



Inappropriate Urine Culture Orders and Effects on Antibiotic Use



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Background

- Guidelines recommend against urine culture (UCx) screening and treatment of bacteriuria in most asymptomatic patients.¹
- Evidence suggests up to 68% of inpatient UCx are ordered without guideline-concordant indications.²
- Inappropriate UCx orders can lead to antibiotic overuse and associated risks, and increased healthcare costs.²
- Characterizing local UCx ordering practices and downstream effects will help to identify opportunities for antimicrobial stewardship intervention.

Definitions

- Guideline-concordant indications:** ≥1 of the following: fever >38°C, dysuria, frequency, urgency, suprapubic pain, costovertebral angle (CVA) tenderness^{1,3}
- Additional clinical indications:** ≥1 of the following: sepsis, new onset hematuria, changes in mental status^{4,5}
- Asymptomatic bacteriuria (ASB):** UCx with 1 bacterial species ≥ 10⁵ cfu/mL in a patient without UTI symptoms¹

Objectives

Primary:

- To quantify proportion of UCx that were ordered inappropriately:
 - Based on guideline-concordant indications
 - Based on additional clinical indications

Secondary:

- To quantify:
 - Proportion of ASB cases that were treated with antibiotics
 - Laboratory costs associated with inappropriate UCx orders

Methods

- Design:** retrospective chart review with 5% of charts reviewed by 3 independent reviewers to determine inter-rater agreement
- Setting:** St. Paul's Hospital (SPH) general surgery or medicine wards (July 1 to October 1, 2016)
- Inclusion:** >18yo with a UCx order and result reported from SPH microbiology laboratory
- Exclusion:** none
- Analysis:** descriptive statistics

Results

- 690 urine cultures were ordered for 476 patients over 3 months from SPH surgical and medical wards

Primary Objectives (Fig. 1)

- 68.6% of urine cultures were ordered inappropriately based on guideline-concordant indications vs. 47.4% based on inclusion of additional clinical indications

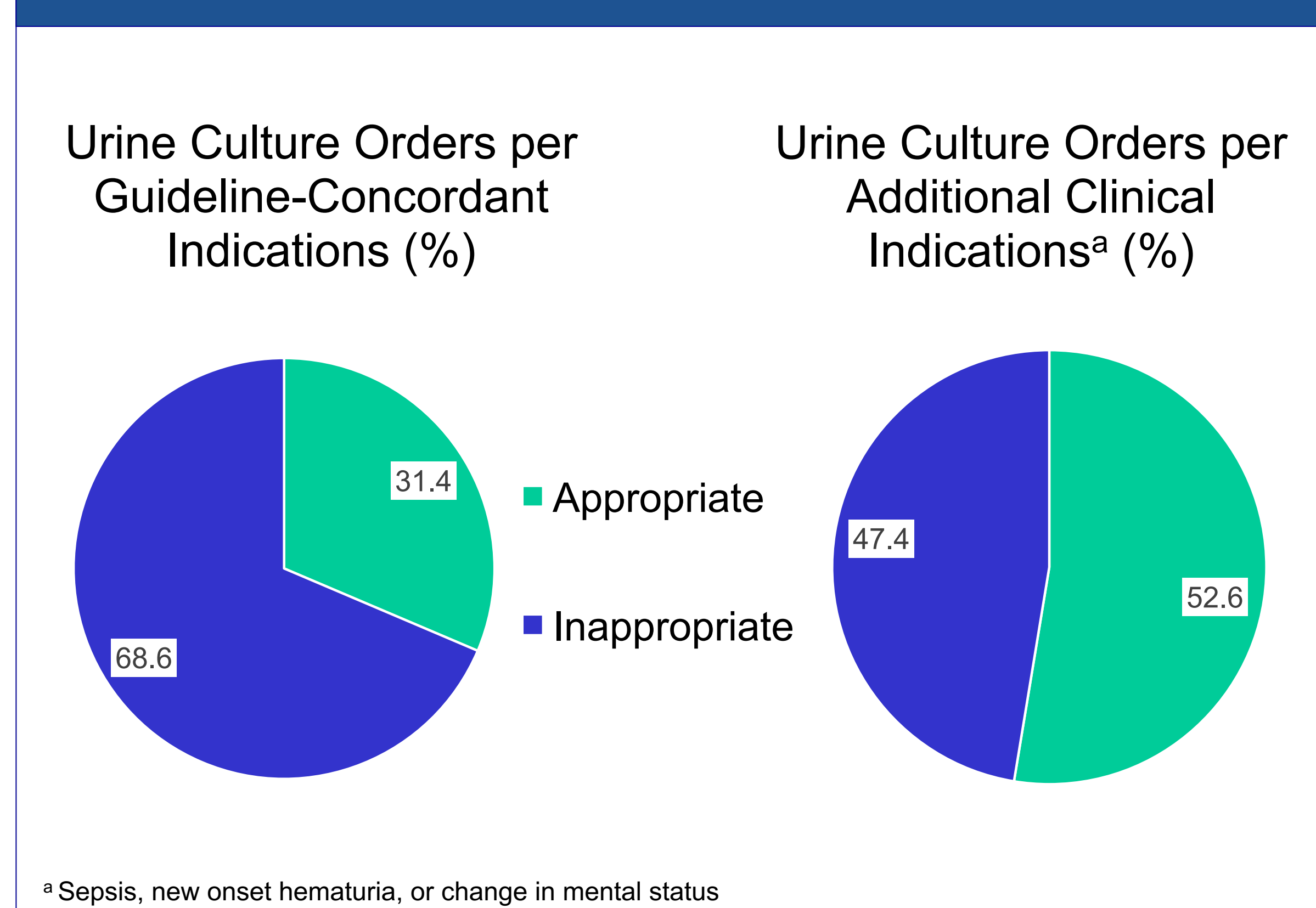
Secondary Objectives (Table. 2)

- 25/68 (36.8%) ASB cases were treated with antibiotics
- Laboratory cost associated with inappropriate urine culture orders = \$9, 257 over 3 months

Table 1: Demographics

Variable	n=476 patients
Age, mean (SD)	64.0 (18.9)
Female, n (%)	193 (40.5)
Patients with repeat cultures, n (%)	129 (27.1)
n=690 UCx orders	
Pregnant, n (%)	0 (0)
Undergoing urological procedure, n (%)	9 (1.3)
Ordering location, n (%)	
Medical ward	578 (83.8)
Surgical ward	112 (16.2)
Positive urine culture result, n (%)	99 (14.3)

Figure 1: Proportion of Inappropriate Urine Culture Orders



^a Sepsis, new onset hematuria, or change in mental status

References:
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 2. Leis JA, Gold WL, Dautman N, Shojania K, McGeer A. Downstream impact of urine cultures ordered without indication at two acute care teaching hospitals. Infect Control Hosp Epidemiol. 2013;34(10):1113-4.
 3. Centers for Disease Control and Prevention. Urinary Tract Infection (Catheter-Associated Urinary Tract Infection [CAUTI] and Non-Catheter-Associated Urinary Tract Infection [UTI]) and Other Urinary System Infection [USI] Events. In: 2016 NISHS Patient Safety Component Manual [Internet]. 2016 [cited 2016 Jul 2]; p. 1-16. Available from: <http://www.cdc.gov/nhsip/pdfs/psemanual/psecurrent.pdf>
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 5. Hooton TM, Bradley SF, Cardenas DD, Colgan R, Goings SE, Rice JC, et al. Diagnosis, prevention, and treatment of catheter-associated urinary tract infection in adults: 2009 International Clinical Practice Guidelines from the Infectious Diseases Society of America. Clin Infect Dis [Internet]. 2010;50(5):625-63. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/20175247>

Table 2: Identification and Treatment of Asymptomatic Bacteriuria

Outcome, n (%)	
ASB cases identified	68 (100)
ASB cases where empiric antibiotics for UTI were continued	3 (4.4)
ASB cases where antibiotic therapy was started for no other documented reason within 72hr of culture result reported	22 (32.4)
Total ASB cases treated with antibiotics^b	25 (36.8)

^b None of these were cases of sepsis

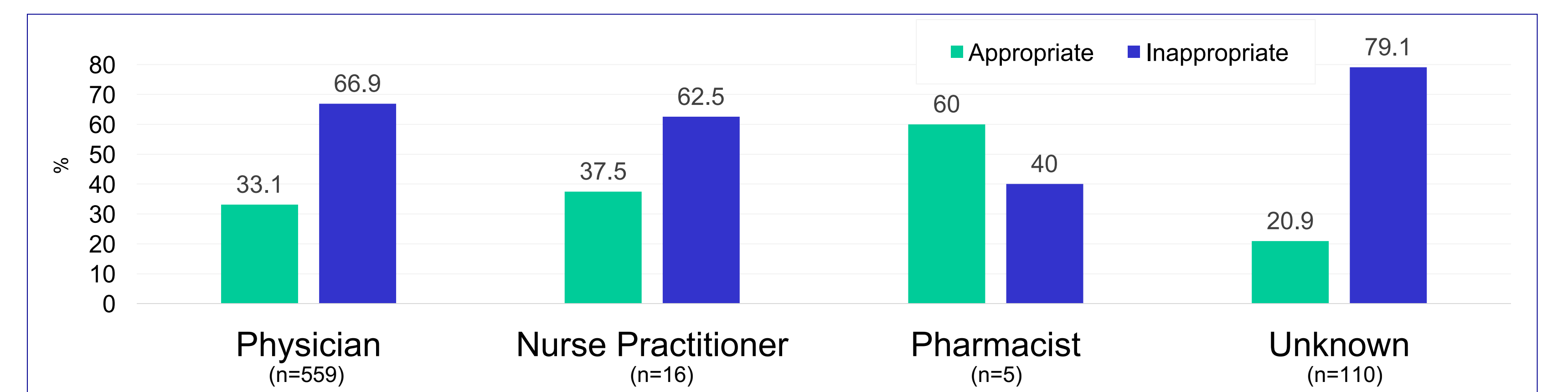


Figure 2: Urine Culture Orders by Provider

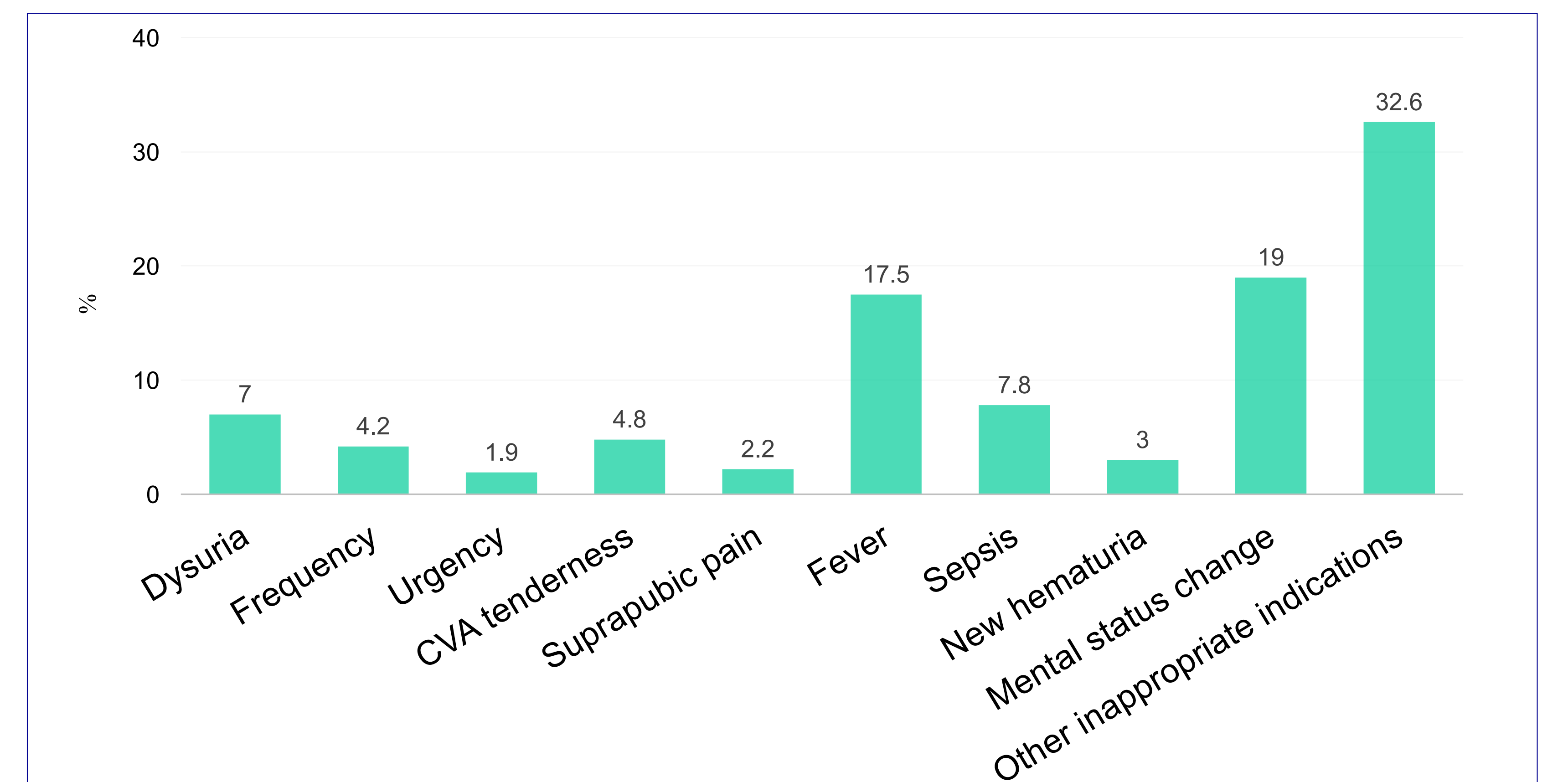


Figure 3: Reasons for Urine Culture Orders

Limitations

- Retrospective study design with convenience sample
- Additional findings are post-hoc analyses

Conclusions

- 68.6% of urine cultures are ordered inappropriately from SPH medical and surgical wards.
- Downstream effects include unnecessary antibiotic use in 36.8% of ASB cases and \$9, 257 over 3 months in laboratory costs.
- Strategies aimed at reducing the number of inappropriate urine culture orders may reduce unnecessary antibiotic use and hospital expenditure.

