- **Resistances to oral antibiotics used to treat infections with uropathogenic *E. coli* from German outpatients in 2022/2023 followed the trends of the years 2010 to 2020.**
- **Lowest resistance rates were observed for fosfomycin, nitrofurantoin and nitroxoline, with no nitroxoline-resistant isolates detected over the entire period 2010 to 2023.**

Multidrug resistance to oral antibiotics among *Escherichia coli* urine isolates from patients at outpatient departments in Germany and in vitro activity of nitroxoline, Germany, 2010-2023

Background

Treatment of urinary tract infections (UTI) can be difficult due to the spread of multidrug-resistant bacteria (mainly *Escherichia coli*) conferring resistance to standard oral antibiotics.[1,2] Nitroxoline is an antimicrobial agent recommended in the treatment of acute or recurrent UTI.

Results

- In total, 1.984 isolates were collected between 2010 and 2023. About 50% of isolates were resistant to at least one drug tested (Table).
- Combined resistance to amoxicillin, cefuroxime, ciprofloxacin and trimethoprim was detected in 5.4%, 2.0%, 2.8%, 3.3% and 4.1% of isolates collected in 2010/11, 2013/14, 2016/17, 2019/20, and 2022/23, respectively. Rates of ESBL-producing isolates were 8.3%, 3.3%, 7.3%, 10.8% and 6.6%, respectively.
- Nitroxoline was tested against 1.073 isolates (see Table footnote 4). **Resistance to nitroxoline was not observed.**

Table: Resistance rates (%) of *Escherichia coli* isolates from 2010 to 2023

Antibacterial agent	Breakpoint (mg/L) [1]	Study interval					Trend [2]
		2010/11 (n=399)	2013/14 (n=395)	2016/17 (n=400)	2019/20 (n=400)	2022/23 (n=390)	
Resistance to at least one drug	Not applicable	58.9	46.1	49.5	50.0	52.8	0.0122
Amoxicillin	> 8	43.5	41.5	41.5	45.5	40.5	0.6247
Amoxicillin-clavulanic acid	> 8	32.5	34.7	14.8	19.0	16.7	< 0.0001
Cefuroxime	> 8	10.0	5.1	12.4	12.3	10.8	0.0034
Cefpodoxime	> 1	8.5	4.3	9.0	12.0	9.0	0.0039
Ciprofloxacin	> 0,5	20.1	14.2	16.8	10.8	13.1	0.0030
Trimethoprim	> 4	34.1	26.1	28.0	28.0	29.5	0.1337
Fosfomycin	8	5.0	3.0	6.3	7.8 [3]	7.2 [3]	0.0320
Nitrofurantoin	> 64	0.8	1.0	1.0	1.5	0.3	0.4621
Nitroxoline [4]	> 16	0	0	Not tested	0	0	Not calculated

[1] EUCAST breakpoints for all orally administered antibiotics. [2] Chi-squared-test for linear trend. [3] Resistance was confirmed by agar dilution. [4] Isolates tested: 2010/11, n=399; 2013/14, n=212; 2019/20, n=240; 2022/23, n=222

Methods

E. coli isolates were collected prospectively at 20 laboratories during five surveillance studies (period 2010 – 2023) conducted by the Paul-Ehrlich-Society for Infection Therapy. Species identification and antimicrobial susceptibility testing using broth microdilution (in-house plates and industrially manufactured plates) were performed at a reference laboratory. Presence of ESBL genes was confirmed in isolates with ceftazidime and/or cefotaxime resistance by PCR and sequencing.[3]

Wohlfarth E.*[1], Deuchert F.[1], Pfeifer Y.[2], Werner G.[2], Kresken M.[3],
Study Group `Antimicrobial Resistance´ of the Paul-Ehrlich-Society for Infection Therapy

[1]Antiinfectives Intelligence GmbH, Cologne (Germany); [2]Robert Koch Institute, Wernigerode (Germany); [3]Paul-Ehrlich-Society for Infection Therapy, Cologne (Germany)

*corresponding author: esther.wohlfarth@antiinfectives-intelligence.de

SCAN ME

References

1. Naber KG et al., Eur Urol 2008; 54:1164-75
2. Lindblom et al., Sci Rep 2022; 12: 10048
3. Schuster CF et al., J Antimicrob Chemother 2021; https://doi.org/10.1093/jac/dkab407

Funding & Disclosures

This project was sponsored by MIP Pharma GmbH. EW is a general partner and CEO of Antiinfcetives Intelligence GmbH, which provides research services for pharmaceutical companies.

Paul-Ehrlich-Gesellschaft für Infektionstherapie e.V.