

Guideline Compliance of Urine Cultures Collected in an Emergency Department: A Retrospective Chart Review

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Background

- Urine cultures (UC) are frequently obtained and easy to collect¹
- Unnecessary UC may contribute to unwarranted antibiotic use, adverse drug reactions, antibiotic resistance and increased health care costs²
- Infectious Diseases Society of America (IDSA) guidelines are the most comprehensive in North America and echoed by European and Asian guidelines and encompass:^{3, 4, 5, 6}
 - Asymptomatic Bacteriuria in Adults
 - Catheter Associated Urinary Tract Infection in Adults
 - Fever and Infection in Older Adults
 - Acute Uncomplicated Cystitis and Pyelonephritis in Women
- No published studies reviewing UC compliance with guidelines

Definitions

IDSA guidelines recommend a UC in patients with:^{3,4,5,6}

- Urinary symptoms:** dysuria, urgency, frequency, hematuria or pelvic discomfort
- Pyelonephritis:** flank pain, costovertebral pain, fever, rigors, nausea or vomiting
- > 65 yrs:** new or increasing confusion, incontinence, falling, deteriorating mobility, reduced food intake or failure to cooperate with staff
- Spinal cord injury:** increased spasticity, autonomic dysreflexia or sense of unease
- Systemic inflammatory response syndrome (SIRS):** 2 or more of temp <36°C or >38°C, HR > 90, RR >20, WBC <4 or >12 cells/mm³
- Febrile neutropenia:** temp > 38.3 °C, ANC < 0.5 x 10⁹/L and infection suspected from urinary or unknown source
- Pregnancy**
- Transurethral prostatic resection (TUPR) scheduled in 7 days**

Compliant UC defined as a UC in a patient with:

- ≥1 urinary symptom or
- ≥1 symptom in special populations as defined above or
- Pregnancy or
- TUPR scheduled in 7 days

Note: UC not recommended for catheterized patients unless at least one symptom above present

Objectives

Primary

- Identify compliance of UC collection with IDSA guidelines in Kelowna General Hospital (KGH) Emergency Department (ED)

Secondary

- Determine if UC prescriber ordered and impact of non-compliance with IDSA guidelines on laboratory costs, antibiotic costs and length of stay (LOS)

Methods

Design:

- Retrospective chart review
- 214 patients > 18 yrs, who had a UC collected in the KGH ED November 1st to 30th, 2011

Outcomes:

- Percent of UC compliant with IDSA guidelines
- Percent of UC prescribed by a physician or nurse practitioner
- Number of patients on antibiotics resulting from non-compliant UC
- Cost of non-compliant UC
- Cost of antibiotics as a result of non-compliant UC
- LOS (ED, ward & intensive care) comparing patients who had UC collected in compliant vs. non-compliant groups

Statistical Analysis:

- Descriptive statistics, unpaired Student's t-test, chi-squared test

Table 1: Baseline Characteristics

Characteristic	Total (%) (n=214)	Compliant (%) (n=133)	Non-Compliant (%) (n=81)	P-value*
Sex				
Male	63 (29.4)	40 (30.1)	23 (28.4)	0.79
Female	151 (70.6)	93 (69.9)	58 (71.6)	0.79
Age in yrs (±SD)	53.57 (±22)	53.78 (±23)	53.22 (±22)	0.86
Special Populations ^{a,b}				
> 65 yrs	72 (33.6)	46 (34.6)	26 (32.1)	0.71
Pregnancy	2 (0.9)	1 (0.8)	1 (1.2)	0.72
Spinal cord injury	1 (0.5)	1 (0.8)	0 (0)	0.43
Febrile neutropenia	4 (1.9)	4 (3)	0 (0)	0.12
Indwelling catheter	8 (3.7)	7 (5.3)	1 (1.2)	0.13
Suprapubic catheter	1 (0.5)	1 (0.8)	0 (0)	0.43
SIRS	17 (7.9)	14 (10.5)	3 (3.7)	0.07

a = No patients had a TUPR scheduled in 7 days or had an external catheter;

b = In special patient populations, urinary symptoms not required to define compliance with guidelines

* P-value represents the comparison between compliant and non-compliant groups

Table 2: Outcomes

Outcome Measure	Total (%) n = 214	Compliant (%) n = 133	Non-Compliant (%) n = 81	P-value*
Primary				
Compliant UC	133 (62.1)	--	--	
Secondary				
Prescriber ordered UC	133 (62.1)	91 (68.4)	42 (51.9)	0.015
LOS (hrs) (±SD)	5.3 (±10.3)	4.3 (±3.1)	6.3 (±16.3)	0.10
Antibiotic initiated	46 (21.5)	35 (26.3)	11 (13.6)	0.001

* P-value represents the comparison between compliant and non-compliant groups

Results

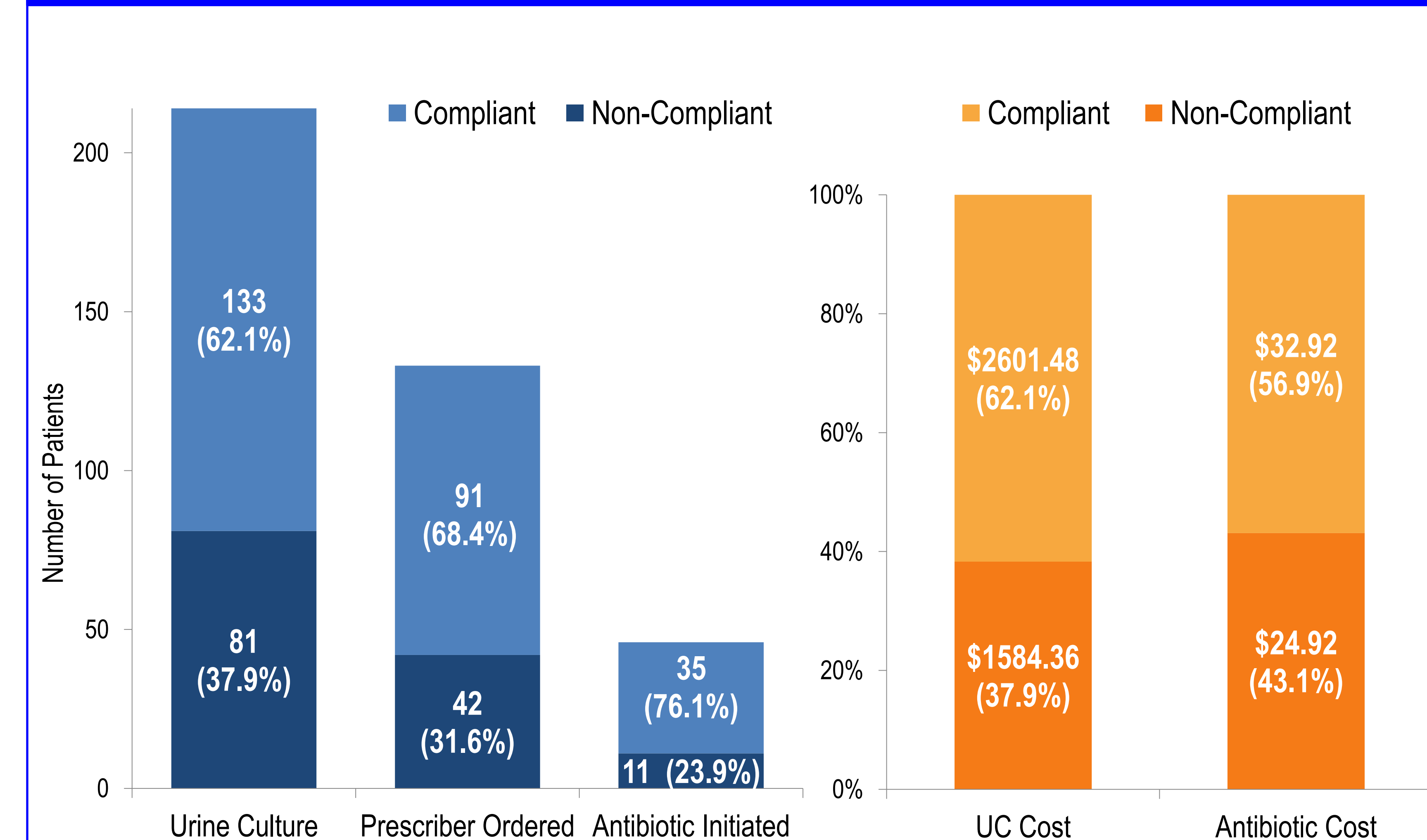
Primary Outcome:

- 62.1% of UC were compliant with guidelines

Secondary Outcomes:

- UC were ordered by prescribers 62.1% of the time
- 68.4% of prescriber ordered UC were compliant with guidelines
- 13.6% of patients with a non-compliant UC were initiated on antibiotics
- Cost associated with a non-compliant UC was \$1584.36 (projected annual cost of \$20,000)
- Cost associated with antibiotics in the non-compliant UC group was \$24.92
 - Does not include costs associated with adverse reactions and increased antibiotic resistance
- No difference in LOS between compliant and non-compliant UC groups
- No intensive care admissions and only one ward admission

Figure 1: Outcome Measures



Limitations

- Retrospective chart review
- Charting incomplete in some ED records
- Potential differences in prescriber/nurse practice may not be accounted for due to short study period
- Included patients' first UC only, which may have underestimated the primary outcome

Conclusions

- Given only 62.1% of UC were compliant with guidelines and half of the non-compliant UC were initiated by non-prescribers, ED staff may benefit from education of IDSA guidelines
- Increased compliance with guidelines may decrease initiation of unnecessary antibiotics
- Increased awareness and guideline compliance may result in significant savings to our healthcare system



1. Silver SA, Balliu L, Sirov AE. Positive urine cultures: A major cause of inappropriate antimicrobial use in hospitals. *Can J Infect Dis Med Microbiol* 2009;20(4): 107-111.
 2. Grover ML, Bracamonte JD, Kanodia AK, et al. Assessing adherence to evidence-based guidelines for the diagnosis and management of uncomplicated urinary tract infection. *Mayo Clin Proc*. 2007;82:181-185
 3. Nicolle LE, Bradley S, Cogan R, Rice JC, Schaeffer A, Hooton TM. Infectious Diseases Society of America Guidelines for diagnosis and treatment of asymptomatic bacteriuria in adults. *Clin Infect Dis* 2005;40:643-654

4. Hooton TM, Bradley SF, Cardenas DD, 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* 2010;50:625-633
 5. High KP, Bradley SF, Gravenstein S, et al. Clinical Practice Guideline for the Evaluation of Fever and Infection in Older Adult Residents of Long-Term Care Facilities: 2008 Update by the Infectious Diseases Society of America. *Clin Infect Dis* 2009;48:149-171
 6. Gupta K, Hooton TM, Naber KG, et al. International Clinical Practice Guidelines for the Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women: A 2010 Update by the Infectious Diseases Society of America and the European Society for Microbiology and Infectious Diseases. *Clin Infect Dis* 2011;52(5):e103-120