Background. Bacterial resistance in China has been increasing in prevalence. Vancomycin-resistant enterococci (VRE) different from other bacteria had lower isolated rate and apparent regional variations. In this study, we identified the characteristics of VRE infections in Chinese patients based on the China Antimicrobial Surveillance Network (CHINET) in 2016.

Methods. A case–control study was conducted in 97 VRE patients and 95 Vancomycin-susceptible Enterococcus (VSE) patients from 20 medical centers. Demographics, disease characteristics, therapeutic measure, as well as laboratory data were obtained from medical records for analysis. Descriptive statistics, simple and multivariable logistic regression were performed to explore the risk factors of VRE infection.

Results. The mean age of patients in the case and control groups was 75.0 years and 65.0 years, respectively. In the case group, 52 patients developed urinary tract infections, accounting for 53.6%, followed by bloodstream infections (19.6%) and abdominal infections (5.2%). And the cases of Enterococcus faecium, Enterococcus faecalis and other enterococci infections were 70 (72.2%), 7 (7.7%), and 20 (20.6%), respectively. Moreover, the proportion of vancomycin usage before infection was 20.6%. The result of resistance analysis showed VRE patients' other drug resistance rate was higher than VSE ones. Compared with VSE patients, VRE patients had received more urinary intubation, indwelling venous catheter, and dialysis. Additionally, the proportions of combination stroke (8.3% vs. 2.1%), multiple organ failure (8.3% vs. 3.2%), and other infection (59.8% vs. 40.0%) were higher in the case group. What's more, 44 (45.4%) VRE patients had been treated in intensive care unit, while 21 (22.1%) cases in the control group. Multivariable logistic regression showed that receiving indwelling venous catheter was independent risk factor for VRE infection (OR=3.342, 95% CI: 1.379~8.099). For prognosis, VRE patients had a lower effective rate (67.4% vs. 83.7%), higher hospital expense (59.8% vs. 40.0%) and longer hospital stay (26.0 days vs. 21.0 days). What’s more, 44 (45.4%) VRE patients with stroke (8.3% vs. 2.1%), multiple organ failure (8.3% vs. 3.2%), and other infection (59.8% vs. 40.0%) were higher in the case group. What’s more, 44 (45.4%) VRE patients had been treated in intensive care unit, while 21 (22.1%) cases in the control group. Multivariable logistic regression showed that receiving indwelling venous catheter was independent risk factor for VRE infection (IR=3.342, 95% CI: 1.379~8.099). For prognosis, VRE patients had a lower effective rate (67.4% vs. 83.7%), higher hospital expense (59.8% vs. 40.0%) and longer hospital stay (26.0 days vs. 21.0 days).

Conclusion. Indwelling venous catheter may increase the VRE infection risk and Linezolid or Fosfomycin could still be used for infection treatment in VRE patients.

Table 1. Comparison of demographic and other characteristics between VRE and VSE patients

| Characteristics          | VRE patients | VSE patients | P-value |
|--------------------------|--------------|--------------|---------|
| Age, years               | 75.0±10.3    | 65.0±10.3    | 0.0003  |
| Place before infection   |              |              |         |
| Hospital                 | 42 (47.9%)   | 51 (58.7%)   | 0.0976  |
| Community                | 46 (51.6%)   | 36 (46.4%)   |         |
| Diabetes                 | 1 (1.1%)     | 2 (2.2%)     |         |
| Tumor                    | 24 (25.3%)   | 17 (17.5%)   | 0.1909  |
| Cardiovascular diseases  | 12 (12.8%)   | 22 (27.3%)   | 0.0602  |
| Cardiac insufficiency    | 9 (9.5%)     | 23 (27.3%)   | 0.0001  |
| Renal insufficiency      | 10 (10.3%)   | 9 (10.5%)    | 0.2824  |
| Hypertrophic cardiomyopathy | 7 (7.2%) | 5 (5.2%) | 0.4446 |
| Vascular perforation     | 2 (2.1%)     | 0 (0.0%)     | >0.999  |
| Immune disease           | 1 (1.1%)     | 2 (2.2%)     | >0.999  |
| Gastrointestinal bleeding| 6 (6.3%)     | 2 (2.2%)     | 0.5672  |
| Severe-acute pancreatitis| 1 (1.1%)     | 1 (1.2%)     | >0.999  |
| After the pacemaker implantation | 1 (1.1%) | 0 | 0.4948 |
| Intestinal fistula       | 2 (2.1%)     | 0 (0.0%)     | >0.999  |
| Urinary intubation       | 3 (3.2%)     | 3 (3.5%)     | 0.7580  |
| Indwelling venous catheter| 9 (9.5%) | 31 (31.9%) | 0.0001 |
| Mechanical ventilation   | 17 (17.6%)   | 17 (17.6%)   | 0.8518  |
| DVT                      | 8 (8.4%)     | 6 (6.3%)     | 0.0067  |
| Drainage                 | 12 (12.6%)   | 10 (10.6%)   | 0.6135  |
| Surgical drainage        | 12 (12.6%)   | 5 (5.2%)     | 0.0082  |
| Vascular drainage        | 0 (0.0%)     | 5 (5.2%)     | 0.0094  |
| Organ transplantation    | 2 (2.1%)     | 1 (1.2%)     | 0.6191  |

Table 2. Related factors of VRE infection by multivariable logistic regression

| Factors                                      | OR (95%CI) | P-value |
|----------------------------------------------|------------|---------|
| Age, years                                   | 1.014 (0.997~1.031) | 0.0063  |
| Diabetes                                     | 1.321 (0.587~2.022) | 0.5991 |
| Gastrointestinal bleeding                    | 1.775 (0.794~4.124) | 0.1823 |
| Cardiovascular diseases                      | 1.965 (0.794~4.853) | 0.1434 |
| Indwelling venous catheter                   | 3.342 (1.379~9.099) | 0.0876 |
| Mechanical ventilation                       | 1.829 (0.656~5.080) | 0.1189 |
| Surgical drainage                            | 0.360 (0.196~0.694) | 0.0174 |

Conclusion. Understanding how HCWs connect patients can elucidate how pathogens, such as VRE, spread in the hospital. We demonstrated how EHR data can inform how HCWs connect patients to spread HAIs and the impact of those connections on the spread of VRE. Though EHR data have limitations, as certain activities and contacts are not logged into the system, they provide a scalable and generalizable source for understanding how patients are connected and can be utilized to reduce the spread of nosocomial infections.

Figure 1. Antimicrobial resistance in VRE and VSE patients

Disclosures. All authors: No reported disclosures.
Table 1: Multivariable Logistic Results (Risk factors for acquiring VRE colonization in the medical ICU and solid organ transplant unit)

| Variable | OR (95% CI) |
|----------|-------------|
| HCW Connections to VRE Patients | 1.32 (1.20-1.44) |
| Patient on contact precautions (Y/N) | 1.04 (0.96-1.13) |
| Rectal tube use (Y/N) | 3.61 (2.85-4.58) |
| GI Tube use (Y/N) | 1.13 (0.71-1.79) |

Note: CI = confidence interval; OR = odds ratio; VRE = vancomycin-resistant enterococci; Y/N = yes/no

Disclosures. All authors: No reported disclosures.

578. Microbiology Laboratory-Driven Standardized Urine Culture Reporting Increases Aminopenicillin Prescribing in Vancomycin-Resistant Enterococci Urinary Infections
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Background. Vancomycin-resistant Enterococcus (VRE) urinary tract infections (UTI) are traditionally treated with therapies like linezolid or daptomycin. Multiple recent studies have demonstrated that aminopenicillins (APs) have equivalent clinical efficacy outcomes as these therapies and may also have favorable comparative safety profiles and lower costs. Our institution implemented a standardized microbiology report for urine cultures positive for VRE which encouraged prescribing of APs and blinded sensitivity results.

Methods. This was a single-center, retrospective, observational study evaluating the impact of this microbiology report on prescribing outcomes in patients being treated with VRE UTI at a community regional medical center. The study was conducted over 7.5 years with January 2011 to September 2018 representing the pre-intervention cohort and October 2014 to July 2018 representing the post-intervention cohort. Patients were included if they were 18 years or older and received antibiotic therapy for a diagnosed VRE UTI. The primary outcome measure was terminal antibiotic therapy.

Results. Out of 388 patients with VRE positive urine cultures, 102 were included for analysis, 38 in the pre-intervention cohort and 64 in the post-intervention cohort. Cohorts were similar in terms of age, Charlson Comorbidity Index (CCI), β-lactam allergy, ID consultation, and urologic abnormalities. AP prescribing significantly increased from 3% (1/38) in the pre-intervention cohort to 44% (28/64) in the post-intervention cohort both in univariate (OR 38.7, 95% CI 4.8-312.3) analyses. In the post-intervention cohort, age, gender, CCI, β-lactam allergy, and urologic abnormalities were not significantly associated with differences in aminopenicillin prescribing. There was no difference in in-hospital mortality between cohorts.

Conclusion. The results from this study demonstrate that a simple microbiology report for VRE positive urine cultures encouraging AP prescribing is significantly associated with an increase in AP prescribing for diagnosed VRE UTI and should be considered as a supplementary antimicrobial stewardship intervention.

Disclosures. All authors: No reported disclosures.

579. Machine-Learning Based Models for Prediction of Recurrence-free Catheter Retention After ALT Treatment of CLABSI in a Pediatric Population
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Background. Deciding whether to attempt salvage of an infected central venous catheter (CVC) can be challenging. While line removal is the definitive treatment for central-line associated bloodstream infection (CLABSI), salvage may be attempted with systemic antibiotics and antibiotic lock therapy (ALT). Weighing risk and benefit of CVC salvage is limited by uncertainty in the future viability of salvaged CVCs. If a CVC is likely to require subsequent removal (e.g., due to recurrent infection) salvage may not be beneficial, whereas discarding a viable CVC is also not desirable. Here we describe a machine learning approach to predicting outcomes in CVC salvage.

Methods. Episodes of pediatric CLABSI cleared with ALT were identified by retrospective review between January 1, 2008 and December 31, 2018 and were defined by a single positive central blood culture of a known pathogen or two matching cultures of a possible contaminant. Clearance was defined as 48-hours of negative cultures and relapse was defined as a matching positive blood culture after clearance. Predictive models (logistic regression (LR), random forest (RF), support vector machine (SVM) and an ensemble combining the three) were used to predict recurrence-free CVC retention (RFCR) at various time points using a training and test set approach.

Results. Overall, 712 instances CLABSI cleared with ALT were identified. Demographic and microbiological data are summarized in Tables 1 and 2. Few (8%) instances recurred in the first 28 days. 58% recurred at any time within the study period. Rates of RFCR were 75%, 43%, 22% and 10% at 28, 91, 182 and 365 days. Machine learning (ML) models varied in their ability to predict RFCR (Table 3). RF models performed best overall, although no model performed well at 91 days.

Conclusion. ML models provide an opportunity to augment clinical decision making by learning patterns from data. In this case, estimating the likelihood of useful line retention in the future could help guide informed decisions on salvage vs. removal of infected CVCs. Limitations include the heterogeneity of clinical data and the use of an outcome capturing both clinical decision making (line removal) and infection recurrence. With further model development and prospective validation, practical machine learning models may prove useful to clinicians.