

Original article

# What is evaluation of hematuria by primary care physicians? Use of electronic medical records to assess practice patterns with intermediate follow-up

Anna Buteau, B.S.<sup>a,1</sup>, Casey A. Seideman, M.D.<sup>a,1</sup>, Robert S. Svatek, M.D.<sup>b</sup>,  
Ramy F. Youssef, M.D.<sup>a</sup>, Gaurab Chakrabarti, B.S.<sup>a</sup>, Gary Reed, M.D.<sup>c</sup>, Deepa Bhat, M.D.<sup>c</sup>,  
Yair Lotan, M.D.<sup>a,\*</sup>

<sup>a</sup> Department of Urology, University of Texas Southwestern Medical Center, Dallas, TX

<sup>b</sup> Department of Urology, University of Texas Health Science Center of San Antonio, San Antonio, TX

<sup>c</sup> Department of Internal Medicine, University of Texas Southwestern Medical Center, Dallas, TX

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## Abstract

**Background:** To determine whether patients found to have hematuria by their primary care physicians are evaluated according to best practice policy.

**Materials and methods:** The University of Texas Southwestern Medical Center maintains institutional outpatient electronic medical records (EMR) that are used by all providers in all specialties. We conducted an Institutional Review Board approved observational study of patients found to have more than 5 red blood cells/high power field between March 2009 and February 2010.

**Results:** There were 449 patients of whom the majority were female (82%), Caucasian (39%), with microscopic hematuria (MH) (85%). Almost 58% of patients were initially symptomatic with urinary symptoms or pain. Evaluation for the source of hematuria was limited and included imaging (35.6%), cystoscopy (9%), and cytology (7.3%). Only 36% of men and 8% of women were referred to a urologist. No abnormality was found in 32% and 51% of patients with gross hematuria and MH, respectively ( $P = 0.004$ ). There were 4 bladder tumors and 1 renal mass detected. Male gender, ethnicity and gross (vs. microscopic) hematuria were associated with higher rate of urological referral. Advanced age, smoking, provider practice type, and the presence of urinary symptoms were not associated with an increase rate of urological referral. No additional cancers were diagnosed with 29-month follow-up.

**Conclusions:** While urinalysis remains a common diagnostic tool, most cases of both microscopic and gross hematuria are not fully evaluated according to guidelines. Use of cystoscopy, cytology, and upper tract imaging is limited. Further studies will be needed to determine the extent of the problem and impact on morbidity and survival. © 2014 Elsevier Inc. All rights reserved.

**Keywords:** Primary care physicians; Hematuria; Electronic medical records; Compliance; Referral

## 1. Introduction

Hematuria is a highly prevalent condition affecting up to 16% of the adult population [1,2]. The condition varies by age and gender, depending on the definition of hematuria, and whether the testing utilizes dipstick testing or mi-

croscopy [1,2]. Gross hematuria is defined as blood in the urine visible without microscopy. While the exact definition of microscopic hematuria is debated, most urologists consider 3 or more red blood cells (RBCs) per high power field (HPF) as an abnormal finding [1,2]. The finding of microscopic hematuria is associated with urological malignancy in approximately 2%–5% of patients depending on whether the study was population-based (lower risk) or referral-based (higher risk) [1–4]. The risk of urological malignancy is higher in patients with gross hematuria, ranging from 10% to 20% [5–7]. Furthermore, there are non-life-threatening conditions, such

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\* Corresponding author. Tel.: +1-214-648-0483; fax: +1-214-648-8786.

E-mail address: yair.lotan@utsouthwestern.edu (Y. Lotan).

<sup>1</sup> These authors contributed equally to this work.

as urinary tract infection, medical renal disease, or kidney stones, which can be found in some cases.

The evaluation of patients with hematuria is not standardized among all specialties. The American Urologic Association best practice policy recommends that all patients with nonglomerular hematuria at high-risk for bladder cancer (especially those over age 40 years or with a history of smoking or chemical exposure) should be considered for a full urological evaluation after 1 positive properly performed urinalysis [8]. In patients with suspected benign causes for microscopic hematuria or urinary tract infection (UTI) and low risk for malignancy based on age, smoking, and environmental risk, a repeat urinalysis is recommended before a complete evaluation [8]. A complete urological evaluation of microscopic hematuria includes radiological imaging of the upper urinary tracts followed by cystoscopic examination of the urinary bladder [8]. A clinical practice article by Cohen and Brown recommended complete evaluation for patients with dipstick positive for microscopic blood who have risk factors for bladder cancer [1]. By contrast, they recommend repeating a urinalysis for patients at low risk prior to complete evaluation. For nonglomerular hematuria, they recommended a helical computed tomography (CT) and cytologic evaluation of the urine. Cystoscopy is recommended for patients over the age 50 years or risk factors for bladder cancer.

Most studies of hematuria are based on referred populations, yet urinalyses are frequently utilized in routine evaluations by primary care physicians. The actual practice patterns of primary care physicians are unclear and can impact outcomes of patients with hematuria. Surveys of primary care physicians found that only 36%–48% of patients with microscopic hematuria are referred for urological evaluation [9,10]. A review from a health plan database found that only 27% and 47% of women and men with hematuria were referred to urologists [11]. Another recent study including subjects over the age of 50 years with greater than 10 pack/year of smoking found that only 12.8% of patients with microscopic hematuria were referred to a urologist for cystoscopic evaluation [12].

An important question centers on what evaluation is performed on patients with hematuria. Complete evaluation with cystoscopy is primarily performed by urologists, yet the primary care physician is the gatekeeper who largely determines which patient will receive a referral. The University of Texas Southwestern Medical Center uses computerized electronic medical records (EMR) for all inpatient and outpatient encounters. In this study, all patients with greater than 5 RBC/HPF were identified and charts were reviewed to determine what testing was performed on each individual.

The advantages of this approach is that it allows a comprehensive understanding of practice patterns compared with just evaluating referred patients which are subject to selection bias and survey results from primary care providers, which could vary from actual clinical

practice. We also were able to follow-up on patients regardless of evaluation to determine if cancers were diagnosed after initial evaluation.

## 2. Materials and methods

The EMR at the University of Texas Southwestern Medical School was queried for all patients who underwent a urinalysis with microscopy and had greater than 5 RBCs per HPF between March 2009 and February 2010. The study was approved by the local institutional review board.

Review of records identified 632 patients with urinalysis meeting the above criteria. Patients were excluded if they were already seeing a urologist, undergoing chemotherapy, were recently hospitalized or catheterized, or were followed by providers outside of our institution for part of their care. The study population narrowed to 449 and included patients with both gross and microscopic hematuria. Microscopic hematuria was defined as 5 or more red blood cells per high power field without visible blood per patient or physician report. Gross hematuria was defined as visible blood reported by either the patient or the physician. For each patient, progress notes, medical transcripts, imaging results, laboratory results, and referrals were reviewed. Those patients who had 2 consecutive urinalyses with greater than 5 RBCs/HPF but without signs of infection were determined to need further workup, and of that group, those who underwent upper urinary tract imaging and cystoscopy were considered to have been fully evaluated. The EMR was queried again in 1/2,012 to determine if any malignancy (renal or bladder) was diagnosed.

Statistical analysis was performed using Fisher's exact test as a 1-tailed test, and  $\chi^2$  analysis with significance at 0.05. All analyses were performed with SPSS ver. 19.0 (SPSS Inc, Chicago, IL).

## 3. Results

Patient demographics are highlighted in Tables 1 and 2. In this cohort, most patients were female (82%), Caucasian (38.5%), with microscopic hematuria (85%). Most of the patients were seen by primary care physicians with nearly 50% by internal medicine physicians. Almost 57% of the patients were initially symptomatic with urinary symptoms or pain. There were no statistical differences in gender, ethnicity, and age between patients with gross and microscopic hematuria.

The extent of evaluation that patients underwent is shown in Table 3, and Fig. 1. Of the patients who were not immediately referred to Urology, 42.5% of patients with microscopic hematuria and 43.9% of patients with gross hematuria did not have a repeat urinalysis. In this group, repeat urinalysis was performed on 57.5% of patients with microscopic hematuria, with 21.2% and 36.3% of patients

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