

# Antibiotic resistance in gram-negative community-onset urinary tract infections among adults presenting to hospitals, United States, 2012-2020

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## Background

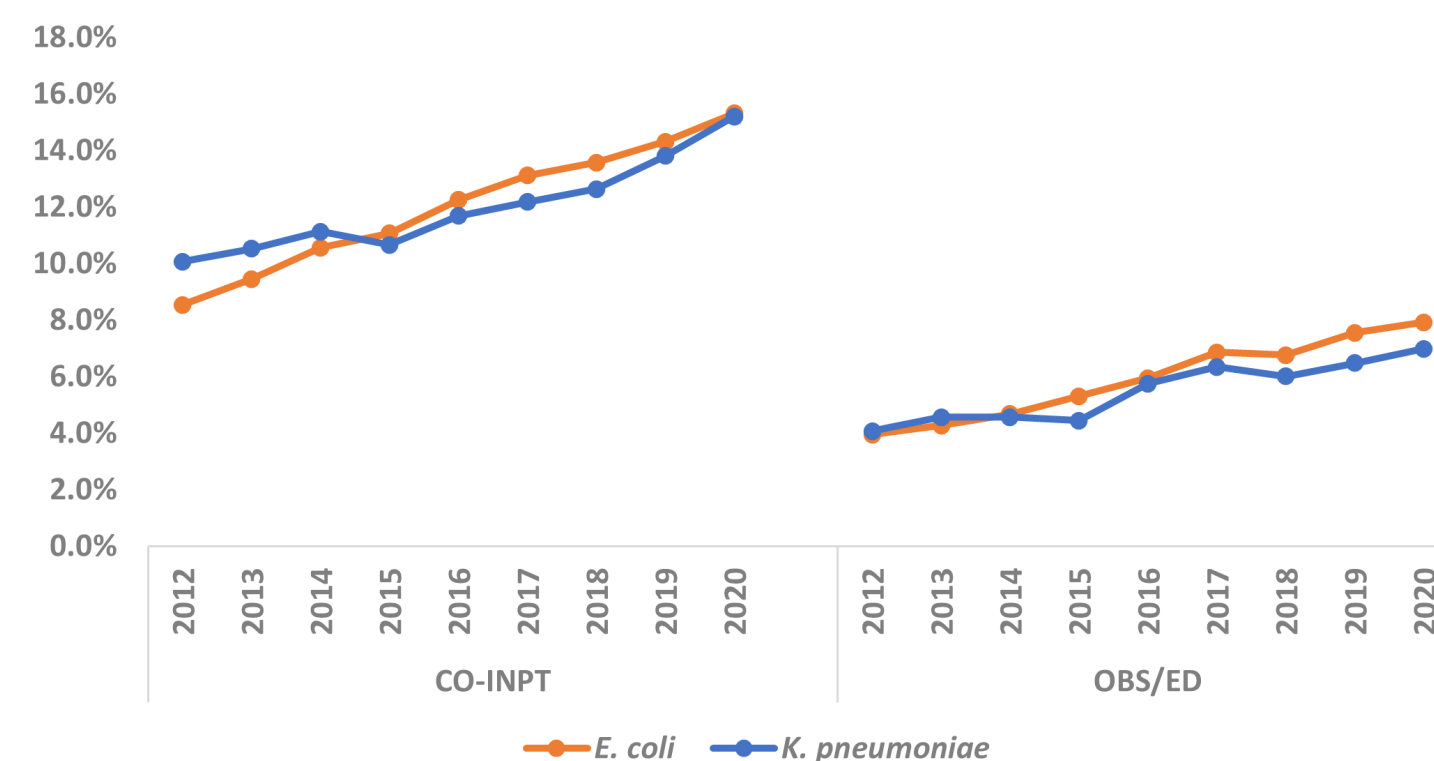
- Choosing empiric therapy for patients with community-onset urinary tract infections (CO-UTI) presenting to hospitals for treatment is challenging without understanding local antimicrobial susceptibility patterns.
- To better understand antimicrobial resistance among adults hospitalized with CO-UTI, the objectives of this analysis were to:
  - Describe changes in gram-negative antimicrobial resistance over time
  - Report patient-level factors associated with higher levels of antimicrobial resistance

## Methods

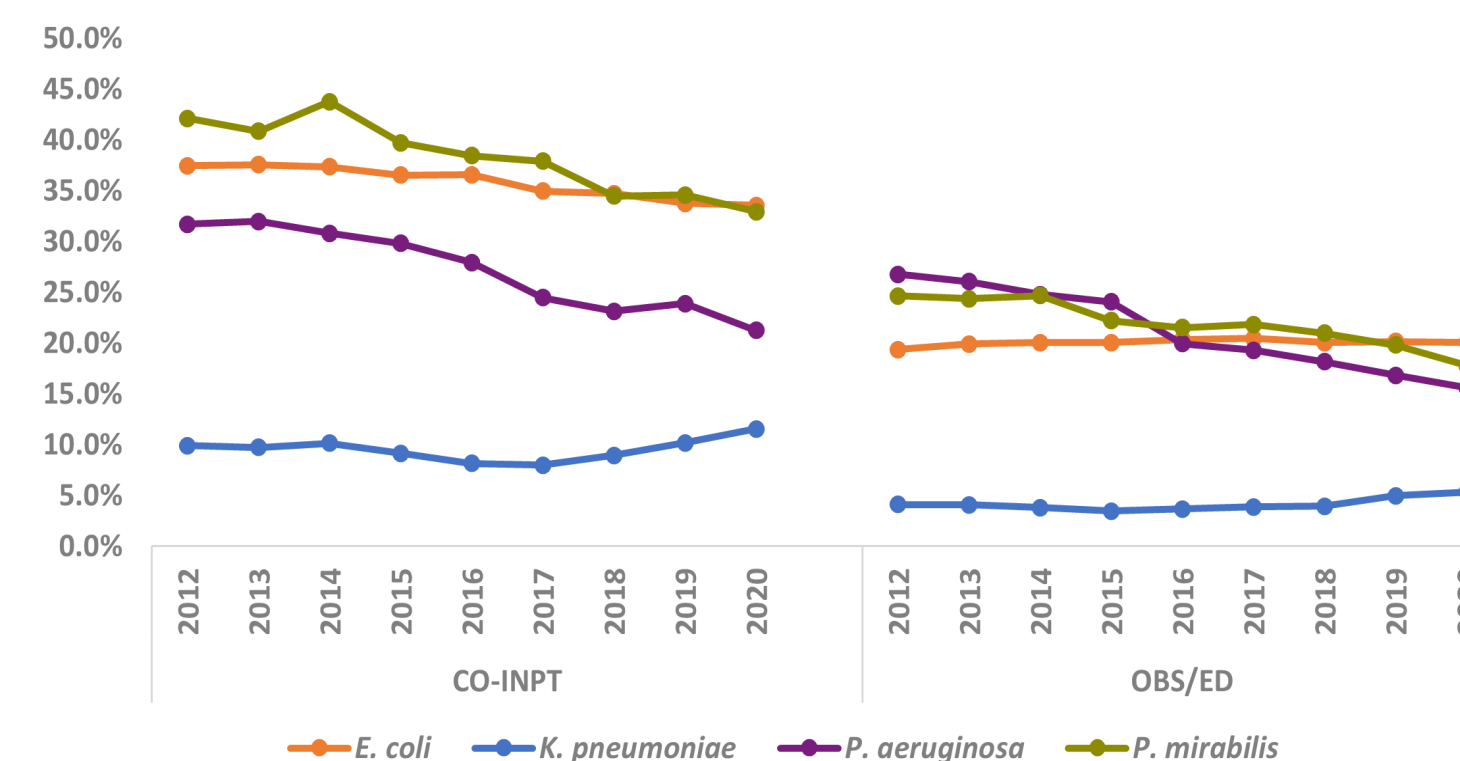
- Data Source:** Microbiology data from PINC AI<sup>TM</sup> Healthcare Database<sup>1</sup> as a proxy for CO-UTI in patients  $\geq 18$  years old presenting to hospitals from 2012-2020
- Care Settings:** Community-onset inpatient (CO-INPT) encounters obtained on/before 3 days of admission or observation/emergency department (OBS/ED) encounters.
- Organisms:** Urine cultures positive for *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis*, and *Pseudomonas aeruginosa*
- Analysis:** Proportion of Antimicrobial Resistance (AR) to extended-spectrum cephalosporins (ESC), fluoroquinolones (FLQ), trimethoprim-sulfamethoxazole (TMP-SX), and nitrofurantoin (NFT) was assessed. Generalized estimating equation models with a negative binomial distribution were performed to identify patient-level factors associated with levels of resistance.

## Elevated antibiotic resistance among adults presenting to hospitals with CO-UTI emphasize the importance of local resistance data to guide therapy.

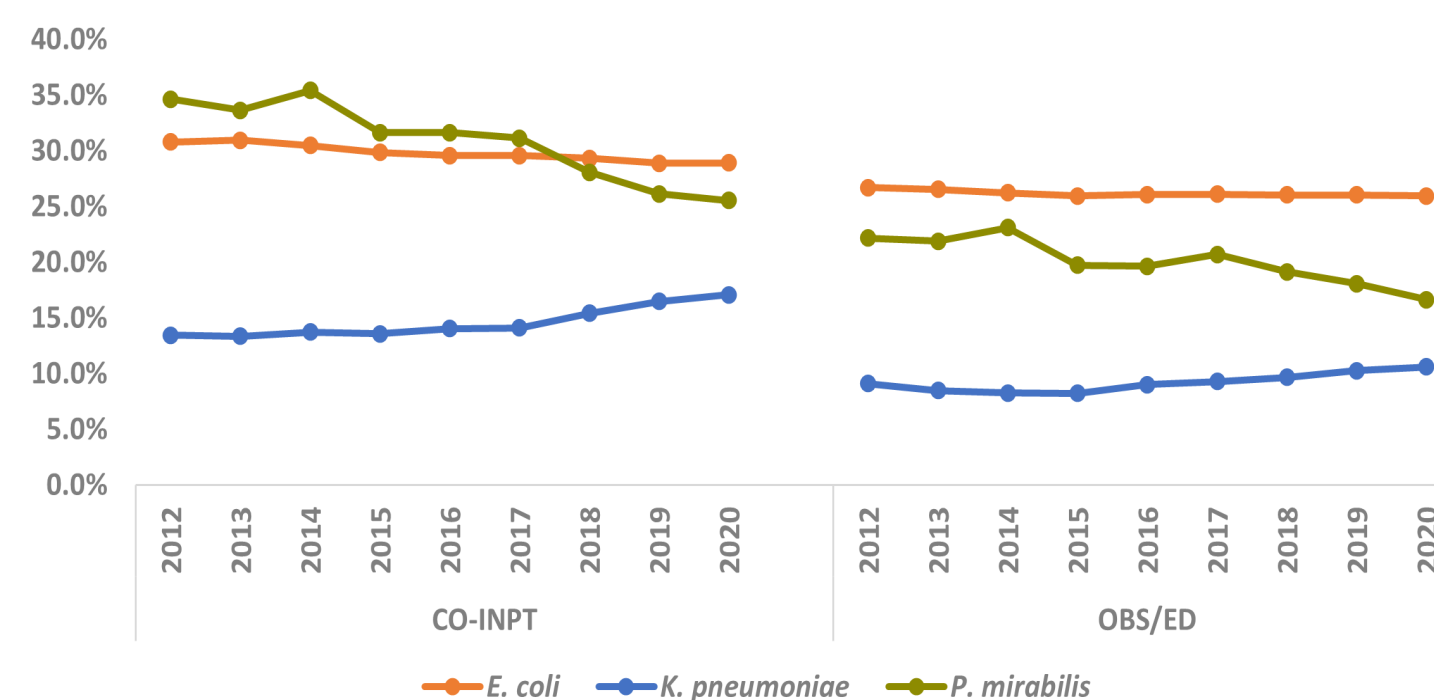
**Figure 1.** ESC resistance increased among *E. coli* from 2012-2020 and among *K. pneumoniae* from 2015-2020 in both CO-INPT and OBS/ED



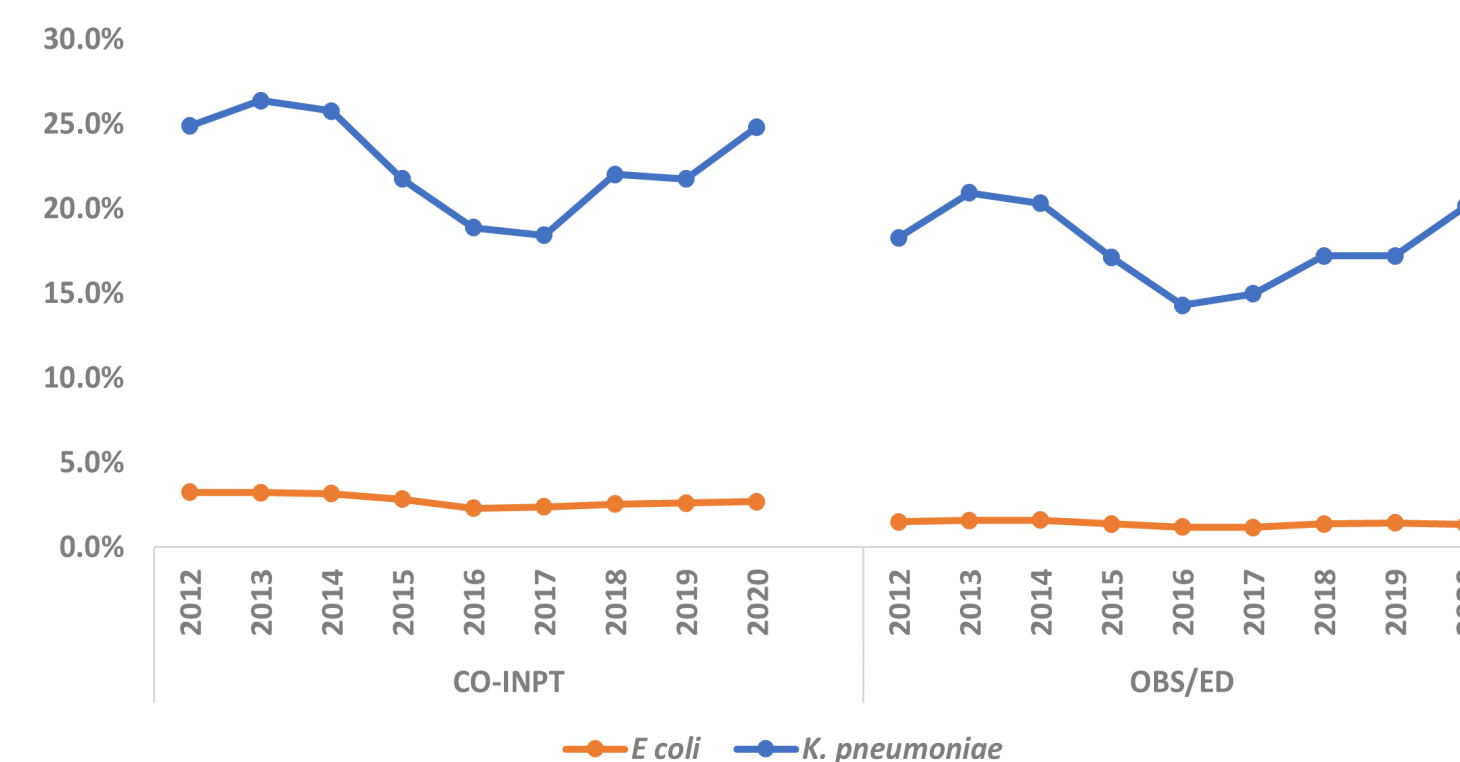
**Figure 2.** FLQ resistance was highest among *E. coli* and *P. mirabilis* in CO-INPT from 2012-2020, and increasing among *K. pneumoniae* in CO-INPT from 2017-2020



**Figure 3.** TMP-SX resistance remained  $>20\%$  among *E. coli* in CO-INPT and OBS/ED and *P. mirabilis* in CO-INPT from 2012-2020, while increasing among *K. pneumoniae* in both CO-INPT and OBS/ED from 2015-2020



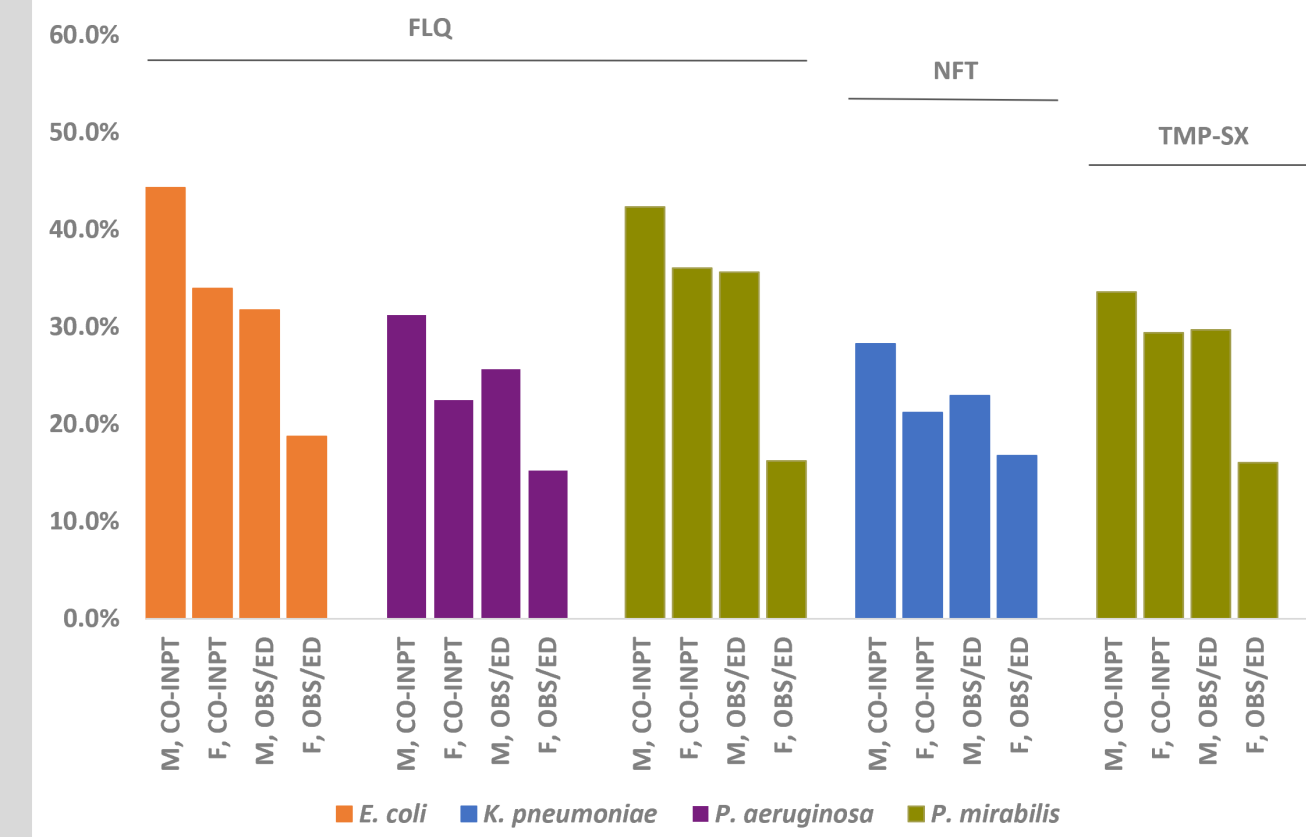
**Figure 4.** NFT resistance decreased among *K. pneumoniae* from 2013-2016 and increased from 2017-2020 in both CO-INPT and OBS/ED



## Results

- Among 1,337,343 urine cultures meeting study criteria from 369 hospitals, 75% were *E. coli*.
- All AR phenotypes were significantly higher among CO-INPT than OBS/ED ( $p < 0.001$ ), and higher among males than females ( $p < 0.001$ ).

**Figure 5.** FLQ resistance among *E. coli*, *P. aeruginosa*, and *P. mirabilis*, NFT resistance among *K. pneumoniae*, and TMP-SX among *P. mirabilis* was  $>20\%$  among both males and females in CO-INPT but not in OBS/ED



## Conclusions

Elevated resistance above 20% to TMP-SX in both CO-INPT and OBS/ED, FLQ in CO-INPT, and NFT in CO-INPT, and increasing resistance to ESC among pathogens in CO-INPT cultures warrants further evaluation of local resistance levels. Gender and need for inpatient therapy are factors to consider in developing local treatment recommendations.

### CONTACT INFO

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<sup>1</sup>PINC AI<sup>TM</sup> Healthcare Data White Paper: Data that informs and performs, September 14, 2021. PINC AI<sup>TM</sup> Applied Sciences, Premier Inc. <https://offers.premierinc.com/rs/381-NBB-525/images/Premier-HealthcareDatabase-Whitepaper-Final.pdf>