

Background

Antibiotic bladder irrigations have limited data assessing safety and efficacy. One indication they have been used in is neurogenic bladder (NGB). NGB can cause abnormal bladder storage and emptying. This can result in urinary tract infections (UTIs), pyelonephritis, and eventual renal injury and failure.⁴ There is no consensus on the preferred management for UTIs in NGB. Bladder irrigations are generally not recommended in NGB due to increased mucosal irritation, inferior improvement rates of symptomatic UTIs, and possibly increasing susceptibility to infections.⁴

One study done in patients with spinal cord injury or multiple sclerosis showed that antibiotic use and indwelling urinary catheters were associated with an increased risk of developing candiduria.³ People with NGB have an increased risk of infection caused by *Pseudomonas aeruginosa*, *Enterococcus* species, and *Acinetobacter* species, compared to more common UTI bacteria, *Escherichia coli* and *Klebsiella* species.¹ The difference in pathogens can affect the management approach for NGB patients.

Neomycin/polymyxin irrigations have been used in select patients for years at Children's Mercy Kansas City (CMKC). Given limited data on antibiotic bladder irrigations, interest has been shown to assess current utilization. Characterizing patients receiving neomycin/polymyxin irrigations will allow for determination of the most common uses of this irrigation and provide an assessment on the overall incidence of UTIs in patients receiving irrigations.

Objectives

- Primary:**
 (1) To characterize the use of neomycin/polymyxin bladder irrigations at CMKC between July 1, 2018, and June 30, 2020
- Secondary:**
 (1) To characterize the frequency of UTIs in patients using neomycin/polymyxin bladder irrigations

Methods

- Single center, retrospective, observational chart review study at CMKC
- Approval obtained by the CMKC Institutional Review Board (IRB)
- Inclusion criteria: all patients who received neomycin/polymyxin bladder irrigation during inpatient encounter
- Exclusion criteria: patients with bladder cancer or irrigation use outside of bladder (e.g., operating room)
- Data collected: patient demographics; treatment course details including; drug dosing characteristics; prescriber and medical service; applicable laboratory data; positive urine culture per patient and systemic antimicrobial exposure

Results

Table 1. Patient demographics and irrigation characteristics (n=28 subjects)

Age, years, median (IQR)	9 (7.75, 15)
Male, n (%)	17 (61)
Neurogenic bladder diagnosis, n (%)	25 (89)
Prophylactic indication, n (%)	28 (100)
Urology consulted, n (%)	26 (93)
Cumulative exposure in days per patient, median (IQR)	502.5 (19-730)
Positive urine cultures, n	39
Positive urine cultures per patient, median (IQR)	1 (0-12)
Positive urine cultures treated with antimicrobials, n (%)	23 (59)
Positive urine cultures treated with antimicrobials per patient, median (IQR)	0 (0-9)

Figure 1. Percentage of inpatient orders by dose in mL (n=82 encounters)

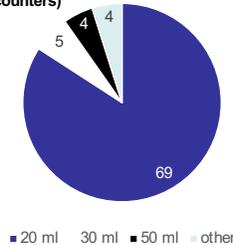


Figure 2. Percentage of neomycin/polymyxin bladder irrigation dosing frequency (n=82 encounters)

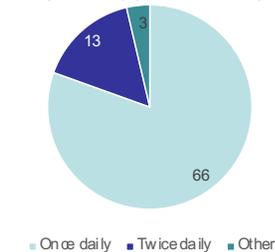


Table 2: Number of positive urine cultures by pathogens grown (n=39)*

<i>Candida</i> species	11
<i>Klebsiella</i> species	10
<i>Escherichia coli</i>	9
<i>Enterococcus</i> species	3
Diphtheroid	2
<i>Staphylococcus</i> species	2
<i>Citrobacter</i> species	2
<i>Acinetobacter</i> species	1
<i>Alcaligenes</i> species	1
<i>Enterobacter</i> species	1
<i>Morganella</i> species	1

*13 (33%) of positive cultures were polymicrobial

Figure 3: Number of positive urine cultures resulting in systemic antimicrobial treatment of UTI (n=39)

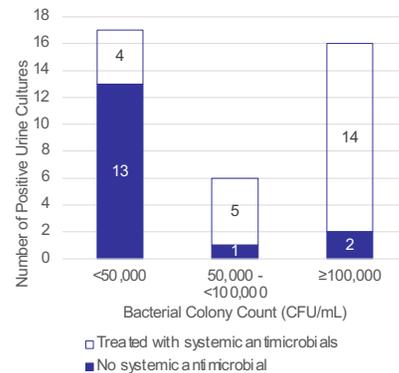


Table 3: Number of positive urine cultures treated with systemic antimicrobials by coverage for treatment of UTI (n=23)

Narrow spectrum, n (%)	7 (30)
Broad spectrum, n (%)	11 (48)
Antifungal, n (%)	5 (22)

Discussion

Neomycin/polymyxin bladder irrigation was used for prophylactic treatment of UTIs in all patients included in the medication use evaluation. The majority of patients (89%) were diagnosed with NGB. A standard dose or frequency was not identified. The most commonly prescribed dose and frequency was 20mL and once daily, respectively. The most common pathogens grown in urine cultures were *Candida*, *Klebsiella*, and *E. coli*, not the expected *Pseudomonas aeruginosa*, *Enterococcus* species, and *Acinetobacter* species typically found in patients with NGB. *Candida* is often associated with colonization or contamination and does not always require treatment.² *Candida* may have been more likely to grow as the antibiotic irrigation was preventing bacterial growth, not fungal growth, allowing more space for fungal species. Five patients received neomycin/polymyxin bladder irrigation intermittently, allowing for a drug-free time for the patient or drug holiday. Intermittent use may be a future consideration for prevention of UTIs in patients diagnosed with NGB; however further research is warranted.

Conclusion

Neomycin/polymyxin bladder irrigation use during July 1, 2018, and June 30, 2020, was for UTI prophylaxis in all patients. Neomycin/polymyxin bladder irrigation was not effective in preventing UTIs. Further research is needed to determine the efficacy of neomycin/polymyxin bladder irrigation. Criteria for use and/or dose standardization may also be warranted. Criteria to be considered should include adherence, frequency of UTIs, and pathogens present in addition to standard dose in mL and frequency.

References

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3. Goetz L, Howard M, Ciper D, et al. Occurrence of candiduria in a population of chronically catheterized patients with spinal cord injury. *Spinal Cord*. 2010; 48:51-54.
4. McKibben MJ, Seed P, Ross SS, et al. Urinary Tract Infection and Neurogenic Bladder. *Urologic Clinics of North America*. 2015 42(4):527-536.

Disclosures

The authors of this presentation have nothing to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.