CLINICAL RESEARCH STUDY

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Evaluating Hematuria: Impact of Guideline Adherence on Urologic Cancer Diagnosis

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ABSTRACT

PURPOSE: The purpose of this study was to assess physician adherence to 2001 American Urological Association (AUA) guidelines for evaluating patients with asymptomatic hematuria and its impact on the diagnosis of urologic cancer.

METHODS: In this institutional review board-approved retrospective study of patients with asymptomatic hematuria evaluated in a large academic health center in 2004 (allowing for long-term follow-up), we randomly selected 100 of 1771 patients with asymptomatic hematuria (52 men; mean age 54 years; 58 microscopic, 39 macroscopic, three unknown-type hematuria; median follow-up 89 months, interquartile range 33-97 months). Multivariate logistic regression assessed effects of age, sex, hematuria type, and physician specialty on guideline adherence, the primary outcome. Secondary outcome measures were variability in evaluation among physician specialists, and the proportion of patients developing urologic cancer.

RESULTS: Only 36 of 100 patients had a guideline-adherent evaluation, of which 5 were diagnosed with urologic cancer (median 1 month, range 0-11). No urologic cancers were diagnosed in 64 patients with nonadherent evaluations. Only evaluation by a urologist significantly predicted guideline adherence ($P < .0001$). Patients with gross hematuria more often underwent intravenous or computed tomography urography ($P = .009$); urologist evaluation more often led to intravenous or computed tomography urography ($P < .0001$), cystoscopy ($P < .0001$), cytology ($P = .009$), and guideline-adherent evaluation ($P < .0001$).

CONCLUSIONS: Although most physicians did not adhere to 2001 AUA guidelines when evaluating patients with asymptomatic hematuria, no urologic cancers were diagnosed in patients without guideline-adherent evaluation, barring the possibility of occult cancers. Evaluation by a urologist was the only predictor of a guideline-adherent evaluation. Future studies are needed to determine the optimal evaluation of patients with asymptomatic hematuria.

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KEYWORDS: Adherence to guidelines; Diagnostic evaluation; Hematuria; Variability in practice

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Asymptomatic hematuria is common in clinical practice, with a prevalence ranging from 0.18% to 38.7%.[1-12] Both gross and microscopic forms can arise from any site in or near the urinary tract, and even when intermittent, can be the only sign of a serious disease, including malignancy. However, hematuria is more commonly due to benign diseases such as infection, urolithiasis, benign prostatic hyperplasia, or clinically insignificant causes (eg, menses, exercise). The evaluation of hematuria, particularly when microscopic, fails to reveal a cause in 8%-61% of patients.[7-11] As a result, the cost-effective, medically appropriate diagnostic approach to asymptomatic hematuria is controversial.

Evidence-based data are lacking regarding the optimal choice, timing, and frequency of diagnostic tests for evaluating patients with hematuria. Therefore, variability exists among published professional society guidelines that rely

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mainly on literature review and expert consensus.[1,3,12-17] While rising health care costs[18] and increasing medical radiation exposure[19-22] are driving factors to limit utilization of diagnostic imaging tests, the desire to diagnose all cancers persists. Hence, in general, the most important clinical concern when evaluating patients with hematuria is diagnosing a urologic cancer at an early, treatable stage. Indeed, of 40 lawsuits between 2002 and 2012 related to missed or delayed diagnosis of renal or bladder cancer due to an inadequate hematuria evaluation, 15 (38%) led to substantial payments.[23]

Among the published guidelines,[1,3,12-17] those of the American Urological Association (AUA) provide specific recommendations and are most likely to be followed by urologists, internists, and other physicians who encounter patients with hematuria in the US. In 2012, the 2001 AUA guidelines were revised.[3,14] The time interval between them provided an opportunity to study the impact of the 2001 guidelines on the evaluation of patients with hematuria and allowed a long follow-up interval to identify all patients who developed urologic cancer. Therefore, the purpose of this study was to assess physician adherence to the 2001 AUA guidelines for evaluating patients with asymptomatic hematuria and its impact on the diagnosis of urologic cancer.

CLINICAL SIGNIFICANCE

- Most physicians did not adhere to published guidelines when evaluating asymptomatic hematuria.
- Substantial variability exists in evaluating asymptomatic hematuria by type of hematuria (gross vs microscopic) and physician specialty; only evaluation by a urologist predicted guideline adherence.
- All patients diagnosed with urologic cancer (5% of total cohort) underwent guideline-adherent evaluation, however, an occult cancer may have been present in patients not undergoing guideline-adherent evaluation.

METHODS

Study Setting and Subjects

In this institutional review board-approved, Health Insurance Portability and Accountability Act-compliant, retrospective cohort study, informed consent was waived. The study site was a large academic health center. Electronic medical records were searched for patients presenting with an onset of hematuria in 2004, a period selected to allow for long-term follow-up.

Our institution's Research Patient Data Registry query tool identified 1771 ambulatory and inpatients aged 18 years or older with a principal or secondary International Classification of Diseases, 9th edition, Clinical Modification (ICD9-CM) diagnosis code of hematuria (599.70, 599.71, or 599.72). These ICD9-CM codes excluded patients with insignificant causes of hematuria (eg, menstruation, exercise).

A sample size calculation for 95% confidence level and 10% confidence interval for the primary outcome measure, adherence to AUA guidelines, yielded a sample size of 91 and therefore we aimed for 100 patients. To select the sample, we randomly ordered the 1771 patients identified by the Research Patient Data Registry query tool and from these, selected 100 consecutive patients who met inclusion criteria of initial presentation of asymptomatic hematuria in 2004, electronic medical records available for review, and hematuria not due to causes such as menstruation, exercise, trauma, or infection, as documented in the electronic medical records (**Figure 1**). In addition, 40 patients were selected for a pilot study of the data collection form.

Chart Review

Data were collected in all 100 patients from 2004 through 2012, including: patient age, sex, date of first presentation of hematuria, type (gross or microscopic), specialty of physician initially evaluating hematuria, and risk factors for urologic cancers included in the guidelines.[3,14] Risk factors included age over 40 years, gross hematuria, history of cigarette smoking, occupational exposure to chemicals or dyes, history of urologic disorder, irritative voiding symptoms, urinary tract infection, pelvic irradiation, or analgesic abuse.[3,14] We also studied the number and types of diagnostic tests utilized in the hematuria evaluation, including urinalysis, upper urinary tract imaging, urine cytology, and cystoscopy. The type of imaging (radiography, intravenous urography, computed tomography [CT], ultrasonography, or magnetic resonance imaging) and protocols used (CT urography or magnetic resonance urography) were noted. All urologic malignancies (defined as renal, ureteral, bladder, urethral, and prostate cancers) developing during the follow-up period, as well as survival information, were recorded.

Pilot Study

During the pilot study, we learned that the presence or absence of some risk factors could not be extracted reliably from the electronic medical records; absence of documentation of a risk factor was not considered reliable unless the chart explicitly stated it was absent. The only risk factors reliably documented were age and presence of gross hematuria. Therefore, further data collection was limited to these risk factors. Other risk factors were recorded, when available, for the purpose of risk stratification, but were excluded from other analyses.

Guideline Adherence

The 2001 AUA guidelines divided patients into high- and low-risk categories based on presence or absence of risk factors enumerated above. For high-risk patients, defined as