

Background

- Urinary tract infections (UTIs) are commonly treated infections in the emergency department (ED)
 - Result in 3 million visits annually and 15% of outpatient antibiotic prescriptions
- The 2010 Infectious Diseases Society of America (IDSA) guidelines for acute uncomplicated cystitis and pyelonephritis in women recommend specific antimicrobial therapy based on local resistance rates²
- Clinician use of local susceptibility patterns is commonly stated as the basis for empirical treatment decisions, though local antibiograms may be more likely to include isolates from patients with resistance risk factors, past antibiotic resistance, and experience treatment failure compared to ED patients with uncomplicated UTIs

Objective

Characterize empiric and definitive antimicrobial therapy for treatment of UTIs in a nationally representative sample of ED patients

Methods

Study Design

- Multi-center retrospective cohort study from 2018-2020 utilizing the Emergency Medicine PHARMacotherapy Research NETWORK: EMPHARM-NET, a network of 15 of geographically diverse EDs (Midwest: 8 sites; South: 1; Northeast: 4; West: 2)

Table 1. Inclusion Criteria

Inclusion	Exclusion
Age ≥ 18 years	Presence of suspected or confirmed acute bacterial prostatitis, orchitis, epididymitis, or chronic bacterial prostatitis
Diagnosis of uncomplicated or complicated cystitis and pyelonephritis*	Gross hematuria requiring intervention other than administration of antibiotics for UTI
Discharged from the ED	Urinary tract surgery within 7 days of study enrollment

Definitions*2:

- Uncomplicated cystitis: dysuria, frequency, urgency, suprapubic pain, or hematuria
- Uncomplicated pyelonephritis: fever (temperature >38C), chills, flank pain, costovertebral-angle tenderness, and nausea or vomiting with or without symptoms of cystitis
- Complicated cystitis and pyelonephritis: functional metabolic or anatomical conditions that may increase the risk of treatment failure or serious outcomes (e.g., obstruction, stone, pregnancy, male sex, diabetes, neurogenic bladder, renal insufficiency, immunosuppression)

References:
1. Nat Rev Urol. Dec 2010;7(12):653-660. 4. Clin Infect Dis. 2008 Feb 15;46(4):642-4
2. Clin Infect Dis. Mar 01 2011;52(5):e103-120
3. Pharmacotherapy. Sep 2007;27(9):1306-1312.

Outcomes

Primary outcome: empiric intravenous (IV) and oral antibiotics used for the treatment of UTI in patients seen and discharged from the ED

Secondary outcomes: antimicrobial dose and duration, return ED visit within 30 days, appropriate antimicrobial coverage (defined as *in vitro* activity against the etiologic pathogens⁴)

Results

Table 2. Baseline Characteristics for All ED Patients

Baseline Characteristic	Total Cohort (N=3779)	Culture Positive (N=2269)	Culture Negative (N=1510)
Age in years, median (IQR)	62.9 (41-77.6)	66 (45.5-79.4)	58.2 (36.3-74)
Female, n (%)	2882 (76.3)	1678 (74)	1204 (79.7)
Pregnant, n (%)	46 (1.2)	22 (1)	24 (1.6)
Chief complaint UTI	1902 (50.3)	1169 (51.1)	733 (48.5)
UTI Type			
Pyelonephritis, uncomplicated	293 (7.8)	187 (8.2)	106 (7)
Pyelonephritis, complicated	394 (10.4)	271 (11.9)	123 (8.1)
Cystitis, uncomplicated	1489 (39.4)	805 (35.5)	684 (45.3)
Cystitis, complicated	1544 (40.9)	969 (42.7)	575 (38.1)
Risk Factors for Antimicrobial Resistance, n (%)			
Previous antibiotic last 90 days	1095 (29)	645 (28.4)	450 (29.8)
Hemodialysis dependence	55 (1.5)	35 (1.5)	20 (1.3)
Urinary tract abnormality	587 (15.5)	387 (17.1)	200 (13.2)
Long-term care facility	284 (7.5)	206 (9.1)	78 (5.2)
History of multidrug resistance	387 (10.2)	294 (13)	93 (6.2)

Figure 2. Percentage of Antibiotic Use in the ED

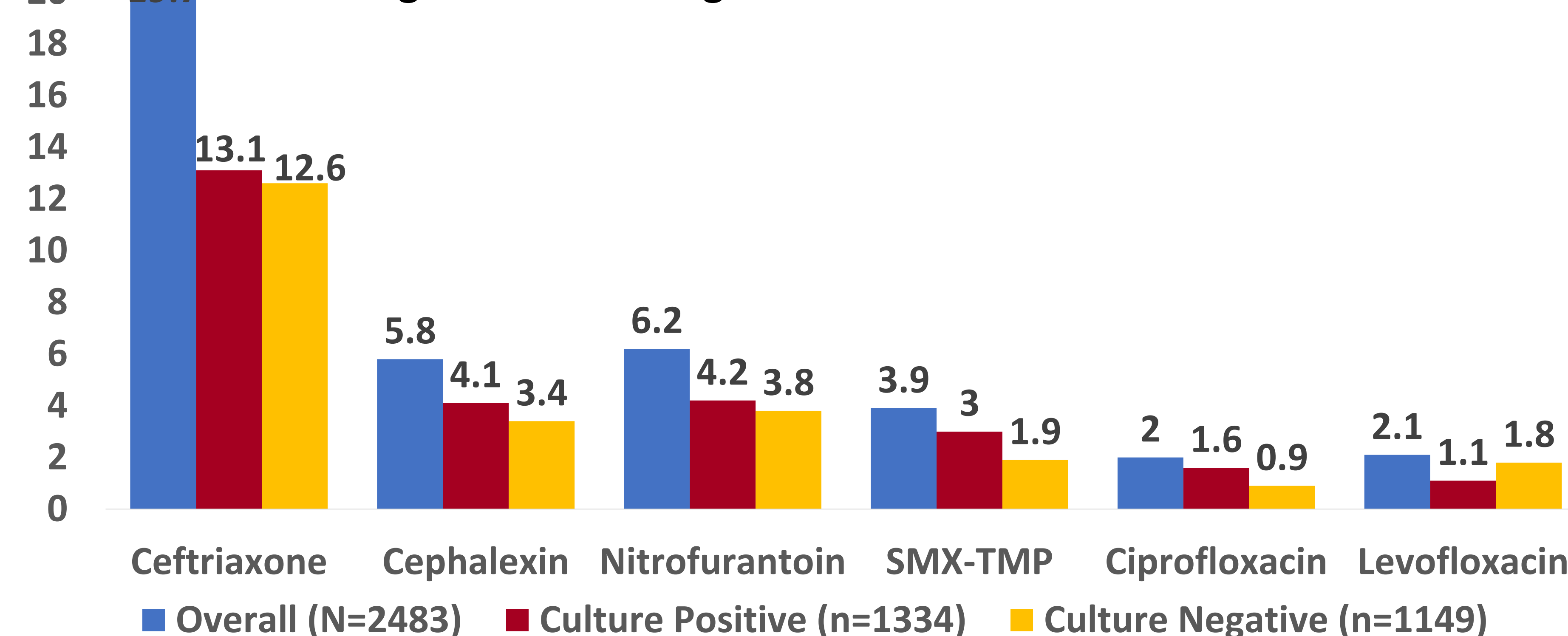
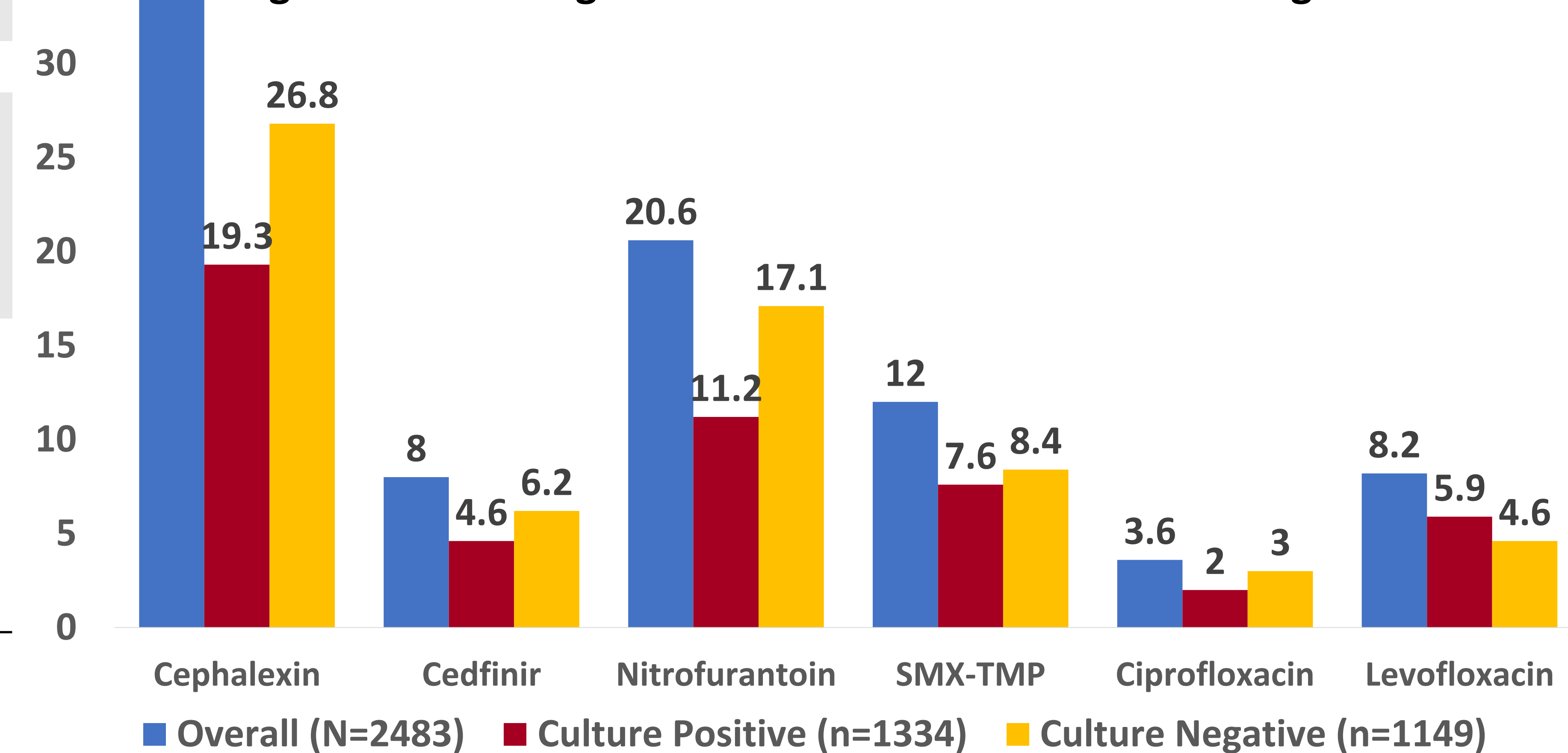


Table 3. Management and Outcomes

Baseline Characteristic	Total Cohort (N=3779)	Culture Positive (N=2269)	Culture Negative (N=1510)
Pathogen			
E coli	1428 (37.8)	1428 (37.8)	--
K pneumonia	295 (7.8)	295 (7.8)	--
ESBL-producing pathogen	138 (2.7)	138 (2.7)	--
Received antibiotic in the ED	1,209 (48.7)	748 (33)	461 (30.5)
Oral	675 (27.2)	417 (18.4)	258 (17.1)
IV	557 (22.4)	349 (15.4)	208 (13.8)
Length of antibiotics, mean (SD)	7.1 (2.5)	6.9 (2.7)	7 (4.1)
Appropriate empiric antibiotics	--	1874 (82.6)	--
Return ED visit within 30 days	454 (12)	253 (11.2)	244 (16.2)

Odds of returning to the ED within 30 days was higher in those that did not have appropriate empiric antibiotics (OR 1.37, 95% CI 1.06 - 1.78).

Figure 3. Percentage of Antibiotics Prescribed at Discharge from ED



Conclusion

- This study describes ED patients discharged from the ED after UTI diagnosis
- Antibiotic selection varied: IV ceftriaxone and oral cephalexin were most commonly empirically utilized to treated patients with UTI
- Inappropriate antimicrobial selection increased odds of a return ED visit within 30 days

Acknowledgements

- Supported by an investigator initiated research grant from Spero Therapeutics
- We would like to acknowledge and thank all of the investigators in EMPHARM-NET who made this project successful