Table 1: Multivariable Logistic Results (Risk factors for acquiring VRE colonization in the medical ICU and solid organ transplant unit)

| Risk Factor                        | Odds Ratio (95% CI) |
|------------------------------------|---------------------|
| HCW Connections to VRE Patients    | 1.32 (1.20-1.44)    |
| Patient on contact precautions     | 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)    |
| Patient was in a long-term care or skilled nursing facility in the last six months | 5.59 (3.45-9.06) |

Note: CI = confidence interval, DDD = defined daily dose, GI = gastrointestinal, HCW = healthcare worker, 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 2014 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 (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.

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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 record review between January 1, 2008 and December 31, 2018 and were defined by a single positive central venous 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 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.

CLABSI Events

| N=712 |
|-------|
| Sex   | Male     |
|       | 322      |
| Race  | White    |
|       | 493 (69) |
| Race  | Black    |
|       | 167 (23) |
| Race  | Other    |
|       | 52 (7)   |
| Age (y) (mean [IQR]) | 8 (2-13) |
| Diagnosis = ONC (%) | 177 (24) |
| Diagnosis = SGS (%) | 155 (22) |
| Diagnosis = SOT (%) | 216 (30) |
| Diagnosis = BMT (%) | 27 (4)  |
| RFCR at 28 days | 533 (75) |
| RFCR at 91 days | 303 (43) |
| RFCR at 182 days | 155 (22) |
| RFCR at 365 days | 71 (10) |

Table 1: Data set demographics and outcomes. IQR: Interquartile range. ONC: oncology, SGS: short gut syndrome, SOT: solid organ transplant, BMT: bone marrow transplant. RFCR: recurrence-free catheter retention. y: years. An instance may belong to more than one diagnosis group.

CLABSI Events

| N=712 |
|-------|
| VCC  | Tunneled Line (%) |
|       | 570 (80) |
| VCC  | Implanted Port (%) |
|       | 99 (14) |
| VCC  | Other (%) |
|       | 43 (6)  |
| VCC age (d) (mean [IQR]) | 243 [43-290] |
| Polymicrobial infection (%) | 154 (22) |
| Organism = GPC (%) | 412 (58) |
| Organism = GNR (%) | 388 (54) |
| Organism = VST (%) | 71 (10) |
| Organism = OTH (%) | 11 (2) |
| Lock = vancomycin (%) | 287 (40) |
| Lock = gentamicin (%) | 263 (37) |
| Lock = ethanol (%) | 103 (14) |
| Lock = AMB (%) | 56 (8) |
| Lock = other (%) | 59 (8) |

Table 2: Microbiological and central venous catheter (CVC) data. d: days, GPC: Gram-positive cocci, GNR: Gram-negative rods, VST: Yeast, OTH: Other, AMB: Liposomal amphotericin B.
580. Association Between Central Venous Catheter Repair and Bloodstream Infections in a Pediatric Oncology Center
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**Background.** Central venous catheters (CVCs) are important for healthcare delivery in pediatric oncology patients. It is common to repair CVC breakage to prevent replacement. Existing evidence regarding the association between CVC repair and bloodstream infections (BSI) is limited in the general pediatric population and lacking in pediatric oncology patients. We aim at evaluating whether repairing broken CVCs is associated with an increased risk for subsequent BSI in a pediatric oncology center.

**Methods.** This is a retrospective case-crossover study of pediatric oncology patients with broken CVCs that underwent repair between July 2015 and June 2017. The incidence and characteristics of BSI in the 30-day pre-repair period were compared with those in the 30-day post-repair period. Wilcoxon-Mann–Whitney and Fisher’s Exact tests were used for comparison of continuous and categorical variables, respectively. Univariate logistic regression was used to identify potential risk factors for BSI 30 days after CVC repair. Multiple breakages of the same CVC, and BSIs in overlapping observation periods of consecutive breakages are assumed independent.

**Results.** Sixty-four patients had 99 episodes of CVC breakage/repair in 68 CVCs. Median age (range) at repair was 2.5 (0.15–17.6) years. 48% of CVC breakages occurred in patients with solid tumors, 24% in HSCT recipients, and 19% in patients with leukemia. Only 25% of patients had neutropenia at repair and 14% had CVC occlusion 72 hours prior to breakage. All CVCs were made of silicone and 88% were double lumen external tunneled. First CVC breakage occurred at a median (range) of 130 (2–718) days since insertion, and CVCs were removed at a median (range) of 72.5 (3–753) days from the last repair. End of treatment was the most common cause (43%) for removal. The post-repair incidence of BSI was 4.5 per 1000 line-days compared with a pre-repair incidence of 4.3 (RR= 0.95, 95% CI 0.44, 2.18). There is no statistical difference between the characteristics of the pre-repair and post-repair BSI (Table 1). Figure 1 shows the organisms causing BSI before and after CVC repair. None of the evaluated variables was identified as a significant risk factor for BSI 30 days after CVC repair (Table 2).

**Conclusion.** Repair of CVC in pediatric oncology patients was not associated with increased risk of BSI.

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**Table 1: Comparison of the incidence, characteristics, clinical course, and outcomes of Bloodstream infections occurring 30 days before vs 30 days after CVC breakage and repair**

| Variable | BSI 30 days before CVC breakage/repair (N=12) | BSI 30 days after CVC breakage/repair (N=12) | P-value |
|----------|-------------------------------------------|------------------------------------------|--------|
| Median (range) age at BSI in years | 2.63 (0.86 - 10.53) | 2.29 (0.82 - 12.39) | 0.42 |
| Double lumen external tunneled CVC, n (%) | 10 (83) | 12 (100) | 0.48 |
| Median (range) ANC at repair | 1,440 (0 - 29,200) | 2,050 (0 – 6,800) | 0.39 |
| Diagnosis at BSI, n (%) | | | |
| HSCT recipient | 5 (42) | 5 (42) | 0.58 |
| Hematology | 2 (17) | 0 (0) | |
| Leukemia | 2 (17) | 2 (17) | |
| Solid Tumor | 3 (25) | 5 (42) | |

**Table 2: Univariate analysis to assess potential risk factors for BSI 30 days after CVC breakage and repair**

| Risk factor | Odds Ratio | 95% CI | P-value |
|-------------|------------|--------|---------|
| Age at repair in years | 1.07 | [0.93, 1.23] | 0.38 |
| Neutropenia | 1.63 | [0.44, 5.97] | 0.46 |
| Inpatient location at time of CVC breakage/repair | 1.82 | [0.53, 6.28] | 0.35 |
| Occurrence within 72 hours prior to breakage/repair | 0.50 | [0.06, 4.24] | 0.53 |
| BSI within 30 days before repair | 1.5 | [0.29, 7.85] | 0.63 |
| Prior CVC breakage/repair | 0.35 | [0.07, 1.69] | 0.19 |
| Line type of DL vs. SL external tunneled | | >999.99 | |
| Diagnosis at CVC breakage/repair | | >999.99 | 0.96 |
| HSCT vs. Hematology | | >999.99 | 0.96 |
| Leukemia vs. Hematology | | >999.99 | 0.96 |
| [Solid Tumor & NO] vs. Hematology | >999.99 | | 0.96 |

**Figure 1:** Organisms causing the bloodstream infections (BSI) occurring 30 days before or 30 days after the CVC breakage and repair

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