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**Session:** 242. HAI: *MRSA, MSSA, and Other Gram-positives*
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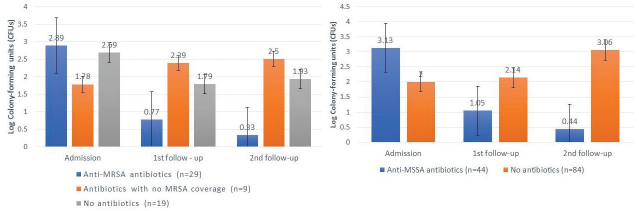
***Background.*** Systemic antibiotic treatment plays a major role in determining the burden of carriage of many healthcare-associated pathogens. However, relatively little information is available on the impact of systemic antibiotic treatment on the burden of nasal carriage of methicillin-susceptible and -resistant *Staphylococcus aureus* (MSSA and MRSA).

***Methods.*** From October to December 2016, 2552 nasal swabs from 1482 patients at a Veterans Affairs Medical Center were cultured for MSSA and MRSA upon admission, ward transfer, and discharge. We measured the concentrations of MSSA and MRSA using quantitative cultures and assessed the impact of antibiotics with or without anti-MSSA or anti-MRSA activity on the burden of carriage in comparison to colonized patients not receiving antibiotic treatment.

***Results.*** Of the 1482 patients, 237 (15.9%) had nasal carriage of MSSA and 92 (6.2%) had nasal carriage of MRSA at the time of admission; paired samples were available in 128 patients carrying MSSA and 57 patients carrying MRSA. As shown in the figure, treatment with antibiotics with anti-MRSA (e.g., vancomycin, trimethoprim-sulfamethoxazole, doxycycline) or anti-MSSA activity resulted in a reduction in the burden of nasal carriage ($P < 0.01$), whereas treatment with antibiotics lacking anti-MRSA activity did not reduce the burden of MRSA ($P > 0.05$). Fluoroquinolone treatment resulted in a reduction in the burden of nasal carriage of fluoroquinolone-susceptible MSSA and MRSA strains.

***Conclusion.*** Treatment of hospitalized patients with antibiotics possessing activity against MSSA or MRSA resulted in a decrease in the burden of nasal carriage. Further studies are needed to determine whether such treatment reduces the frequency of dissemination of staphylococci to skin and the environment.

Figure. Effect of antibiotic treatment on the nasal burden of MSSA and MRSA in hospitalized patients




***Disclosures.*** **All authors:** No reported disclosures.

**2186. Times Up! Manually Working to Remove Patients from Methicillin-resistant *Staphylococcus aureus* (MRSA) and Vancomycin-resistant *Enterococcus faecium* (VRE) Isolation Precautions**

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***Background.*** In 2007 PA Act 52 identified the need to screen and isolate for MRSA in patients who were deemed a high-risk admission in order to prevent the spread of MRSA. High risk at UPMC PUH was determined to be patients who were arriving from an outside facility and patients who were being transferred to an intensive care unit. In 2002 VRE screening began in high-risk patients based on the fact that 80% of our *Enterococcus faecium* was resistant and there was an increase of VRE infections by 42%. After years of gathering data and isolating patients the decision was made to increase the screening of MRSA and VRE to all patients upon admission then weekly and at discharge. With increased surveillance the isolation density averaged around 15% for MRSA and 25% for VRE. As our facility had a decrease in beds due to renovations and still has semi-private rooms the isolation burden, though low was impacting patient flow. The objective was to ensure that the correct patient population remained in isolation while those who were no longer colonized could be removed.

***Methods.*** Removal Criteria:

| VRE | MRSA |
|---|---|
| >2 months since last positive | >2 months since last positive |
| >7 days since effective antibiotics | >7 days since effective antibiotics |
| 3 negative stool or peri-rectal cultures at least 7 days apart | 3 negative nares cultures at least 24 hours apart |

Time Period: December 5, 2016 – May 12, 2017

Manual review: (i) Gather all patients on a daily basis who have MRSA, VRE or a combo of both; (ii) eliminate all patients whose positive test is less than 2 months ago; (iii) evaluate to see if patient has been on antibiotics effective against MRSA/VRE for the past 7 days; (iv) Review for any prior negative swabs; (v) Call the unit and request swabs along with an email to the unit director; (vi) Follow up daily until patient is cleared.

***Results.*** (i) 1707 = positive > 2 months ago; (ii) 1516 = eligible based on Antibiotics; (iii) §113= Cleared based on 3 negative swabs; (iv) 1382 Patients were discharged prior to receiving 3 negative swabs.

***Conclusion.*** (i) 7% of patients were able to have isolation discontinued. (ii) Manual method is not as effective as electronic as many patients were discharged before swabs were obtained; (iii) Ideal circumstances is obtaining swabs on patients while they are not inpatients.

***Disclosures.*** **All authors:** No reported disclosures.

**2187. Epidemiology, Associated Conditions, and Outcomes of Hospital Associated Vancomycin-Resistant *Enterococcus* Infections in the US Military Health Care System**

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***Background.*** Better strategies to combat vancomycin-resistant *Enterococcus* (VRE) infections are needed. Our study aims to characterize the epidemiology and associated conditions, and to measure the attributable cost, length of stay, and in-hospital mortality of VRE infections among hospitalized patients in the US military health system (MHS).

***Methods.*** We performed a retrospective cohort study of patients with VRE infections using MHS database billing records. Cases included all patients admitted to a military treatment facility for ≥2 days from October 2008 to September 2015 with a clinical culture growing *Enterococcus faecalis, Enterococcus faecium* or *Enterococcus* species (unidentified), reported as resistant to vancomycin. Comorbid conditions and procedures associated with VRE infection were identified by multivariable logistic regression. Patient case-mix adjusted outcomes including in-hospital mortality, length of stay, and hospitalization cost were evaluated by high-dimensional propensity score adjusted logistic regression.

***Results.*** During the 7-year study period and among 1,161,335 hospitalized patients within the MHS, we identified 577 (0.050%) patients with VRE infection. A majority of VRE infections were urinary tract infections (57.7%), followed by bloodstream (24.7%), other site/device-related (12.9%), respiratory (2.9%), and wound infections (1.8%). Risk factors for VRE infection included invasive gastrointestinal and urologic procedures, tracheostomy, as well as recent exposure to glycopeptides and extended-spectrum penicillins. Patients hospitalized with VRE infection had significantly higher hospitalization cost (attributable difference [AD] $117,322, $P < 0.001$), prolonged hospital stay (AD 20.45 days, $P < 0.001$, and in-hospital mortality (case-mix adjusted odds ratio 5.77; 95% confidence interval 4.59–7.25).

***Conclusion.*** VRE infection in hospitalized patients is associated with an increased length of stay, hospital cost, and in-hospital mortality. Active surveillance and infection control efforts should target those identified as high-risk for VRE infection. Antimicrobial stewardship programs should focus on limiting exposure to vancomycin and extended-spectrum penicillins.

***Disclosures.*** **All authors:** No reported disclosures.

**2188. Predictors of Vancomycin-Resistant *Enterococcus* (VRE) Bacteremia in Ontario, Canada**

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***Background.*** To determine predictors of vancomycin resistant enterococcus (VRE) bacteremia in Ontario, Canada.

***Methods.*** Ontario hospitals are mandated to report VRE bacteremias to a public reporting database. All confirmed VRE bacteremias between January 2009 - December 2013 were linked to provincial health care administrative data sources. A population-based, nested case–control study was performed to determine predictors of VRE bacteremia. Cases were patients with VRE bacteremia and controls were patients with at least one hospital admission during the study period. Each case was matched with up to three controls using frequency matching on age, sex and aggregated diagnosis group. Associations between patient- and hospital-level predictors and VRE bacteremia were estimated by Generalized Estimating Equations and summarized using odds ratios (OR) (adjusted for age, sex, Charlson score, intensive care unit (ICU) admission, length of stay, hospital admission, comorbidities, hospital size and hospital type) and corresponding 95% confidence intervals (CI) in SAS.

***Results.*** In total, 232 patients had a VRE bacteremia during the study period; 217 cases were successfully linked to administrative data sources and there were 651 controls. Mean age of cases was 61 years (SD 17) vs. 60 years for controls (SD 21). The

proportion of male cases and controls was 60%. Length of stay for cases was longer than controls (median 39 days [range 1–539 days] vs. 3 days [range 1 – 136 days], $P < 0.001$) and 82% of cases died within 30 days vs. 21% of controls ($P < 0.001$). In adjusted analyses, patient-level predictors of VRE bacteremia included: organ transplant (OR 18.93 [95% CI 8.37 – 42.79), cancer (OR 9.56 [95% CI 4.61 – 19.79]), ICU admission (OR 7.45 [95% CI 3.57 – 15.54]), heart disease (OR 5.03 [95% CI 1.92 – 13.18]) and length of stay (OR 1.08 per day [95% CI 1.03 – 1.12]); COPD (OR 3.10 [95% CI 0.86 – 11.20]) and diabetes (OR 2.35 [95% CI 0.72 – 7.64]) were not significant predictors. Hospital-level predictors included hospital size ≥800 beds (OR 10.64 [95% CI 2.34 – 48.25]) and teaching hospitals (OR 4.20 [95% CI 1.65 – 10.74]).

***Conclusion.*** Immunocompromised and patients admitted to ICU are at highest risk of VRE bacteremia, particularly at large hospitals and teaching hospitals. These results may help inform clinical decisions and infection prevention programs.

***Disclosures.*** **All authors:** No reported disclosures.

### 2189. Case–control Study of VRE Acquisition in a Tertiary Care Hospital: Testing the Roles of Antibiotic use, Proton Pump Inhibitor Use and Colonization Pressure

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***Background.*** Vancomycin-resistant Enterococcus (VRE) is a leading cause of healthcare associated infections. VRE can asymptomatically colonize the gastrointestinal tract and colonization is a risk factor for subsequent sterile site infection. Active surveillance for colonization using rectal screening and contact precautions of colonized patients has been pursued by multiple institutions. In this setting, risk factors for converting from swab negative to swab positive have not been assessed.

***Methods.*** We performed a retrospective matched case control study from June 2013 through December 2016 in a single institution. Patients admitted to eight units were routinely screened on admission and weekly thereafter. Cases had a negative swab followed by positive swab more than 3 days after admission. Controls were matched to time from admission to second swab (±5%), unit on which the second swab was performed, and date of admission (±365 days). Co-morbidity data, culture data, and antibiotic and proton pump inhibitor (PPI) days on therapy (DOT) were abstracted from the electronic medical record and verified by manual checking 5% of the cohort. A comorbidity risk factor model was generated using conditional logistic regression and backward stepwise removal by AIC criterion to identify comorbidities significantly associated with conversion. With the best fit comorbidity model, colonization pressure, antibiotic use and PPI use were tested.

***Results.*** We identified 551 cases with matched controls. The comorbidities conferring significantly increased odds ratio (OR) of converting from swab negative to swab positive include age (OR 1.01 per year, P = 0.035), time to index swab (OR 1.5, P = 0.026), neutropenia (OR 1.62, P = 0.014) and renal failure (OR 1.8, P = 0.013). Having one or more DOT of any systemic antibiotic was the largest effect on conversion to VRE positivity (OR 5.6, P < 0.001), but total antibiotic DOT was not significant. Each PPI DOT conferred an OR of 1.06 (P < 0.001). Colonization pressures from patients identified to be carriers and placed in contact precautions did not confer and increased risk.

***Conclusion.:*** Decreasing PPI use and preventing the initiation of antibiotic when possible should be considered to decrease VRE transmission in the hospital.

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### 2190. Single Nucleotide Polymorphisms (SNPs) Analyses Reveal Potential Vancomycin-Resistant Enterococci (VRE) Transmission Networks Between Rooms and Patients in a Hospital Setting

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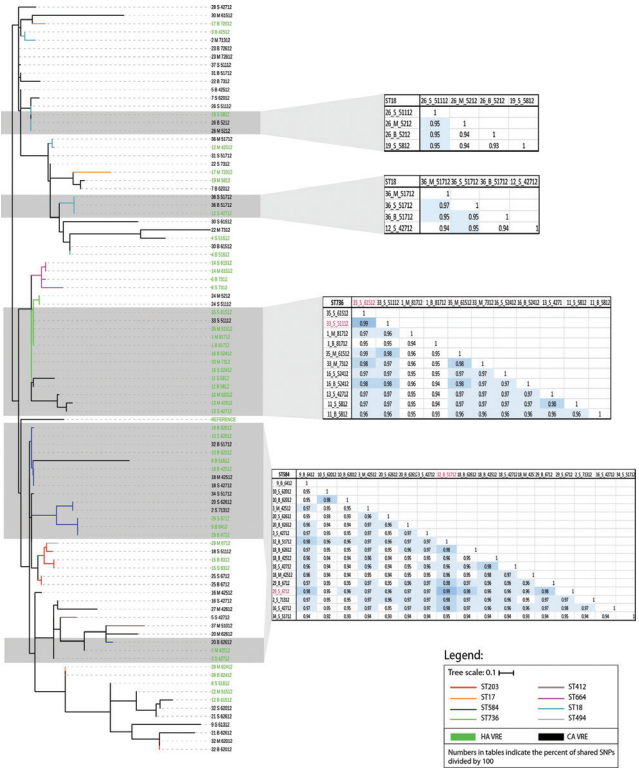
***Background.*** Understanding the reservoirs and transmission networks of pathogens in a hospital setting is important for tracking and controlling the spread of multi-drug resistant organisms, VRE in particular. The transmission of pathogens may occur through direct patient contact or through the surrounding environment including medical equipment.

***Methods.*** In this study, 90 VRE isolates were selected for Whole Genome Sequencing (WGS) including 35 VRE-positive rectal swabs (S) from hematopoietic cell transplant recipients, 29 environmental swabs from these patients' bathrooms (B), and 26 swabs from their main rooms (M). We used SNPs analyses of 100 ortholog concatenated genes to identify VRE clusters and transmission networks between patients and rooms. We categorized isolates into hospital-acquired (HA) VRE (after > 48h from admission) and community-acquired (CA) VRE (≤ 48h). Patient location and VRE sequence types (STs) were identified.

***Results.*** HA and CA VRE isolates did not group into distinct clades. Eight different STs were observed, all belonging to the clonal complex CC17. Interestingly, 1 strain belonged to ST494 which is rarely found in the US and bacteremia was observed in patients with VRE belonging to ST736 and ST664 (Fig1). Some VRE strains isolated from patients and their room environment (pairs) were only 40% identical whereas different pairs were 99% identical based on the SNPs found in 100 ortholog concatenated genes. Two pairs were isolated from distinct rooms and time period and were highly genetically identical (Fig1, in pink).

***Conclusion.*** To our knowledge, this is the first study that compares numerous HA and CA VRE as well as VRE strains derived from the environment and immunocompromised patients. Due to the high frequency of mobile genetic elements' gain/loss in VRE, "hybrid" genomes are emerging resulting in a fusion of HA and CA VRE. We showed the potential presence of transmission networks between rooms and VRE transfer to patients. This data will aid in implementing efficient infection control strategies to prevent and control the spread of this opportunistic organism in the hospital setting.

Figure 1. Phylogenetic tree showing the genetic relatedness of the 90 VRE isolates according to SNPs found in 100 ortholog concatenated genes.




***Disclosures.*** **All authors:** No reported disclosures.

### 2191. Characteristics of Tedizolid Non-susceptible Enterococcal Clinical Isolates

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***Background.*** Tedizolid is a novel oxazolidinone antibiotic with activity across a broad range of gram-positive pathogens. The aim of this study was to describe the characteristics of tedizolid (TZD) resistant enterococcal clinical isolates.

***Methods.*** Tedizolid resistant isolates were recovered from patients at Westchester Medical Center, New York from 2012 to 2016. *In vitro*susceptibility of tedizolid isolates was performed by broth microdilution using the Sensititre™ panel