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## Major article

## Low correlation between self-report and medical record documentation of urinary tract infection symptoms



Jose F. Echaiz MD<sup>a</sup>, Candice Cass CNA<sup>a</sup>, Jeffrey P. Henderson MD, PhD<sup>a</sup>,  
Hilary M. Babcock MD, MPH<sup>a</sup>, Jonas Marschall MD<sup>a,b,\*</sup>

<sup>a</sup> Division of Infectious Diseases, Washington University School of Medicine, St Louis, MO

<sup>b</sup> Department of Infectious Diseases, Bern University Hospital and University of Bern, Bern, Switzerland

## Key Words:

Urinary tract infection  
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**Background:** Correlations between symptom documentation in medical records and patient self-report (SR) vary depending on the condition studied. Patient symptoms are particularly important in urinary tract infection (UTI) diagnosis, and this correlation for UTI symptoms is currently unknown.

**Methods:** This is a cross-sectional survey study in hospitalized patients with *Escherichia coli* bacteriuria. Patients were interviewed within 24 hours of diagnosis for the SR of UTI symptoms. We reviewed medical records for UTI symptoms documented by admitting or treating inpatient physicians (IPs), nurses (RNs), and emergency physicians (EPs). The level of agreement between groups was assessed using Cohen  $\kappa$  coefficient.

**Results:** Out of 43 patients, 34 (79%) self-reported at least 1 of 6 primary symptoms. The most common self-reported symptoms were urinary frequency (53.5%); retention (41.9%); flank pain, suprapubic pain, and fatigue (37.2% each); and dysuria (30.2%). Correlation between SR and medical record documentation was slight to fair ( $\kappa$ , 0.06-0.4 between SR and IPs and 0.09-0.5 between SR and EDs). Positive agreement was highest for dysuria and frequency.

**Conclusion:** Correlation between self-reported UTI symptoms and health care providers' documentation was low to fair. Because medical records are a vital source of information for clinicians and researchers and symptom assessment and documentation are vital in distinguishing UTI from asymptomatic bacteriuria, efforts must be made to improve documentation.

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Medical record documentation is increasingly used to meet complex and prescriptive medicolegal, regulatory, and reimbursement requirements. Although much attention has been given to problem-oriented documentation since Weed first described it in 1968,<sup>1</sup> appropriate documentation at all levels of the physician-

patient encounter is essential and, at the same time, challenging for the busy health care provider. Electronic medical records (EMRs) have been found to improve quality and efficiency in health care, enhancing monitoring of medication errors and adverse drug events.<sup>2</sup> Medical research involving retrospective data review frequently uses EMRs as a primary source. Also, hospital infection surveillance based on variables extracted from EMRs has demonstrated excellent utility.<sup>3</sup> In this regard, identifying cases of urinary tract infection (UTI) using EMR data requires not only objective but also subjective clinical data (ie, signs, symptoms).<sup>4,5</sup> The diagnostic criteria for UTI, one of the most common bacterial infections, require a positive urine culture and a compatible clinical picture. In this way, the probability of bladder infection is >90% in women who experience dysuria and frequency without concurrent vaginal discharge or irritation.<sup>6</sup> For these reasons, the evaluation of urinary tract symptoms and their proper documentation is crucial.

However, research in other diseases has found varying levels of agreement between symptom documentation in medical records

\* Address correspondence to Jonas Marschall, MD, Division of Infectious Diseases, Washington University School of Medicine, 660 S Euclid, St Louis 63110, MO.

E-mail address: [jmarscha@dom.wustl.edu](mailto:jmarscha@dom.wustl.edu) (J. Marschall).

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Conflicts of interest: None to report.

**Table 1**  
Correlation and agreement between SR and medical record-abstracted symptoms from 3 sources

Symptom	SR (n = 43)	Medical record documentation by health care providers											
		IPs (n = 43)	Positive agreement	Negative agreement	$\kappa$	EDs (n = 27)	Positive agreement	Negative agreement	$\kappa$	RNs (n = 43)	Positive agreement	Negative agreement	$\kappa$
Fever	8 (18.6)	4 (7)	0.07	0.79	0.4*	3 (11.1)	0.03	0.81	0.5*	2 (4.7)	0.04	0.81	0.3*
Dysuria	13 (30.2)	6 (10.5)	0.11	0.67	0.4*	8 (29.6)	0.18	0.55	0.4*	1 (2.3)	0.02	0.69	0.1
Frequency	23 (53.5)	5 (8.8)	0.11	0.45	0.2*	5 (18.5)	0.18	0.37	0.2*	4 (9.3)	0.02	0.39	-0.1
Retention <sup>†</sup>	18 (48.9)	1 (1.8)	0.02	0.58	0.06	1 (3.7)	0.03	0.59	0.1	0	0	0.58	-
Suprapubic pain <sup>†</sup>	16 (37.2)	3 (5.3)	0.09	0.6	0.2*	1 (3.7)	0.03	0.63	0.1	0	0	0.62	-
Flank pain	16 (37.2)	5 (8.8)	0.09	0.6	0.2*	7 (25.9)	0.14	0.48	0.2	1 (2.3)	0.02	0.62	0.07
Chills <sup>†</sup>	12 (27.9)	4 (7)	0.07	0.69	0.2*	2 (7.4)	0.07	0.77	0.4*	0	0	0.72	-
Weakness	12 (27.9)	2 (3.5)	0.02	0.69	0.07	6 (22.2)	0.07	0.59	0.09	2 (4.7)	0.02	0.69	0.07
Fatigue <sup>†</sup>	16 (37.2)	3 (5.3)	0.04	0.6	0.1	2 (7.4)	0.07	0.63	0.2*	0	0	0.62	-
Dizziness <sup>†</sup>	9 (20.9)	3 (5.3)	0.04	0.76	0.2*	5 (18.5)	0.11	0.7	0.4*	0	0	0.79	-
Malodorous urine <sup>†</sup>	9 (20.9)	1 (1.8)	0.02	0.34	0.1*	1 (3.7)	0.03	0.77	0.2*	0	0	0.79	-
Confusion <sup>†</sup>	4 (9.3)	2 (3.5)	0.02	0.88	0.2*	3 (11.1)	0.03	0.88	0.4*	0	0	0.9	-

NOTE. Values are n (%) or as otherwise indicated.

ED, emergency department physician; IP, inpatient physician, RN, nursing staff; SR, self-report.

\* $P < .05$ .

<sup>†</sup>No measures of correlation were possible between SR and RNs.

and patient self-report (SR).<sup>7-14</sup> Usually, the health care provider will document fewer symptoms than the patient reports. To our knowledge, the correlation between medical record documentation and patient self-reporting of UTI symptoms is currently unknown. This study's objective was to assess the level of agreement between patients' self-reported UTI symptoms and those documented in their medical records by 3 distinct groups of health care providers.

## METHODS

We prospectively enrolled adult, hospitalized patients with *Escherichia coli* bacteriuria of >50,000 colony forming units/mL of urine diagnosed during routine medical care (either present on or after hospital admission) between April 1, 2012, and February 28, 2013, at Barnes-Jewish Hospital, a 1,250-bed tertiary care teaching hospital in St Louis, Missouri. At the time of study, admitting and treating physicians entered information on paper charts, while only the history and physical and the discharge summary were subsequently dictated and transcribed to be part of the EMR; in contrast, emergency department personnel and nursing staff entered information directly into the EMR. During the study period, daily information on positive urine cultures for *E coli* and corresponding patient lists were obtained via automated query of microbiology laboratory data. Patient charts were reviewed for the following exclusion criteria: age <18 years old, gross hematuria, history of urologic malignancy or prostate cancer, pregnancy, and presence of a urinary catheter. Some of the exclusion criteria were chosen to remove noninfectious etiologies for urinary tract symptoms (gross hematuria may indicate an alternate etiology of symptoms, such as in cancer or nephrolithiasis). Within 24 hours of reported bacteriuria, we consented patients and conducted as SR interview using lay terminology for the following signs and symptoms: fever, dysuria, frequency, retention, suprapubic pain, flank pain, chills, weakness, fatigue, dizziness, malodorous urine, and confusion. Of these, we considered the first 6 to be primary UTI symptoms. We reviewed the EMR for the documentation of UTI symptoms by 3 groups of health care providers: admitting or treating inpatient physicians (IPs), inpatient nursing staff (RNs), and for patients admitted through the emergency room, emergency department physicians (EDs). In addition, we reviewed IP paper documentation, which was not transcribed into the EMR. To test for differences in the mean number of symptoms documented per source we used Wilcoxon matched-pairs test for nonparametric data. Positive and negative agreement were calculated between groups for each

symptom, defined as SR and EMR percentage agreement on the presence (positive agreement) or absence (negative agreement) of symptoms. The level of agreement between groups was assessed using Cohen  $\kappa$ , a coefficient of agreement that corrects for chance. As a general guideline, a  $\kappa$  of <0 indicates poor agreement, 0-0.2 indicates slight agreement, 0.2-0.4 indicates fair agreement, 0.4-0.6 indicates moderate agreement, 0.6-0.8 indicates substantial agreement, and 0.8-1.00 indicates almost perfect agreement.<sup>9,15</sup> Hospital-acquired UTI was defined as a UTI developing  $\geq 48$  hours after hospital admission. Data analysis was performed using SPSS 18 (SPSS Inc, Chicago, IL). The Human Research Protection Office at Washington University approved this study.

## RESULTS

A total of 43 patients were enrolled in the study. The median age at hospital admission was 61 years (range, 22-93 years). Of the patients, 35 (81%) were women, and 27 (63%) were white. Of the patients, 27 (63%) were admitted through the emergency department, and there were 5 hospital-acquired UTIs (11.6%). A diagnostic ICD-9 code for UTI was entered in the medical record of 35 (81.3%) patients, and a diagnostic ICD-9 code was entered for pyelonephritis in 4 (9%). Thirty-four patients (79%) self-reported at least 1 of the 6 primary symptoms. The most common self-reported symptoms were urinary frequency (n = 23; 53.5%); retention (n = 18; 41.9%); flank pain, suprapubic pain, and fatigue (n = 16 for each; 37.2%); and dysuria (n = 13; 30.2%), as seen in Table 1. For 9 patients in whom none of the 6 primary symptoms were self-reported, IP and ED records matched 100%, with no symptoms documented in these patients' charts; and despite the lack of symptoms, an ICD-9 code for UTI was entered for all 9 patients on discharge. Looking at all 12 symptoms we captured, a significantly higher number was reported by patients than was recorded in the medical record by IPs, RNs, or EDs (mean  $\pm$  SD, 2.5  $\pm$  2.0 vs 0.7  $\pm$  1.3 for IPs, 0.2  $\pm$  0.45 for RNs, and 1.0  $\pm$  1.4 for EDs, respectively; Wilcoxon signed-rank test,  $P < .001$ ). Among 5 cases of hospital-acquired UTI (all symptomatic by SR), 4 had no symptoms documented in the medical record by IPs or RNs, but 3 out of these 4 were assigned ICD-9 codes for UTI on discharge from the hospital.

### Symptoms agreement

Agreement between SR and the 3 different groups of health care providers varied. In general, negative agreement was considerably

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