

Increasing Odds of Resistance for Subsequent Urinary *E coli* Isolates

Background

- Resistance of *Escherichia coli* urinary isolates to antibiotics has increased in the United States, compromising treatment effectiveness and antibiotic stewardship and contributing to excess morbidity.^{1,2}
- Clinicians routinely make empiric antibiotic treatment decisions for urinary tract infections (UTIs) based on annual cumulative antibiograms.
- Under current practices, antibiograms only include the first occurrence of an *E coli* isolate per period. This approach may miss important data about the selective antibiotic pressure on resistance patterns among patients with recurrent UTIs.³
- Objective:** The investigators of this study examined results from antibiotic susceptibility tests to determine whether resistance patterns of urinary *E coli* isolates differ based on how often UTIs occur in a patient.

Methods

- Investigators analyzed results of antibiotic susceptibility tests for urinary *E coli* isolates collected for testing at Quest Diagnostics during a 5-year period.
 - Results were categorized by occurrence number for an individual: 1st, 2nd, 3rd, or ≥4th.
- The analysis included antimicrobial resistance results for a group of routinely tested for in urinary *E coli* isolates, in accordance with CLSI guidelines: amoxicillin-clavulanate, ampicillin, ceftriaxone, ciprofloxacin, ertapenem, gentamicin, imipenem, levofloxacin, nitrofurantoin, and trimethoprim-sulfa.
- The association of occurrence number with resistance to an antibiotic was evaluated with logistic regression analysis.

Results

- For all antibiotics except ertapenem and imipenem, the odds of resistance increased significantly ($P < 0.001$) with increasing occurrence number.

Antibiotic	Odds ratio (95% CI)	P value
Amoxicillin-clavulanate	1.09 (1.06-1.12)	<0.001
Ampicillin	1.13 (1.10-1.15)	<0.001
Ceftriaxone	1.23 (1.19-1.28)	<0.001
Ciprofloxacin	1.32 (1.28-1.35)	<0.001
Ertapenem	1.19 (0.95-1.49)	
Gentamicin	1.09 (1.06-1.13)	<0.001
Imipenem	0.97 (0.72-1.30)	
Levofloxacin	1.32 (1.28-1.35)	<0.001
Nitrofurantoin	1.16 (1.12-1.20)	<0.001
Trimethoprim-sulfa	1.15 (1.12-1.18)	<0.001

Conclusions

- For most analyzed antibiotics, the odds of *E coli* antibiotic resistance were higher when the number of occurrences in an individual was higher. However, the increase in odds varied by type of antibiotic.
- Based on these findings, current practices for generating antibiograms may underestimate the levels of antibiotic resistance in a community, which could negatively affect treatment choices, patient outcomes, and healthcare costs.

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