Abstract

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A Retrospective Review of Infection Rates in Low-Risk Outpatients Not Receiving Prophylactic Antibiotics for Elective Percutaneous Nephrostomy Tube Exchanges

**Objective:** The purpose of this project to determine if the evidence-based practice change related antibiotic administration criteria for outpatients receiving percutaneous nephrostomy tube exchanges implemented by a medical center’s Vascular and Interventional Radiology department had an effect on hospital admission rates for infection in these patients. The 2017 practice change was based on 2010 guidelines from the Society of Interventional Radiology (SIR), stating that outpatients with a low risk of acquiring infection did not need to receive a prophylactic antibiotic for this procedure because previous evidence has shown prophylactic antibiotic administration has no significant effect on reducing infection rates for this population. Mindful use of pharmaceutical therapy remains a patient care priority, especially as clinicians are contending the impact of antibiotic resistance, while balancing the goals of decreasing waste of resources and optimizing patient outcomes.

**Methods:** Using a retrospective review design, one year of data prior to the practice change and one year of data following the practice change were collected and analyzed using the Generalized Estimated Equations (GEE) model, with a binomial output. Fisher’s exact test was used to evaluate demographic variables by level of risk of infection. Data included 493 procedural events for 126 outpatients. Admission and infection criteria (WBC >10K, temperature <36 or >38, urine culture, blood cultures, admission date, reason for admission) within thirty days of the event and risk factors for infection (previous history of urinary tract infection,
neoplasm/obstruction, type II diabetes, hypertension, and renal transplant) were collected for each patient.

**Results:** Age, Gender, Race and Mortality were the demographic variables that had a statistically significant relationship with level of risk for infection. Urine culture was the only infection criteria variable that had a significant relationship (p < 0.01) with risk level. Due to sample size, the GEE model could not be run using risk level (high/low) to predict admissions before or after the practice change. The relationship between the number of risk factors and the odds of admission for infection was the same regardless of the practice change (Before: OR = 2.17, 95% CI = 1.19-3.95; After: OR = 1.9, 95% CI = 1.12-3.22). For every increase in a patient’s number of risk factors, their odds ratio of being admitted for infection was almost 90% (OR = 1.9, 95% CI = 1.27-2.84). The number of risk factors in a patient’s medical history was likely to predict antibiotic administration (OR = 1.56, 95% CI = 1.19 – 2.04) following the practice change. All of the risk factors had a significant interaction with the practice change, but were not significant predictors of antibiotic therapy, likely due to constraints of sample size.

**Conclusion:** Although it was not possible to determine efficacy of the practice change, the predictive analysis indicated that risk level is a significant predictor of admission for infection regardless of whether antibiotics were given to low-risk patients. These results suggest that demographic indicators should be considered when prescribing prophylactic antibiotics for percutaneous nephrostomy tube exchanges; however, research studies should evaluate this relationship with larger samples in order to design specific recommendations. Our project results support the 2010 SIR antibiotic prophylaxis guidelines, and SIR’s recently updated antibiotic parameter guidelines from 2018. Limitations of this quality improvement project’s results are primarily due to the sample size. The efficacy of the practice change could also be attributed to
conflicting guidelines found in the department’s procedure handbook, published in May 2017. As evidenced by the analysis on the clinical and demographic risk factors, patients regularly undergoing this procedure face mutable levels of chronic and acute illness, complicated by social determinants of disparity, and diverse access to resources. In pursuance of providing consistent and prudent administration of antibiotics only when warranted, the results from this quality improvement project will be used by the VIR department to update the forthcoming iteration of the department handbook with consistent guidelines and patient risk-factors associated with infection.