy for septicemia.

The use of rapid diagnostic testing, such as polymerase chain reaction is recommended by the 2016 ASP guidelines. It is encouraged to use both novel and conventional methods in combination with stewardship to Improve time of initiation of targeted antibiotic treatment including actions of initiation, escalation, or de-escalation of antimicrobial therapy.[5]

OBJECTIVE

To determine the effects of a pharmacist-driven sepsis PCR alert system on interventions and clinical outcomes.

METHODS

A retrospective chart review using institutional electronic records searching for a positive sepsis PCR results published between the months October - April for the years of 2016,2017, and 2018.

Patients were identified through pharmacy clinical intervention documentation following positive sepsis PCR results. The two cohorts included:

- Patients receiving an antibiotic change per sepsis PCR alert and pharmacist (RPh) recommendation and
- Patients receiving no antibiotic change per RPh recommendation including individuals not requiring need of alternative therapy

The primary outcome compared in-hospital mortality and length of stay (LOS) between patient groups.

Statistical analysis includes Pearson Chi-square for nominal data. Continuous data was analyzed using Shapiro-Wilk for normality and Mann-Whitney U was used to determine difference. An alpha level of significance was defined as <0.05.

RESULTS

Included Patients

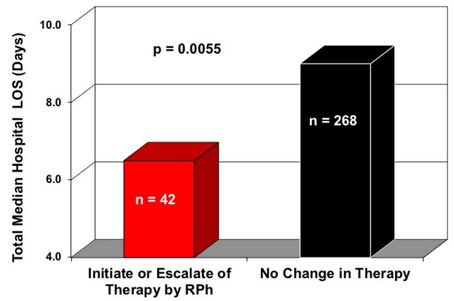
385 positive sepsis PCR interventions by RPh

60 accepted RPh recommendations for change in antimicrobial therapy

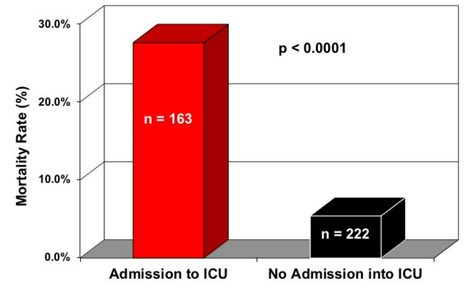
Median (IQR) time to appropriate antibiotic after RPh intervention in minutes: 65 (44)

Baseline Characteristics	
Median (IQR) Age in years	59 (23)
Median (IQR) SAPS II Score	29 (20)

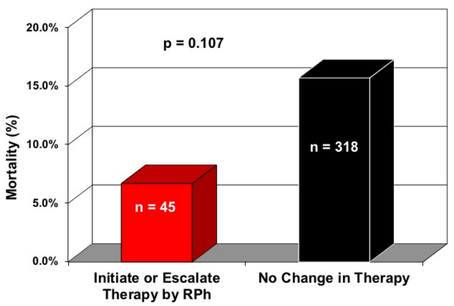
Total Hospital LOS in Patients whose Therapy was Initiated or Escalated by RPh



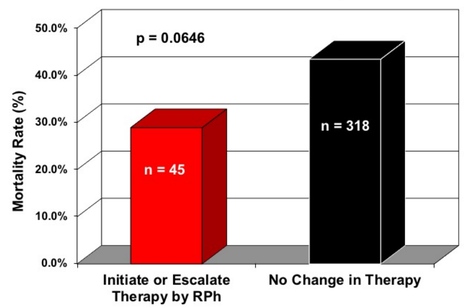
In-Hospital Mortality Rates in Patients Admitted into an Intensive Care Unit (ICU)



In-Hospital Mortality Rates in Patients whose Therapy was Initiated or Escalated by RPh



ICU Admission Rates in Patients whose Therapy was Initiated or Escalated by RPh



CONCLUSIONS

- **Patients admitted into an Intensive Care Unit (ICU) had significantly higher rates in mortality than to patients not requiring an ICU admission**
- **The intervention group had a significantly reduced total hospital LOS**
- **A trend of lower ICU admissions exists for patients receiving appropriate antibiotic therapy due initiation or escalation of antibiotic therapy due to sepsis PCR results and RPh recommendations**
- **Continuation of real-times sepsis PCR alerts to the pharmacist queue may reduce hospital length of stay and admission to ICU for patients receiving inadequate empiric antimicrobial treatment for bloodstream infections**

LIMITATIONS

- **Retrospective chart review**
- **Small sample size**
- **Antibiotic decisions often deferred to senior resident, attending, or infectious disease specialty team despite pharmacy sepsis PCR notification and antibiotic recommendation**

SELECTED REFERENCES

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5. Barlam TF, Cosgrove SE, Abbo LM, et al. Implementing an antibiotic stewardship program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America. *Clin Infect Dis*. 2016;62(10):e51-e77.

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