Antimicrobial Resistance Patterns and Patient Characteristics Among Females With Uncomplicated Urinary Tract Infection in Germany: A Physician-Based Chart Review

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Introduction

- Increasing antimicrobial resistance (AMR) poses a significant health problem and raises concerns for the future treatment of uncomplicated urinary tract infections (uUTIs)/acute cystitis[1]
- Optimizing treatment for uUTIs requires up-to-date surveillance of regional drug resistance,[2] but data are not readily available
- Through a retrospective, physician-based chart review, we assessed the overall and regional prevalence of uUTI AMR, and patient demographic and clinical characteristics by AMR status in Germany

Methods

- **Eligibility:** non-pregnant female patients, aged ≥12 years with a uUTI diagnosis (index date) based on an *Escherichia coli* (*E. coli*)- positive urine culture (between 1 January 2017 and 31 December 2019), with susceptibility test results to ≥3 antimicrobial drug classes in the German uUTI treatment guidelines
- **Drugs/*drug classes*** included fosfomycin-trometamol (fosfomycin); nitrofurantoin; pivmecillinam (mecillinam); *fluoroquinolones* (FQs); cefpodoxime-proxetil (cefpodoxime); and *folate metabolism inhibitors* (FMIs)
- **Physicians** were recruited by Medefield America Limited LLC (Medefield), a physician panel vendor, based on their medical specialty (urology, general internal medicine/primary care, and obstetrics/gynecology) and asked to abstract data on 1–3 randomly selected patients meeting the eligibility criteria
- **Patients** were stratified into 3 cohorts per urine culture drug susceptibility: susceptible to all (SUS), resistant to 1 or 2 (DR1/2), and resistant to ≥3 (multi-drug resistance [MDR]) drug classes tested
- **Outcome variables:** overall/regional AMR prevalence and demographic/clinical characteristics across cohorts

Results

- 220 physicians participated: 131 (59.5%) internal medicine/primary care practitioners; 44 (20.0%) obstetricians/gynecologists; 45 (20.5%) urologists
- 386 female patients had susceptibility test results for ≥3 drug classes (stratified cohorts included: SUS n=259 [67.1%]; DR1/2 n=112 [29.0%]; MDR n=15 [3.9%])
- Generally, the MDR cohort comprised older patients with more history of urinary tract infection (UTI) and less history of antibiotic intolerance compared to the SUS and DR1/2 cohorts (**Table 1**)

Table 1. Baseline demographics and clinical characteristics

Baseline demographics and clinical characteristics	All patients (N=386)	Antibiotic susceptibility cohort		
		SUS (n=259)	DR1/2* (n=112)	MDR* (n=15)
Mean (SD) age, years†	41.7 (16.7)	43.0 (17.0)	37.9 (15.2)	47.3 (16.8)
Region, n (%)				
Northeast	38 (9.8)	23 (8.9)	13 (11.6)	2 (13.3)
Northwest	57 (14.8)	36 (13.9)	20 (17.9)	1 (6.7)
Southeast	90 (23.3)	63 (24.3)	24 (21.4)	3 (20.0)
Southwest	119 (30.8)	81 (31.3)	32 (28.6)	6 (40.0)
West	82 (21.2)	56 (21.6)	23 (20.5)	3 (20.0)
Statutory health insurance, n (%)‡	320 (82.9)	213 (82.2)	94 (83.9)	13 (86.7)
Premenopausal, n (%)†	273 (70.7)	179 (69.1)	86 (76.8)	8 (53.3)
Sexually active, n (%)†	281 (72.8)	177 (68.3)	94 (83.9)	10 (66.7)
Comorbidities, n (%)†				
Obesity	68 (17.6)	38 (14.7)	26 (23.2)	4 (26.7)
Vaginal infections	53 (13.7)	30 (11.6)	22 (19.6)	1 (6.7)
Pre-diabetes or controlled diabetes mellitus§	15 (3.9)	11 (4.2)	4 (3.6)	0
Clinical manifestations, n (%)†				
Dysuria	346 (89.6)	230 (88.8)	101 (90.2)	15 (100)
Urinary frequency	322 (83.4)	216 (83.4)	93 (83.0)	13 (86.7)
Urinary urgency	261 (67.6)	172 (66.4)	79 (70.5)	10 (66.7)
Haematuria	193 (50.0)	134 (51.7)	49 (43.8)	10 (66.7)
Lower abdominal or suprapubic pain	170 (44.0)	113 (43.6)	52 (46.4)	5 (33.3)
Prior history of infections				
Any prior UTI during baseline period, n (%)	90 (23.3)	58 (22.4)	26 (23.2)	6 (40.0)
Median (IQR) number of episodes	2.0 (1.0, 2.0)	2.0 (1.0, 2.0)	2.0 (1.0, 3.0)	2.0 (2.0, 3.0)
No AB treatment during baseline, n (%)	265 (68.7)	178 (68.7)	77 (68.8)	10 (66.7)
No prior history of AB intolerance, n(%)†,¶	340 (88.1)	229 (88.4)	87 (77.7)	14 (93.3)
No prior history of AMR, n (%)†,**	330 (85.5)	232 (89.6)	87 (77.7)	11 (73.3)

Data are shown for evaluable non-pregnant female patients with uUTI and susceptibility test results for ≥3 antimicrobial drug classes. Index date = first uUTI diagnosis occurring between 1 January 2017 and 31 December 2019 based on positive *E. coli* urine culture and baseline period = 12-month period prior to index date.

*Uropathogens from patients were considered resistant to a drug class if they were resistant to ≥1 drug within the class; †Assessed at index date; ‡>1 health insurance type was permitted - statutory data shown only, the remainder were private health insurance; §HbA1c ≥5.7 and HbA1c ≤7; ¶Intolerance to any of the 6 antimicrobial drugs/drug classes tested; **Resistance to agents including fosfomycin-trometamol, nitrofurantoin, quinolones, beta-lactams, penicillins, macrolides, trimethoprim, and others.
AB, antibiotic; IQR, inter-quartile range; SD, standard deviation

- Overall AMR prevalence was highest against FMIs (18.3%) and lowest against FQs (5.2%) (**Figure 1A**)
- Overall susceptibility and resistance varied across regions, with the most notable differences observed for mecillinam (8.4%–28.6%) and FMIs (12.7%–26.1%) (**Figure 1B**)

Results (continued)

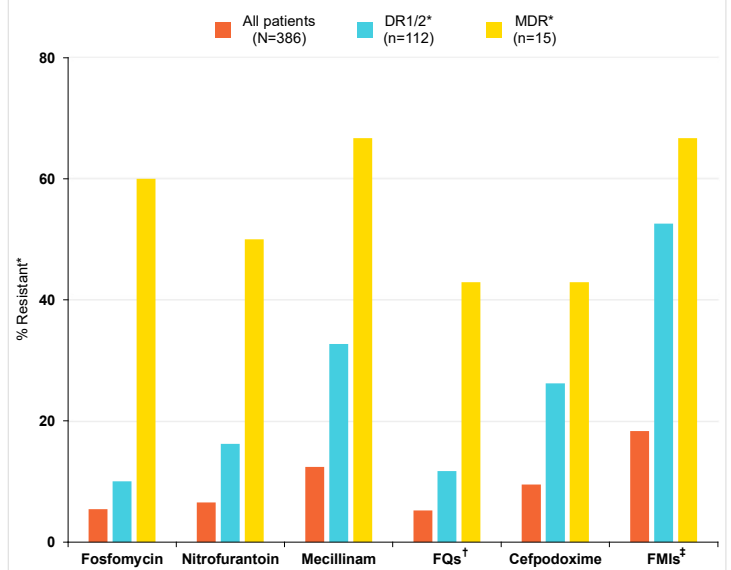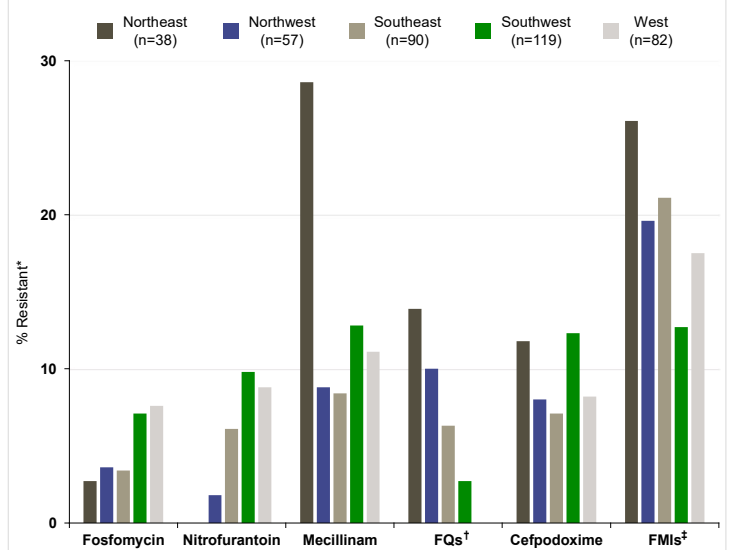### Figure 1A. AMR: Overall and stratified by antibiotic susceptibility cohort

Figure 1B. AMR: Stratified by region

Data are shown for evaluable non-pregnant female patients with uUTI and susceptibility test results for ≥3 antimicrobial drug classes. All values shown are the n (%) of tested patients for whom the uropathogen (*E. coli*) was susceptible or resistant to the indicated drug/class.
*Uropathogens from patients were considered resistant to a drug class if they were resistant to ≥1 drug within the class; †Included ciprofloxacin, levofloxacin, and ofloxacin; ‡Included trimethoprim and trimethoprim-sulfamethoxazole

Conclusions

- Among female German patients with uUTIs, the AMR patterns observed in our study suggest an unmet need for optimized urine culture testing practices, new oral treatment options, and increased community surveillance to inform empiric prescribing

References

1. Prestinaci F, et al. *Pathog Glob Health* 2015;109(7):309–18.
2. Wagenlehner F, et al. *J Glob Antimicrob Resist* 2022;28:18–29.

Disclosures

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