reference broth microdilution methods. Percentage of isolates inhibited at ≤8 mg/L (CLSI, cefepime high dose) and at ≤16 mg/L (pharmacokinetic/pharmacodynamic [PK/PD] susceptible [S] breakpoint based on extended infusion and high dosage) were evaluated.

Results. FEP-TAZ (99.9% inhibited at ≤16 mg/L; Table), CAZ-AVI (99.9%S), and meropenem (MEM; 99.5%S) were the most active agents against *Enterobacterales* (ENT). An ESBL phenotype (CLSI criteria) was observed in 12.5%, 12.9%, and 3.6% of *E. coli* (EC), *K. pneumoniae* (KPN), and *P. mirabilis* (PM), respectively. FEP-TAZ and CAZ-AVI exhibited complete activity against EC, whereas C-T and piperacillin–tazobactam (PIP-TAZ) were active against 91.5% and 88.1% of ESBL-phenotype EC isolates, respectively. The most active agents against KPN were FEP-TAZ (99.6% inhibited at ≤16 mg/L), CAZ-AVI (100.0%S), and amikacin (AMK; 99.4%S). All PM isolates were S to FEP-TAZ (highest MIC, 0.12 mg/L), C-T, CAZ-AVI, MEM, PIP-TAZ and AMK. FEP-TAZ was highly active against *E. cloacae* (n = 94; MIC_{90}, 0.5 mg/L; 98.9% inhibited at ≤16 mg/L) and *Citrobacter* spp. (n = 91; MIC_{90}, 0.12 mg/L; highest MIC, 0.5 mg/L). Against *P. aeruginosa* (PSA), FEP-TAZ inhibited 97.6% of isolates at ≤16 mg/L, with spectrum of activity similar to CAZ-AVI (96.4%S), C-T (99.4%S) and AMK (97.6%S), and greater than MEM (85.5%S) and PIP-TAZ (87.3%S).

Conclusion. FEP-TAZ showed potent activity against ENT and PSA isolated in US hospitals in 2018, with overall spectrum (ENT + PSA) similar to CAZ-AVI and greater than C-T, PIP-TAZ, and MEM when FEP-TAZ proposed PK/PD S breakpoint of ≤16 mg/L was applied. FEP-TAZ may represent a valuable option for treating cUTIs caused by resistant GNB.

Organism /resistant subset (no.)	MIC_{50}/MIC_{90} in mg/L (% Susceptible)			
	FEP-TAZ[a]	FEP	C-T	CAZ-AVI
Enterobacterales (2,841)	0.03/0.12 [99.8/99.9][a]	0.06/1 (91.2)	0.25/0.5 (97.6)	0.12/0.25 (99.9)
E. coli (1,814)	0.03/0.06 [100.0/100.0][a]	0.06/2 (90.2)	0.25/0.5 (99.0)	0.12/0.25 (100.0)
ESBL phenotype (226)	0.06/0.25 [100.0/100.0][a]	32/>256 (21.7)	0.5/2 (91.5)	0.12/0.5 (100.0)
K. pneumoniae (473)	0.03/0.12 [99.2/99.6][a]	0.06/4 (89.9)	0.25/1 (97.6)	0.12/0.25 (100.0)
ESBL phenotype (61)	0.12/4 [93.4/96.7][a]	32/>256 (21.3)	1/>16 (80.4)	0.25/1 (100.0)
P. mirabilis (165)	0.06/0.06 [100.0/100.0][a]	0.06/0.12 (98.8)	0.5/0.5 (100.0)	0.06/0.06 (100.0)
E. cloacae (94)	0.06/0.5 [98.9/98.9][a]	0.06/4 (87.2)	0.5/16 (78.6)	0.25/0.5 (98.9)
Citrobacter spp. (91)	0.03/0.12 [100.0/100.0][a]	0.03/0.25 (97.8)	0.25/0.5 (95.5)	0.12/0.25 (100.0)
P. aeruginosa(165)	2/8 [90.9/97.6][a]	2/8 (90.3)	1/2 (99.4)	2/4 (96.4)
MEM-NS (24)	8/64 [50.0/83.3][a]	8/64 (50.0)	1/4 (95.8)	4/16 (83.3)

[a] % inhibited at ≤8/≤16 mg/L shown in brackets for comparison purposes. NS, nonsusceptible.

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1446. The Impact of Enterobacteriaceae Isolate Breakpoints on Prescriber Treatment Choices for Discordant Pattern Urinary Tract Infections

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Background. Our institution revealed Enterobacteriaceae with discordant cefazolin (CEF)-resistant / ampicillin-sulbactam (SAM) susceptible patterns (CRASS-P). This discordance could be from the multiple MIC cephalosporin breakpoint adjustments from CLSI. SAM has higher resistance for gram-negative bacteria compared with cephalosporins such as CEF which is confirmed by our antibiogram. We sought to understand if narrow-spectrum antibiotic choices for CRASS-P urinary tract infections (UTIs) led to clinical cure (CC).

Methods. We conducted a retrospective review from January 2018 to February 2019 of all CRASS-P *Escherichia coli*, *Proteus mirabilis*, and *Klebsiella pneumoniae* isolates from urine cultures. Patients with any symptom related to a UTI, urinalysis with >10 white blood cells/high-powered field, urine culture with >10,000 colony-forming units/mL, and receipt of an antibiotic were included. CC was defined as symptom resolution within 48 hours with no return to care within 28 days of the positive urinary culture. "Group A" included patients prescribed narrow-spectrum antibiotics such SAM, CEF, or an oral cephalosporin (OC) vs. broad-spectrum antibiotics such as ceftriaxone, quinolones or sulfa-medications ("Group B").

Results. There were 960/1356 (70.8%) CRASS-P urinary isolates and 244 patients met inclusion criteria. Of 244 patients, 72 were in Group A and 172 were in Group B. There was no difference in the diversity of the 3 uropathogens, P = 0.34 (Table 1). Median age was 69±20.3 and 67.5±23.9 years for Group A and Group B, respectively, P = 0.23. Females accounted for 73.6% and 77.9% in Group A and B, respectively, P = 0.51. Overall, patients reached CC in 98.6% (71/72) of Group A patients, compared with 92.4% (159/172) of Group B patients, P = 0.07. Antibiotics used in treatment are outlined in Figure 1. UTI was associated with bacteremia for 2 patients in Group A and 4 patients in Group B (P = 0.84). Both patients in Group A reached CC and used AMC for treatment. However, 1 out of 4 patients did not achieve CC in Group B.

Conclusion. The use of SAM or OC can spare the broad-spectrum antibiotics use for CRASS-P UTIs as there was no statistical difference in CC between the two groups. The use of SAM with CRASS-P bacteremia secondary to UTI is possible; however, future studies are needed.

Table 1: Diversity of Enterobacteriaceae for patients meeting inclusion criteria

	P. mirabilis	*E. coli*	*K. pneumoniae*
All (n= 244)	194	43	7
Group A (n=72)	56	14	2
Group B (n=172)	138	29	5

Figure 1: Antibiotic choices for patients who met the inclusion criteria

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1447. *Ex Vivo* Human Bladder Tissue Model to Evaluate Lactobacillus-Containing Formulations as Preventative Treatment Against Common Urogenital Pathogens

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Background. Urinary tract infections (UTIs) are common bacterial infections in adults, and catheter-associated UTIs are the most common nosocomial infection. The rise of multidrug-resistant organisms and an increased focus on antibiotic stewardship has influenced the development of novel treatments against such infections, and there is growing interest in the use of probiotics for antimicrobial therapy. We used an *ex vivo* human bladder tissue (HBT) model to evaluate the antimicrobial efficacy and biocompatibility of lactobacillus-based developmental formulations (created and supplied by ICET, Inc.) for preventative treatment against common UTI pathogens.

Methods. To assess antimicrobial efficacy, lactobacillus-based formulations (live and attenuated) were spiked with five prevalent UTI organisms (5×10^3 CFU/mL). *Ex vivo* HBT explants were treated with 300 µL of spiked formulation for 6 and 24 h at 37°C, then processed and plated on selective agars. Biocompatibility studies assessed *ex vivo* HBT tissue viability and inflammatory response (IL-8) to lactobacillus-containing formulations with MTT assay and ELISA at 2 h post-treatment.

Results. At 6 h, live lactobacillus-containing formulations (29–124, 29-124C) were bacteriostatic (90.00–99.89% log CFU/mL reduction) against *Escherichia coli* and *Klebsiella pneumoniae* and bactericidal (≥99.90% log CFU/mL reduction) against *Candida albicans, Enterococcus faecalis,* and *Proteus mirabilis*. By 24 h, live formulations were bactericidal against all five organisms tested. Attenuated formulation 29–125 achieved bacteriostatic efficacy against *E. coli*, *K. pneumoniae*, and *P. mirabilis* and bactericidal efficacy against *C. albicans* and *E. faecalis* at 24 h. Biocompatibility assessments following 2 h exposure to lactobacillus-based formulations revealed exposed explants were fully viable, with no significant changes in IL-8 production compared with PBS-treated controls.

Conclusion. This study suggests lactobacillus-based formulations are effective and safe options for UTI prevention. While this static *ex vivo* human bladder mucosalmodel does not fully replicate the dynamic and diluting conditions that occur *in vivo*, we anticipate that our findings will be confirmed by future *in vivo* studies.

ICET ID	*C. albicans*		*E. coli*		*E. faecalis*		*K. pneumoniae*		*P. mirabilis*	
	6 h	24 h	6 h	24 h	6 h	24 h	6 h	24 h	6 h	24 h
29-124 (live)	**99.89[a]**	**100.00[b]**	**99.81[a]**	**99.99[b]**	**99.93[b]**	**100.00[b]**	**99.91[a]**	**100.00[b]**	**98.92[b]**	**100.00[b]**
29-124C (live)	**100.00[b]**	**99.99[b]**	**99.30[a]**	**99.96[b]**	**99.98[b]**	**99.99[b]**	**99.74[a]**	**100.00[b]**	**96.97[b]**	**100.00[b]**
29-125 (attenuated)	**99.77[a]**	**100.00[b]**	**99.96[b]**	**97.42[a]**	**100.00[b]**	**99.99[b]**	63.94	**97.74[a]**	3.76	**93.51[a]**
29-125C (base)	89.14	86.01	**95.14[a]**	81.73	80.47	52.89	73.25	**96.11[a]**	8.09	**94.52[a]**

Table 1. Percent reduction compared to respective untreated growth control of log_{10}CFU/mL UTI challenge organisms collected 6h and 24h after treatment with ICET formulations. [a] denotes bacteriostatic efficacy (90.00-99.89% reduction), [b] denotes bactericidal efficacy (≥99.90% reduction).

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1448. Prostate Abscess: Clinical Features, Management, and Outcomes of a "Stealth" Infection: A Case Series

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Background. Prostate abscess (PA) is uncommon and the diagnosis is often delayed or missed. Traditionally, PA has resulted from acute prostatitis or ascending genitourinary (GU) infection due to gram-negative bacilli but *S. aureus* is an emerging cause.

Methods. A retrospective review of all adult patients admitted with an ICD-9 or -10 diagnosis of PA between January 2013 and July 2018 was conducted. Inclusion criteria included age ≥18 years, a compatible GU infection syndrome, and imaging consistent with PA.

Results. Twenty-two patients with PA were identified. The median age was 57 years. Five patients (22.7%) were immunosuppressed and 11 (50%) had diabetes. The median Charlson Comorbidity Index was 2. No patient had a prior history of PA but 3 patients had a past diagnosis of prostatitis. Only 1 patient had GU instrumentation in the preceding 6 weeks and no patient had an indwelling urethral catheter. Fever (59%), dysuria (49%), and urinary retention (32%) were the most common presenting symptoms. Only 7/18 (39%) patients had a tender prostate on examination; fluctuance

was not described. Pelvic CT revealed PAs in all patients; 14 (64%) were solitary and 16 (73%) were >2 cm in greatest diameter. The median abscess size was 3.2 cm. Urine cultures were positive in 11/18 (61%) patients with 6/11 (55%) growing *S. aureus* (MRSA 3); 9/16 (56%) patients had positive blood cultures (*S. aureus* 7 with MRSA 3) and 5/5 had positive PA cultures (*S. aureus* 1). Nine patients (41%) were managed with antibiotics alone whereas 13 (59%) underwent abscess drainage. The median duration of antibiotic therapy was 34.5 days. All-cause mortality at 4 weeks was 9.1%. No relapses were documented at 6 months. When comparing patients with *S. aureus* PA to those with other causes, *S. aureus* patients more often had diabetes (86% vs. 33%, $P = 0.06$) and a longer median duration of antibiotic therapy (35 days vs. 31 days, P = 0.04) but age, abscess size, and mortality did not differ between groups.

Conclusion. PA is relatively uncommon and may be difficult to distinguish clinically from acute prostatitis. CT is critical to an accurate diagnosis. Optimal management usually requires both antibiotics and drainage. Given the frequent occurrence of *S. aureus* as a cause, coverage for MRSA should be a component of empiric treatment for PA.

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1449. Antibiotic Choice, Duration, and Outcome in Community-Acquired Urinary Tract Infections (UTI) in Male Patients

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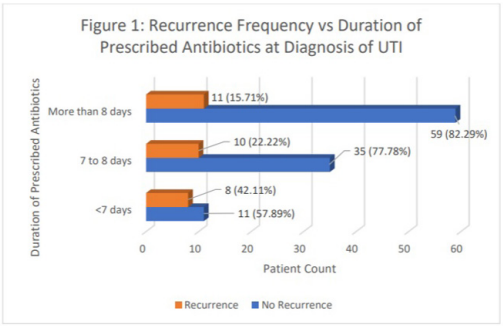
Background. It is common medical practice for all urinary tract infections (UTIs) in males to be diagnosed as "complicated" UTIs. Current guidelines recommend 7 to 14 days of antibiotics for complicated UTIs. Longer duration of antibiotics potentially exposes a patient to harm without sufficient evidence for benefit. This research will attempt to determine the optimal antibiotic and duration of treatment for males diagnosed with a UTI.

Methods. This study is a retrospective cohort study that utilized the electronic health record for Kaiser Permanente Southern California to search for male patients with a diagnosis of cystitis or UTI in the outpatient setting from 2011 to 2016. Only patients with confirmed bacteriuria >100,000 CFU/mL of a gram-negative organism were included. Exclusion criteria included Foley catheterization, intermittent self-catheterization, prostatitis and Pseudomonas infection. There were 10,662 patients in our database who fit these criteria, but only 134 patients were reviewed for preliminary analysis for this abstract. Outcomes included recurrence of UTI within 30 days of finishing treatment

Results. A total of 134 patients were included. Most patients were prescribed Ciprofloxacin (69%) or Cephalexin (19%). The prescription duration was >8 days for 52%, 7–8 days for 34% and <7 days for 14% of all the patients. There was a statistically significant difference in recurrence by antibiotic duration (Figure 1). The odds of recurrence were 3.9 times higher for people with <7 days prescription compared with those with > 8 days (95% CI, 1.28–11.89, $P = .017$) (Table 1). The odds of recurrence were 1.5 times higher for those with a prescription of 7–8 days compared with those with a prescription of > 8 days, but the difference was not statistically significant (95% CI: 0.59, 3.7, $P = .38$).

Conclusion. Male patients diagnosed with a UTI who were treated with a course of antibiotics for > 7 days were less likely to have a UTI recurrence than patients who were treated for < 7 days. However, there was no statistically significant difference between 7 to 8 days vs. >8 days of antibiotics in terms of recurrence. This study will be continued to increase study power. Determining the best treatment course will reduce healthcare cost and patient morbidity from UTI recurrences.



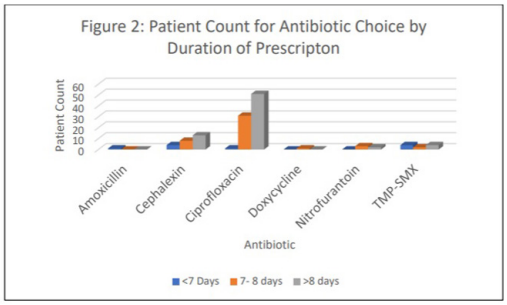
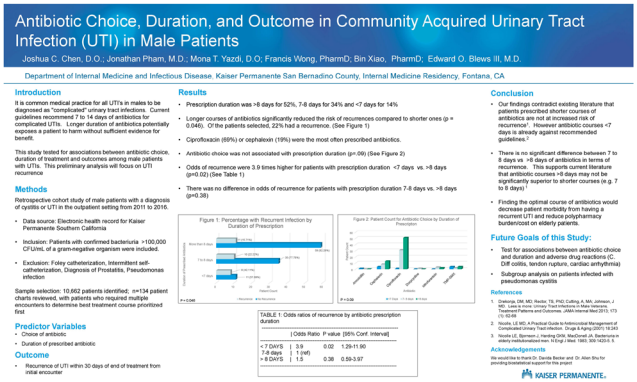


TABLE 2 : Odds ratios of recurrence by antibiotic prescription duration

	Odds Ratio	P value	[95% Conf. Interval]
< 7 DAYS	3.9	0.02	1.29-11.90
7-8 days	1 (ref)		
> 8 DAYS	1.5	0.38	0.59-3.97



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1450. Risk Factors for Antibiotic Resistance of *Escherichia* coli Urinary Isolates in Outpatients

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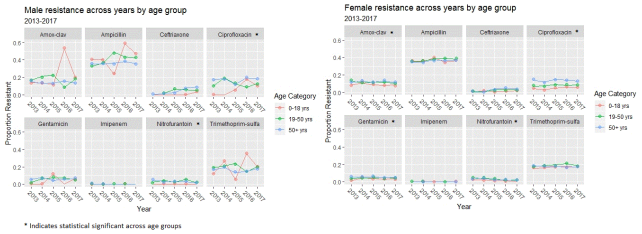
Background. Antibiotic-resistant *E. coli* infections represent a major cause of morbidity and mortality, and pose a challenge to antibiotic stewardship. Patient age has been suggested as a key determinant of resistance patterns in studies based in the United States and Europe, although local antibiotic use patterns may affect this relationship. We analyzed results from clinical antibiotic susceptibility tests performed at a large reference laboratory to further examine the association of age with *E. coli* urinary tract resistance patterns in WA State.

Methods. We analyzed 5 years of *E. coli* antibiotic susceptibility data for outpatient urinary tract infections in WA State from a national clinical reference laboratory. We included only the first isolate recorded for each patient and calculated crude rates of resistance to antibiotics for the age groups of 50 years. In a multivariate logistic model, we tested the effect of patient age, year of antimicrobial susceptibility test submission, and sex on antibiotic resistance.

Results. Univariate analyses indicated that resistance rates differed significantly across patient age groups for ciprofloxacin and nitrofurantoin. Among females, resistance rates also differed significantly across patients age groups for amoxicillin-clavulanate and gentamicin. Logistic regression using data from male patients found the odds of resistance to be significantly greater in older individuals for ciprofloxacin (OR 2.59) and lower in older individuals for amoxicillin-clavulanate (OR 0.56). For females, logistic regression found the odds of resistance to be significantly greater for older individuals for amoxicillin-clavulanate (OR 1.43), ciprofloxacin (OR 3.04), ceftriaxone (OR 2.58), nitrofurantoin (OR 2.20), and gentamicin (OR 1.62).

Conclusion. In WA State, the distribution of antibiotic resistance in *E. coli* urinary isolates varies with age, sex and the antibiotic of interest. Greater and more timely use of databases of susceptibility testing of clinical isolates from outpatient settings can allow for the creation of age-specific antibiograms to guide and improve stewardship.



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