Positive predictive value of a vancomycin-resistant enterococcus (VRE) screen for VRE bloodstream infection among critically ill patients

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Background

- Enterococci are a common cause of bloodstream infections (BSI) in the United States accounting for more than 9% of isolates. (1-2)
- Vancomycin resistance is independently associated with increased mortality among patients with enterococcal bloodstream infections. (1)
- Polymerase chain reaction (PCR) rectal swab analysis is one of the fastest methods to identify a colonized patient with VRE. (2)

Objectives

Primary Objective

- To determine whether VRE colonization upon ICU admission predicts the risk of vancomycin resistant enterococcal BSI among patients with an enterococcal BSI.

Secondary Objectives

- To identify the positive predictive value of a VRE screen stratified by severity of illness as well as the negative predictive value of the screen.
- To analyze the impact of positive VRE screen on antimicrobial therapy.
- To analyze the Impact of positive VRE screen on mortality and ICU and hospital length of stay

Methods

- IRB-approved, single-center, retrospective observation cohort study
- Subjects will be identified by a medical record search for patients admitted to an ICU at Duke University Hospital between June 1, 2007 and July 1, 2015 and a subsequent enterococcal bloodstream infection.
- Data will be collected to include demographic and clinical data related to that patient’s age, gender, race, ICU length of stay, hospital length of stay, and mortality.

Inclusion Criteria

- Initial enterococcal bloodstream infection
- Intensive care unit admission
- VRE rectal swab within 72 hours of admission to ICU

Exclusion Criteria

- Hospice/home care during ICU admission
- Age <18 years
- Prisoners
- Positive VRE blood cultures 1 year before VRE swab
- Positive enterococcal infection greater than 14 days after VRE swab

Endpoints

Primary Endpoint

- Positive VRE screen upon admission to an ICU correlates with an increased risk of VRE bloodstream infection

Secondary Endpoints

- ICU length of stay
- ICU, in-hospital, 30-day, and 1 year mortality rate
- Time of antimicrobial therapy change from positive VRE swab to positive VRE blood culture

- Incidence of concomitant multi-drug resistant bacterial infection

Statistical Analysis

- Descriptive statistics (mean, standard deviation, range for continuous variables, counts and percentages for categorical variables) will be used to summarize the sample.
- The positive predictive value (PPV) of the VRE screen will be estimated along with 95% confidence interval.
- Association between the VRE screens (positive or negative) and VRE organism (presence or absence) in a 2 by 2 table will be examined using Chi-squared tests.
- Multivariable logistic regression analysis with backward elimination variable selection method will be employed to determine factors that affect hospital length of stay.
- Thirty-day, as well as one-year mortality, will be assessed separately using Kaplan-Meier techniques and log-rank tests.

References


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