**Title:** Antibiotic Appropriateness on Mondays vs Fridays: Empiric Treatment of Simple Cystitis in the Emergency Department

**Article type:** Original Article

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**Acknowledgment:** None

**Financing:** None

**Conflict of interest statement by authors:** CLG is an expert witness for Johnson and Johnson, a consultant for Provepharm, Inc., and receives Institutional Research Funding from REIAHealth. The remaining authors have declared they have no conflicts of interest.

**Compliance with ethical standards:** Study approval was obtained from the New York Medical College IRB #14607

**Authors Contribution Statement:** Conceptualization: KL, AB, PP, SS, CG. Formal Analysis: KL, AB, PP, SS, CG. Investigation: KL, AB, PP, SS, CG. Methodology: KL, AB, PP, SS, CG. Supervision: PP, SS, CG. Writing - Original Draft: KL, AB. Writing - Review Editing: KL, AB, PP, SS, CG.

**Manuscript word count:** 3116

**Abstract word count:** 248

**Number of Figures and Tables:** 1 Figure, 3 Tables

**Personal, Professional, and Institutional Social Network accounts**

**Instagram:** @nymcschoolofmed, @nymedcollege

**Discussion Points:**

- What guidelines do you follow for treatment of simple cystitis?
- Practice good #AntibioticStewardship when treating UTI's

**Dates**

Submission: 06/03/2023

Revisions: 10/18/2023

Responses: 03/25/2024

Acceptance: 03/22/2024

Publication: 03/27/2024

**Editors**

Associate Editor/Editor: Francisco J. Bonilla-Escobar

Student Editors: Eugenia M. Ramos-Dávila

Copyeditor:

Proofreader:

Layout Editor:

**ABSTRACT.**

**Background:** The treatment of urinary tract infections (UTIs) has contributed to the rise of antibiotic resistance. Antibiotic appropriateness in the outpatient setting is lower than expected. We hypothesized that prescribing practices may vary based on the day of the week. We sought to determine the percentage of antibiotic prescriptions that met criteria for antibiotic appropriateness on Mondays vs Fridays.

**Methods:** This is a retrospective case series of adult females with simple cystitis presenting to the Emergency Department (ED) between 2019 and 2021. We defined antibiotic appropriateness based on the Infectious Diseases Society of America guidelines in conjunction with a regional outpatient UTI antibiogram. Each prescription was assessed for drug selection, dose, frequency, and duration. Categorical data is reported as counts (%) and compared with chi-square. Nonparametric continuous data is reported as median (range) and compared with Mann-Whitney.

**Results:** 160 subjects were included: 80 came to the ED on Mondays and 80 on Fridays. Demographics were similar; except, more subjects had antibiotic allergies on Mondays. The number of appropriate antibiotic prescriptions was similar between Mondays and Fridays: 54 (68%) and 60 (75%), respectively (P=0.3). Overall, 44 subjects had an inappropriate duration of antibiotics and 14 subjects had an inappropriate antimicrobial prescribed, with no differences between Mondays and Fridays. Dose and frequency were always correct. In total, there were 46 (29%) antibiotics that failed to meet appropriateness criteria.

**Conclusions:** There was no difference in antibiotic appropriateness between Mondays and Fridays; however, 29% of prescriptions did not meet criteria for appropriateness.

**Key Words:** Urinary Tract Infections, Cystitis, Antibiotics, Bacterial Drug Resistance, Emergency Medicine

**INTRODUCTION.**

Urinary tract infections (UTIs) are common and account for 2 million visits to the Emergency Department (ED) annually.[1] Women are more susceptible to UTIs due to urethral proximity to colonized vagina and rectum, moist periurethral areas that promote bacterial growth, and shortened urethral length that allows quick bladder ascent.[2,3] Due to the high volume of empiric antibiotic prescriptions for UTIs and failure to adhere to appropriate prescribing guidelines, antibiotic resistance is on the rise.[4,5] The Infectious Diseases Society of America (IDSA) published guidelines for antibiotic management of UTIs that account for local resistance.[6] These guidelines can be used alongside a local antibiogram to assess the appropriateness of antibiotics.

Studies have shown that adherence to guidelines for the empiric treatment of UTIs has been poor. Denny et al. determined that only 62.8% of antibiotics prescribed in an Australian ED met appropriateness criteria.[7] In addition to driving antibiotic resistance, there was a substantial risk that inappropriate prescribing of antibiotics could lead to increased adverse events and treatment failure. Chardavoyne et al. evaluated the appropriateness of antibiotic prescriptions in an American ED specifically for cystitis and pyelonephritis and found that antibiotic prescriptions for adults were appropriate in 68% of cases of cystitis and 46% of cases of pyelonephritis.[8]

Others have shown discrepancies in antibiotic prescribing practices based on the day of the week. Huibers et al. examined the frequency of antibiotic prescribing for the Danish out-of-hours primary care service and found that 17.6% of patients received antibiotics over the weekend vs only 10.6% during weekdays.[9] Furthermore, patients seen on weekdays were more likely to get broad-spectrum penicillins, compared to beta-lactamase sensitive penicillins on weekends. Thus, the frequency of antibiotic prescription, and even the class of antibiotic prescribed, can vary. Bishara et al. compared the appropriateness of all antibiotics prescribed in an ED in Israel on weekdays and weekends and found that a higher percentage of inappropriate antibiotics prescribed over the weekend vs weekday. Of note, they found a significant decrease in antibiotic appropriateness from 71% on Sunday, the first day of the week in Israel, to 33% on Saturday, the last day of the week.[10]

The objective of this study was to evaluate prescribing practices at a New York City (NYC) community hospital ED and determine the antibiotic appropriateness of treatment for simple cystitis in females on Mondays vs Fridays. We hypothesized that a higher proportion of antibiotic prescriptions would meet the criteria for “appropriateness” on Mondays vs Fridays.

## METHODS

This was a retrospective case series of female subjects ≥18 years old presenting to the ED of a NYC community hospital between August 2019 and May 2021 and empirically treated as outpatients for simple cystitis. Ethics approval was obtained from the New York Medical College IRB (#14607). Two authors performed data extraction. 25% of charts were double-screened. Conflicts were resolved by consensus. Due to the clear definitions of antibiotic appropriateness established by the IDSA guidelines, inter-rater reliability for antibiotic appropriateness was 100%. Simple cystitis was defined as a UTI confined to the bladder and lacking signs of upper urinary tract symptoms (fever, chills, flank pain, and costovertebral angle tenderness) in the setting of normal urinary tract anatomy and function.[11] Subjects were included based on the International Classification of Diseases, Tenth Revision (ICD-10) codes for UTI (N39) or acute cystitis (N30) with an antibiotic prescription at time of discharge. Exclusion criteria included catheter use, recent genitourinary tract surgery, pregnancy up to 6 weeks postpartum, immunosuppression, recent antibiotic prescription within 1 month, concurrent treatment of another bacterial infection, or prior microbial treatment of current UTI. Subjects treated for a concurrent vaginal infection, bacterial or fungal, remained in the study.

Antibiotic appropriateness was based on the 2011 IDSA guidelines for antibiotic selection, dose, duration and frequency (Table 1)[6], and cross-referenced with the local NYC antibiogram for outpatient UTIs from 2016 to 2017.[12] First line agents in the treatment of acute simple cystitis in the United States include nitrofurantoin, trimethoprim-sulfamethoxazole (TMP-SMX), and fosfomycin. If these are contraindicated due to availability, allergy, or intolerance, fluoroquinolones and beta-lactams are second-line agents. Based on local NYC resistance data, amoxicillin, ampicillin, ciprofloxacin, and TMP/SMX were not appropriate empiric therapies.[12] For a treatment to be considered appropriate, the prescribed antibiotic had to meet all 4 criteria for selection, dose, duration, and frequency. Institutional Review Board approval was obtained.

Subject characteristics included age, race, ethnicity, diabetes, hypertension, and antibiotic allergies (Table 2). Diagnostic methods for UTI were recorded for each subject: urinary symptoms, urine dipstick, microscopic urine analysis (UA), and urine culture (UC). Dipstick and UA were categorized as positive, negative, contaminated, or not done. A dipstick result with leukocyte esterase and/or nitrites was considered positive. A UA result with bacteria was considered positive. If a UA had multiple epithelial cells and few bacteria without associated leukocyte esterase or nitrites on dipstick, it was considered contaminated. Pathogen type, number of colony-forming units (CFU), and susceptibility testing were collected for all UCs with bacterial growth. Only cultures with CFU >100,000 were considered positive, though some clinicians treat with CFU>50,000 in conjunction with urinary symptoms.

The time results were published to the electronic medical record was compared to the time of subject discharge to determine whether the provider was aware of the test results prior to prescribing treatment. Modalities used to empirically treat a UTI were then analyzed for each subject: symptoms only, dipstick, UA, and/or UC. Timing of UC collection and results before/after antibiotic prescription were also captured. Any reason for deviation from guidelines or changes in treatment after the UC resulted were also captured.

Categorical data is reported as counts (%) and compared with Chi-square; nonparametric continuous data is reported as median (range) and compared with Mann-Whitney. Significance was defined as P<.05. Sample size calculation estimated that 71 subjects were needed on each day to detect an effect size of 20% difference in our primary outcome (90% antibiotic appropriateness on Monday and 70% on Friday) with 80% power and an alpha error of 0.05. All available cases for 22 months were screened until 80 subjects were collected in each group.

The primary outcome of this study was to determine the percentage of antibiotic appropriateness (based on 4 criteria) in the treatment of simple cystitis in adult female subjects presenting to the ED and compare this between Monday and Friday. The secondary outcome was to determine the most common criteria for cause of inappropriateness.

## RESULTS.

### Demographics and Antibiotic Prescriptions

160 subjects met inclusion criteria for the study: 80 subjects seen on Mondays and 80 seen on Fridays. Demographics were similar between groups, except beta-lactam allergy was higher in the Monday cohort (Table 2). The median (IQR) age was 46 (28) years in the Monday cohort vs 41 (25) years in the Friday cohort. The majority of subjects self-identified as "other" race, and Hispanic ethnicity. The second most common race/ethnicity was Black, Non-Hispanic. Less than 5% of participants identified as white and less than 1% identified as Asian. 25 (16%) subjects had diabetes, and 33 (21%) had hypertension. Out of 27 (17%) subjects with an antibiotic allergy, 24 were allergic to beta-lactams, with a majority in the Monday cohort.

The majority of subjects received nitrofurantoin: 55 (69%) on Mondays vs 61 (76%) on Fridays. The second most common antibiotic was a beta-lactam: 19 (24%) on Mondays vs 13 (16%) on Fridays. Prescribed beta-lactams included cefuroxime, cephalexin, cefpodoxime, and amoxicillin-clavulanate. 2 (2.5%) subjects in each group received TMP-SMX, and 4 (5%) subjects in each group received fluoroquinolones, ie. ciprofloxacin. No subjects received fosfomycin.

There was no difference observed between the number of appropriate antibiotic prescriptions on Mondays vs Fridays: 54 (68%) vs 60 (75%), P=0.3 (Fig. 1). 8 (10%) prescriptions on Mondays and 6 (7.5%) on Fridays were deemed inappropriate due to antibiotic selection, P=.58. 25 (31%) prescriptions on Mondays and 19 (24%) on Fridays were deemed inappropriate due to prescription duration, P=.29. All prescriptions met criteria for dose and dosing frequency. Overall, 28.75% of subjects received inappropriate antibiotic prescriptions for UTIs.

### Use of Diagnostic Tools in the Treatment of UTIs

More subjects in the Friday cohort presented with urinary symptoms compared to the Monday cohort: 71 (89%) vs 60 (75%), respectively (P=.024). The distribution of dipstick results was the same between groups: 68 (85%) had positive dipstick, 11 (14%) had negative dipstick, and 1 (1%) not performed. The UA results were also similar between groups (P=.210). On Mondays, 68 (85%) were positive, 6 (7.5%) were negative, 4 (5%) were contaminated, and 2 (2.5%) were not done. On Fridays, 72 (90%) were positive, 7 (9%) were negative, 0 (0%) were contaminated, and 1 (1%) was not done. More subjects had a UC collected on Mondays vs Fridays: 62 (78%) vs 49 (61%), respectively (P = .03). The decision to prescribe an antibiotic was based on symptoms only in 21 (13%) subjects, dipstick in 130 (81%) subjects, UA in 132 (83%) subjects, and UC in 1 (0.5%) subject. Of the 111 (69%) subjects with UCs, only 1 (0.9%) had UC results prior to antibiotic prescription. This subject was referred to the ED by an outside provider for the purpose of culture-directed antibiotic prescription for UTI. 15 (9.4%) subjects were treated concurrently for a vaginal infection: 13 received fluconazole for candidiasis, and 2 received metronidazole: 1 for Bacterial Vaginosis, 1 for Trichomonas. Although the majority of subject presentations did not warrant further testing, it was frequently ordered, with 87.5% of subjects receiving UA.

Overall, 29 (18%) subjects were given antibiotics due to a positive or contaminated UA without urinary symptoms. Presenting symptoms for this group of subjects included abdominal pain, nausea, dizziness, vaginal discharge, back pain without costovertebral tenderness, and pelvic pain. Of these 29 subjects, 11 had urine cultures, all of which were negative for UTI. We also noted that 28 subjects and 24 subjects were discharged from the ED while awaiting the results of their urine dipstick and UA, respectively.

**Urine Cultures, Pathogens, & Antibiotic Sensitivity**

Only 43 (39%) of the collected UCs were positive for a UTI. Meanwhile, 12 (11%) of the UCs had no growth. The remaining cultures had intermediate levels of bacterial growth: 44 (40%) with CFU <10,000, 6 (5%) with 10,000-49,000 CFU, and 6 (5%) with 50,000-99,000 CFU. Of the 43 patients with CFU >100,000, 43 (100%) had urinary symptoms, 42 (97.7%) had a positive dipstick, and 40 (93%) had a positive UA. The remaining patients had 1 negative UA, 1 contaminated UA, and 1 was not done. Of the 12 patients with negative UCs, 9 (75%) had urinary symptoms, 9 (75%) had a positive dipstick, and 11 (91.7%) had a positive UA.

Out of 111 cultures, less than half grew an identifiable pathogen: 41 *E. coli* , 1 *S. aureus*, 3 *S. saprophyticus*, 2 *E. aerogenes*, 2 *P. mirabilis*, and 1 *K. pneumoniae*. There were also 4 *S. agalactiae*, one of which also grew *E. coli*. The remainder were contaminated, grew normal flora, or had no growth (Table 3). The following resistance frequencies were recorded based on which antibiotics were tested: 4/44 (9%) nitrofurantoin, 12.44 (27%) TMP-SMX, 4/43 (9%) fluoroquinolones, 28/45 (62%) beta-lactams. We identified two instances where UCs showed resistance to the initial prescription with no record of those patients being contacted or offered alternative treatment.

**DISCUSSION.**

Although we found no difference in antibiotic appropriateness between the two groups, we did identify an overall high rate of inappropriate antibiotic prescriptions for UTI. Further data analysis allowed us to examine many aspects of how physicians approach the workup, diagnosis, and treatment of patients with suspected UTIs. While 99% of our subjects received empiric antibiotics, we were struck by the high rate of inappropriate antibiotic prescriptions and the inferred lack of unifying treatment guidelines in use. This underscores the utility of localized resistance data in the form of a hospital-wide antibiogram.

Antibiotics for UTI remain one of the largest drivers of antibiotic resistance in the US. Provider attention to prescribing guidelines can help address this issue. Studies in an Australian and American ED have shown that adherence to antibiotic guidelines is low in the case of total antibiotics and those only prescribed for UTI/pyelonephritis, respectively.[7,8] Studies in a Danish out-of-hours primary care service and an Israeli ED showed an increase in total antibiotic prescriptions and a lower rate of appropriateness over the weekend.[9,10] In our study, we found a similar rate of overall antibiotic inappropriateness; however, there was no significant difference in the proportion of appropriate antibiotic prescriptions on Mondays vs Fridays. We propose several factors that might contribute to this difference from the literature. Studies that found an increase in inappropriate antibiotic prescriptions over weekends speculated that this difference might be related to decreased access to healthcare during weekends, leading physicians to prescribe overly broad antibiotics during this time. Compared to Danish out-of-hours ambulatory care, American EDs are open 24/7 and thus providers do not have the same temporal regard to treatment on the weekend as outpatient providers.

Compared to the Israeli ED, which looked at all antibiotic prescriptions, our study focused on the treatment of simple cystitis in women. While there may be a discrepancy in the ED provider's access to specialists for other infections during the weekend, UTIs can be safely treated empirically, regardless of day of the week. According to the AUA, there is a low risk of progression to pyelonephritis in the setting of simple cystitis; thus, empiric treatment is appropriate, but a UC should always be collected.[13,14]

Almost one-third of patients received inappropriate antibiotics in this study. This represents a population at risk of treatment failure, resistant organisms, and side effects. Navigating patient allergies to antibiotics can justify departure from prescribing guidelines, however, there are appropriate beta-lactam and non beta-lactam options for UTI and our review of patient allergies did not identify any reasonable deviations from prescribing guidelines for this reason. Physician education regarding appropriate antibiotic choices based on IDSA guidelines in conjunction with a hospital-specific antibiogram may help improve practices. Nys et al. found that educational interventions in the ED were associated with increased guideline-concordant antibiotic prescriptions, thus enhancing quality improvement, patient safety, and antibiotic stewardship.[15]

There was no significant difference in antibiotic appropriateness between the two groups, but data analysis allowed us to examine many aspects of how physicians approach the workup, diagnosis, and treatment of patients with suspected UTIs. Signs of infection on UA such as pyuria or bacterial growth from a UC are not necessary to make a UTI diagnosis. History and physical examination can be sufficient. The probability of

cystitis is greater than 90% in women with frequency and dysuria in the absence of vaginal symptoms.[16] A small portion of subjects in our study were treated for concurrent vaginal infection. Subjects who present with symptoms such as vaginal discharge or itching warrant testing beyond history and physical as the presence of vaginal symptoms lowers the probability of cystitis in these subjects to 50%.[16]

A majority of patients were ordered a UA. This creates a scenario where some subjects without urinary symptoms were treated for an incidentally positive or contaminated UA. According to the IDSA guidelines for asymptomatic bacteriuria, incidentally positive UA in a patient with no urinary symptoms should not be treated unless the patient is pregnant.[17] Thus, these 29 subjects likely did not require treatment for their asymptomatic bacteriuria. Some patients were discharged on treatment without a results urinalysis. This brings the utility of ordering these tests into question if the physicians felt confident enough in their diagnoses to discharge the subjects with antibiotics before results were available.

Only 69% of our subjects had a UC collected. In uncomplicated female patients with urinary symptoms, it is acceptable to collect a UC and treat empirically until a UC can guide treatment.[13] AUA advocates for waiting until culture results are available before providing antibiotics given the improvement in symptoms that can be achieved with increased fluid intake, acetaminophen, phenazopyridine, and NSAIDs[13]. A culture-directed treatment approach can help prevent inappropriate antibiotic treatment in cases of negative or resistant cultures. This treatment strategy was not favored in our study, likely due to the nature of the ED, where patients are easily lost to follow-up. Furthermore, it is essential for a provider to contact patients and switch them to more appropriate therapies if culture results show pathogens resistant to empiric therapies.

Compared to the NYC outpatient antibiogram, this study had more *E. coli* cultures sensitive to TMP-SMX, nitrofurantoin, fluoroquinolones, and cephalosporins but fewer sensitive to ampicillin/sulbactam, and amoxicillin (Fig. 3). An up-to-date hospital-specific antibiogram is essential for ensuring that prescribing practices are reflective of local pathogens and patterns of resistance. At the time of our study, the ED did not have a hospital-specific antibiogram in place, thus we referenced the NYC outpatient UTI antibiogram. The rates of antibiotic sensitivity from the cultures collected in our study still differed from those published in the NYC antibiogram, which further highlights the need for a hyper-local approach. Having a thorough understanding of local pathogens and their resistance can help physicians tailor their approach to antibiotic prescription and ensure that empiric therapies are appropriate and effective.

Strengths of this study include the diversity of the population and the collection of detailed data for each subject including their presenting symptoms, diagnostic modalities, results of dipstick, urine microanalysis, and urine culture growth and antibiotic sensitivity. This study provides detail beyond the primary aim that is useful for evaluating not only appropriate vs inappropriate prescribing but also the nuances of working up and treating patients with UTI.

Our general conclusions regarding antibiotic prescribing practices may fail to capture the overall picture since we analyzed data collected from only 2 days of the week. Furthermore, we utilized the most recent 2011 IDSA

guidelines to establish appropriateness criteria. Updated guidelines are currently in development and new recommendations may reflect emerging trends in pathogen resistance and antibiotic selection that are being considered in current clinical practice but are not yet reflected in established guidelines. As we retrospectively reviewed subject records, we were offered a limited view into the prescribing physician's decision-making process. Factors influencing antibiotic selection that were not explicitly outlined in the medical record were unable to be assessed. Many subjects captured in our study were older and may have presented with comorbidities affecting management that were not captured.

While we found no significant difference in antibiotic appropriateness between Mondays and Fridays, there was a high rate of inappropriate antibiotic use in both groups. Our findings represent an important opportunity for providers and institutions to assess their antibiotic prescribing practices and use up-to-date treatment guidelines. Physicians may be unaware of their institution's antibiogram; however, a quick review of this resource can help ensure that patients receive appropriate treatment. Antibiotic stewardship is essential to avoid driving antibiotic resistance further.

**SUMMARY - ACCELERATING TRANSLATION**

**Title**: Antibiotic Appropriateness on Mondays vs Fridays: Empiric Treatment of Simple Cystitis in the Emergency Department

**Main Problem to Solve:**

Urinary tract infections (UTIs) are incredibly common infections, especially among female patients due to differences in anatomy. A large number of antibiotic prescriptions are written every year for these infections. It is important for physicians to ensure that the antibiotics they select for treatment of these infections are appropriate in terms of the actual drug selected, dose, frequency, and duration. Failure to properly take these factors into consideration can lead to treatment failure and drive the development of antibiotic resistance. The Infectious Disease Society of America has published guidelines that physicians can follow in conjunction with a local antibiogram when selecting antibiotics.

Prior studies have shown that adherence to prescribing guidelines for urinary tract infections has been poor. There are many factors that may contribute to poor adherence to guidelines. Studies performed in Israel and Denmark showed that there were different prescribing trends on weekdays vs weekends.

**Aim of Study:**

The primary aim of the study was to determine whether there is a difference in the percentage of antibiotic prescriptions for the treatment of uncomplicated urinary tract infections meeting the criteria for appropriateness on Mondays vs Fridays. Our secondary aim was to determine the most failed appropriateness criteria.

**Methodology:**

We performed our study by reviewing the medical records of 160 adult female subjects who presented to the emergency department for treatment of an uncomplicated urinary tract infection. 80 subjects presented on Mondays and 80 on Fridays. We reviewed the symptoms that each subject presented with such as urinary urgency, frequency, pain with urination, abdominal pain etc. We also determined which diagnostic tests were ordered by the treating physician and how the results of those tests may have been utilized to decide what treatment the subject would need. Each antibiotic that was prescribed was evaluated using the IDSA criteria for antibiotic selection, dose, frequency, and duration to determine whether it was an appropriate prescription.

**Results:**

The demographics including age and race as well as comorbidities such as hypertension and diabetes were similar between the Monday group and the Friday group. The only significant difference between the two groups was an increased number of allergies to beta-lactam antibiotics in the Monday group. When comparing the percentage of appropriate antibiotic prescriptions between Monday and Friday, there was no difference. We did note that overall, 28.75% of subjects received an inappropriate antibiotic prescription for their infection. The most common failed criteria for appropriateness was antibiotic duration (44 inappropriate) followed by selection (14 inappropriate).

**Conclusion:**

Though no difference in appropriate prescribing practices was found between Mondays and Fridays, we did identify a large proportion of prescriptions that fail to meet appropriateness criteria and represent an important area for improvement to prevent treatment failure and further driving of antibiotic resistance. Practitioners should utilize relevant prescribing guidelines in conjunction with their local antibiogram to inform antibiotic selection.

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**FIGURES AND TABLES.**

**Figure 1.** Rate of Antibiotic Appropriateness on Mondays vs Fridays, N= 160

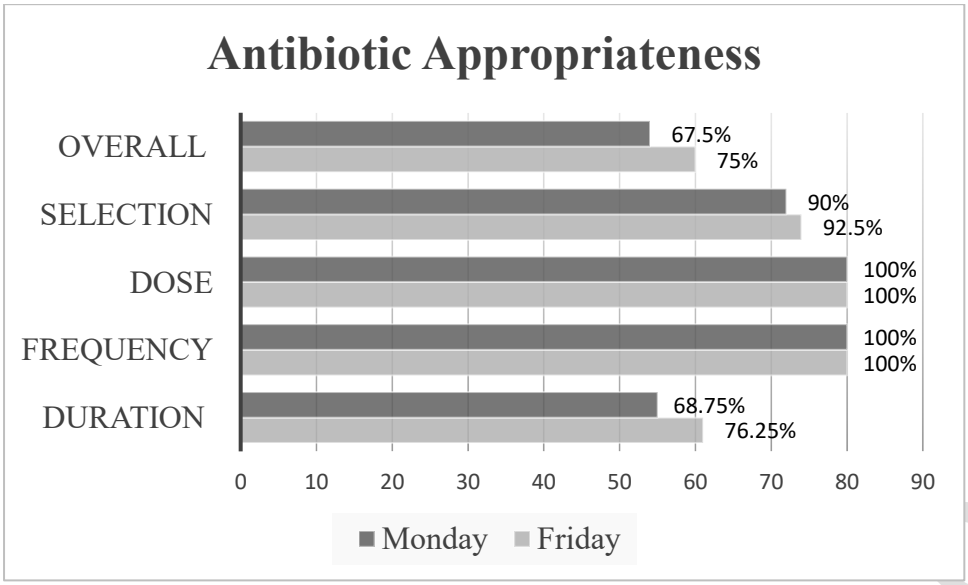

**Table 1**. Antibiotic Appropriateness Criteria for the Treatment of Simple Cystitis in the United States

| Antibiotic | Contraindications | Dose | Duration | Frequency |
|---|---|---|---|---|
| Nitrofurantoin* | Early pyelonephritis suspected | 100mg | 5-7 days | Twice daily |
| TMP-SMX* | Local resistance >20%, Used to treat UTI <3 months ago | 160/800mg | 3 days | Twice daily |
| Fosfomycin* | Early pyelonephritis suspected | 3g | 1 day | Single dose sachet |
| Fluoroquinolones | High local resistance | varies | 3 days | varies |
| Beta-lactams | Avoid ampicillin or amoxicillin | varies | 3-5 days | varies |

*Adapted from the 2011 Infectious Diseases Society of America Guidelines*
**Considered first line treatment options*

**Table 2**. Patient Demographics and Comorbidities

| | Monday (N=80) | Friday (N=80) | P value |
|---|---|---|---|
| **Race** | | | .454 |
| White | 5 (6.3) | 2 (2.5) | |
| Black/African American | 13 (16.3) | 15 (18.8) | |
| Asian | 1 (1.3) | 0 (0.0) | |
| Other | 50 (62.5) | 56 (70.0) | |
| Not Documented | 11 (13.8) | 7 (8.8) | |
| **Ethnicity** | | | 0.39 |
| Hispanic | 52 (65.0) | 56 (70.0) | |
| Not Hispanic | 27 (33.8) | 21 (26.3) | |
| Not Documented | 1 (1.25) | 3 (3.75) | |
| **Comorbidities** | | | |
| Diabetes | 11 (13.8) | 14 (17.5) | 0.51 |
| Hypertension | 18 (22.5) | 15 (18.8) | 0.56 |
| **Allergies to antibiotics** | | | |
| Nitrofurantoin | 0 (0.0) | 0 (0.0) | 1.0 |
| TMP/SMX | 1 (1.3) | 1 (1.3) | 1.0 |
| Fluoroquinolones | 0 (0.0) | 1 (1.3) | 0.32 |
| Beta-Lactams | 17 (21.3) | 7 (8.8) | **0.03** |

*Reported as N(%) and compared with chi square*

**Table 3**. Pathogen Distribution from Urine Cultures

| **Pathogen** | **Total Cultures* (N=111)** |
|---|---|
| E. Coli | 41 (36.9%) |
| Non E. Coli | 13 (11.7%) |
| Contaminated | 7 (6.3%) |
| Normal Flora/No Growth | 50 (45%) |

*Reported as N(%).*
**N=111, inclusive of all cultures collected on Mondays and Fridays combined*