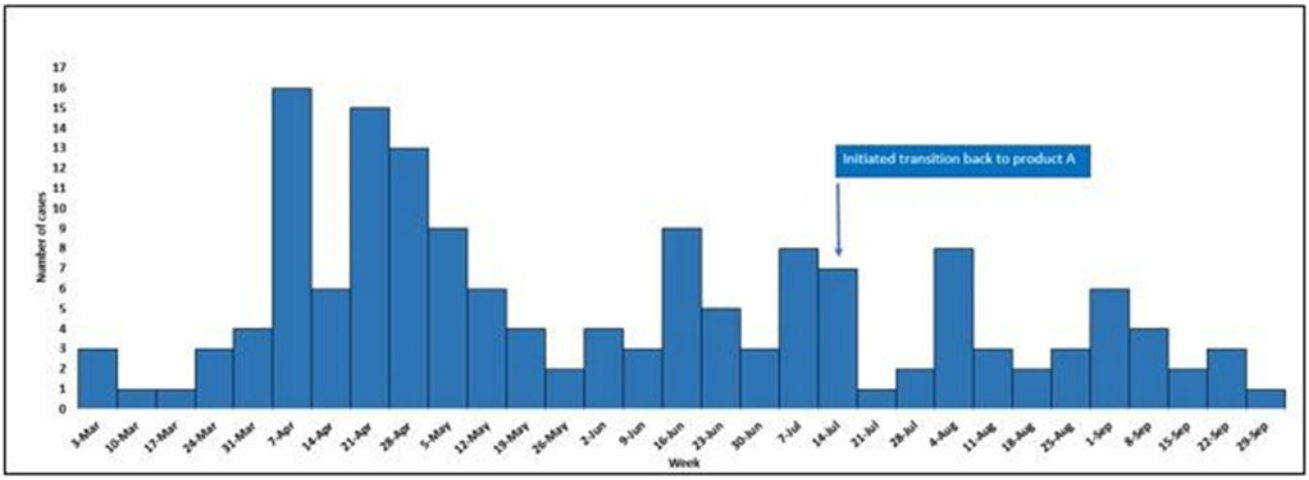
Figure: Cases of peritonitis reported from 15 facilities in two states by week of onset, March – September 2019 (N=157)



staff. Peritonitis is a serious complication of peritoneal dialysis, most commonly caused by gram-positive organisms. During March—April 2019, a dialysis provider organization transitioned ~400 patients to a different manufacturer of peritoneal dialysis equipment and supplies (from product A to B). Shortly thereafter, patients experienced an increase in peritonitis episodes, caused predominantly by gram-negative organisms. In May 2019, we initiated an investigation to determine the source. **Methods:** We conducted case finding, reviewed medical records, observed peritoneal dialysis procedures and trainings, and performed patient home visits and interviews. A 1:1 matched case–control study was performed in 1 state. A case had ≥2 of the following: (1) positive peritoneal fluid culture, (2) high peritoneal fluid white cell count with ≥50% polymorphonuclear cells, or (3) cloudy peritoneal fluid and/or abdominal pain. Controls were matched to cases by week of clinic visit. Conditional logistic regression was used to estimate univariate matched odds ratios (mOR) and 95% confidence intervals (CIs). We conducted microbiological testing of peritoneal dialysis fluid bags to rule out product contamination. **Results:** During March—September 2019, we identified 157 cases of peritonitis across 15 clinics in 2 states (attack rate≈39%). *Staphylococcus* spp (14%), *Serratia* spp (12%) and *Klebsiella* spp (6.3%) were the most common pathogens. Steps to perform peritoneal dialysis using product B differed from product A in several key areas; however, no common errors in practice were identified to explain the outbreak. Patient training on transitioning products was not standardized. Outcomes of the 73 cases in the case–control study included hospitalization (77%), peritoneal dialysis failure (40%), and death (7%). The median duration of training prior to product transition was 1 day for cases and controls ($P = .86$). Transitioning to product B (mOR, 18.00; 95% CI, 2.40—134.83), using product B (mOR, 18.26; 95% CI, 3.86—∞), drain-line reuse (mOR, 4.67; 95% CI, 1.34—16.24) and performing daytime exchanges (mOR, 3.63; 95% CI, 1.71—8.45) were associated with peritonitis. After several interventions, including transition of patients back to product A (Fig. 1), overall cases declined. Sterility testing of samples from 23 unopened product B peritoneal dialysis solution bags showed no contamination. **Conclusions:** Multiple factors may have contributed to this large outbreak, including a rapid transition in peritoneal dialysis products and potentially inadequate patient training. Efforts are needed to identify and incorporate best training practices, and product advances are desired to improve the safety of patient transitions between different types of peritoneal dialysis equipment.

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Poster Presentation

A Machine-Learning Approach For Predicting Antibiotic Resistance in *Pseudomonas aeruginosa*

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Background: *Pseudomonas aeruginosa* is an important nosocomial pathogen associated with intrinsic and acquired resistance mechanisms to major classes of antibiotics. To better understand clinical risk factors for drug-resistant *P. aeruginosa* infection, decision-tree models for the prediction of fluoroquinolone and carbapenem-resistant *P. aeruginosa* were constructed and compared to multivariable logistic regression models using performance characteristics. **Methods:** In total, 5,636 patients admitted to 4 hospitals within a New York City healthcare system from 2010 to 2016 with blood, respiratory, wound, or urine cultures growing PA were included in the analysis. Presence or absence of drug-resistance was defined using the first culture of any source positive for *P. aeruginosa* during each hospitalization. To train and validate the prediction models, cases were randomly split (60 of 40) into training and validation datasets. Clinical decision-tree models for both fluoroquinolone and carbapenem resistance were built from the training dataset using 21 clinical variables of interest, and multivariable logistic regression models were built using the 16 clinical variables associated with resistance in bivariate analyses. Decision-tree models were optimized using

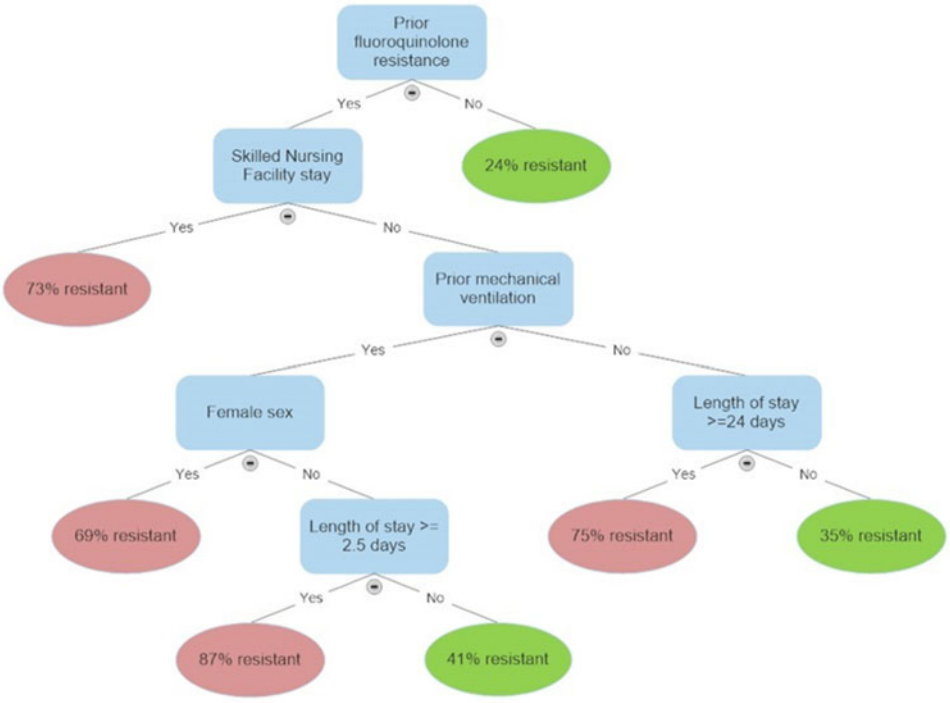

Fig. 1.

K-fold cross validation, and performance characteristics between the 4 models were compared. **Results:** From 2010 through 2016, prevalence of fluoroquinolone and carbapenem resistance was 32% and 18%, respectively. For fluoroquinolone resistance, the logistic regression algorithm attained a positive predictive value (PPV) of 0.57 and a negative predictive value (NPV) of 0.73 (sensitivity, 0.27; specificity, 0.90) and the decision-tree algorithm attained a PPV of 0.65 and an NPV of 0.72 (sensitivity 0.21, specificity 0.95). For carbapenem resistance, the logistic regression algorithm attained a PPV of 0.53 and a NPV of 0.85 (sensitivity 0.20, specificity 0.96) and the decision-tree algorithm attained a PPV of 0.59 and an NPV of 0.84 (sensitivity 0.22, specificity 0.96). The decision-tree partitioning algorithm identified prior fluoroquinolone resistance, SNF stay, sex, and length-of-stay as variables of greatest importance for fluoroquinolone resistance compared to prior carbapenem resistance, age, and length-of-stay for carbapenem resistance. The highest-performing decision tree for fluoroquinolone resistance is illustrated in Fig. 1. **Conclusions:** Supervised machine-learning techniques may facilitate prediction of *P. aeruginosa* resistance and risk factors driving resistance patterns in hospitalized patients. Such techniques may be applied to readily available clinical information from hospital electronic health records to aid with clinical decision making.

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A National Aged Care Infection and Antimicrobial Use Survey: A Three-Year Report

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Background: Australia has ~2,700 aged-care homes and 180 multipurpose services. The annual Aged Care National Antimicrobial Prescribing Survey (AC NAPS), first pilot tested in 2015, is a surveillance tool that can be used in these facilities to monitor infections and antimicrobial use. It assists in identifying priorities for local and national infection control and antimicrobial stewardship interventions. **Methods:** Nurses or pharmacists collect point prevalence data using standardized data collection forms: (1) A facility form, completed by each participating facility, includes resident-level data fields (eg, number of residents present on the survey day). (2) An infection form is completed for residents with signs and/or symptoms of infection. (3) An antimicrobial form is completed for residents who are prescribed an antimicrobial. **Results:** Regarding prevalence,for those 31 facilities that participated annually, there was no significant change in either prevalence rate (Table 1). Regarding priority areas for improvement (2018 data only), 64.6% of prescriptions were for residents who did not have signs and/or symptoms of a suspected infection in the week prior to the antimicrobial start date. The most common clinical indications for prescriptions were skin soft-tissue and mucosal infection (18.3%), cystitis (16.0%) and pneumonia (9.4%). Cefalexin (20.3%), clotrimazole (19.0%), and chloramphenicol (7.0%) were the most commonly prescribed antimicrobials. Review or stop dates were not documented for 58.9% of prescriptions. Only 39.2% of antimicrobials were prescribed in the 7 days prior to the survey day; 28.3% were prescribed >6 months prior. Furthermore, 36.3% of all prescriptions were for