



Development of institution-specific guidelines for double coverage of gram-negative sepsis

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INTRODUCTION

- Empiric antimicrobial regimens often include 2 agents with activity against *P. aeruginosa*, due to higher mortality rates compared to infections with other gram-negative organisms.
- Selection of specific empiric antimicrobial regimen should be based on hospital-specific susceptibility data. Current recommended empiric double coverage for sepsis at VCUHS is piperacillin-tazobactam plus levofloxacin.

OBJECTIVES

Primary Objective: Assess the adequacy of empiric antibiotic combinations in septic patients for gram-negative infections based on *in vitro* susceptibilities

Secondary Objectives:

- 1) Adequacy based on patient location [Intensive care unit (ICU) vs. non-ICU]
- 2) Adequacy based on gram-negative organism
- 3) Adequacy based on source of culture
- 4) Rate of in-hospital mortality

METHODS

Study Design: Retrospective electronic medical record review

Patient Selection: Patients identified using ICD-9 codes for sepsis (995.91), severe sepsis (995.92) and septic shock (785.52) and microbiology data

Inclusion Criteria

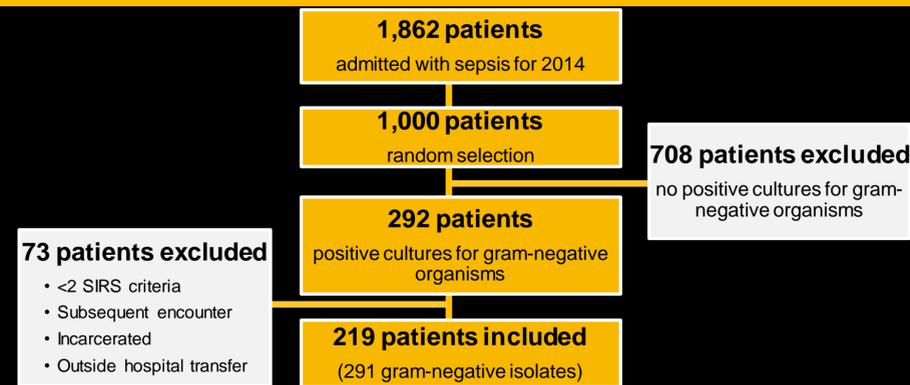
- January 1, 2014 - December 31, 2014
- ≥ 18 years of age
- Diagnosis of sepsis, severe sepsis, or septic shock and infection documented by positive culture for the 13 most common gram-negative isolates at VCUHS
 - *Acinetobacter* species, *Citrobacter koseri*, *Citrobacter freundii* complex, *Enterobacter aerogenes*, *Enterobacter cloacae* complex, *Escherichia coli*, *Klebsiella oxytoca*, *Klebsiella pneumoniae*, *Morganella morganii*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Salmonella* species, *Serratia marcescens*

Study Definitions:

- 1) Adequate antibiotic regimen
 - contains at least 1 antibiotic with *in vitro* activity against each organism cultured
- 2) Systemic inflammatory response syndrome (SIRS) criteria
 - heart rate > 90 bpm; respiratory rate > 20 bpm; temperature >38.4 °C or < 36; white blood cell count >12,000 cells/mm³ or < 4,000 cells/mm³

Analysis: Primary and secondary objectives analyzed using Pearson's chi-squared test

PATIENT SELECTION PROCESS



RESULTS

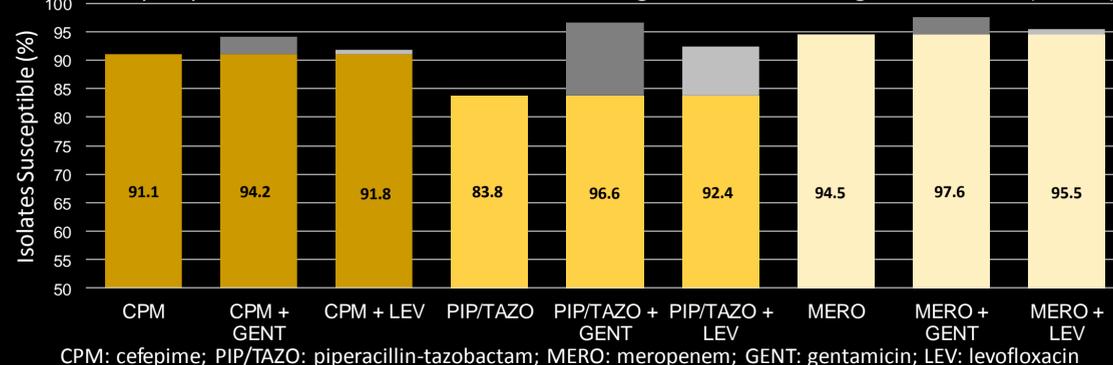
Patient Population:

- Median age of 61 (20-93 years old)
- Male (50.6%)
- African American (59.4%)
- Intensive care unit (ICU) location (41.5%)
- In-hospital mortality (15.5%)
- 3 most common gram-negative organisms
 - *Escherichia coli* (37.1%)
 - *Klebsiella pneumoniae* (21.6%)
 - *Pseudomonas aeruginosa* (13.4%)
- 3 most common sources of culture
 - Urinary tract (46.7%)
 - Blood stream (28.9%)
 - Respiratory tract (13.4%)

Antimicrobial Therapy:

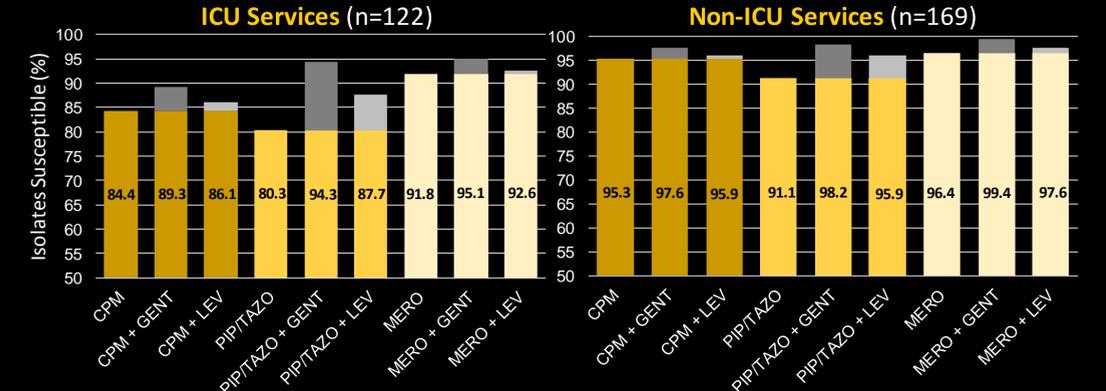
- Number of antibiotics received
 - None within 12 hours of culture (11.4%)
 - 1 antibiotic (62.1%)
 - 2 antibiotics (23.7%)
- Most commonly used antibiotics
 - piperacillin/tazobactam (55.3%)
 - levofloxacin (19.2%)

Adequacy of Various Antibiotic Combinations Against All Gram-Negative Isolates (n=291)



RESULTS CONTINUED

Adequacy of Various Antibiotic Combinations Against All Gram-Negative Isolates



	Appropriate antibiotic coverage (n=170)	Inappropriate antibiotic coverage (n=49)	P-value
In-hospital mortality, n (%)	19 (11.2)	15 (30.6)	0.0009

DISCUSSION

- Most patients received only 1 antibiotic covering gram-negative organisms
- Reduced susceptibility of piperacillin-tazobactam for all gram-negative organisms
- Gentamicin provided broader gram-negative coverage compared to levofloxacin
- Limitations of this study include:
 - Retrospective design
 - Incomplete documentation

CONCLUSIONS

- Receipt of appropriate antibiotic coverage may reduce in-hospital mortality in septic patients
- Choice of empiric antibiotic regimen for sepsis should be based on local susceptibility profiles, patient level of care and source of infection
- Consideration to modify current VCUHS guidelines to stratify patients based on ICU or non-ICU level of care and increase use of gentamicin instead of levofloxacin for empiric double coverage for septic patients

Authors of this poster have no financial disclosures