An Evidence-Based Protocol for Antibiotic Use Prior to Cystoscopy Decreases Antibiotic Use without Impacting Post-Procedural Symptomatic Urinary Tract Infection Rates

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Abbreviations and Acronyms

AUA = American Urological Association

UTI = urinary tract infection

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Purpose: Symptomatic urinary tract infection is a complication of office based cystourethroscopy. Studies are mixed regarding the efficacy of antibiotic prophylaxis to prevent urinary tract infections. Our aim was to develop and evaluate an evidence-based protocol that reduces unnecessary antibiotic use while avoiding an increase in urinary tract infections.

Materials and Methods: We created a clinic antibiogram based on all urology office visits performed during a 2-year period. Bacterial resistance rates, institutional risk related data and clinical guidelines were applied to create a protocol for antibiotic administration before cystourethroscopy. We then analyzed 1,245 consecutive patients without a renal transplant who underwent outpatient cystourethroscopy, including 610 after protocol initiation. Urinary tract infection rates and antibiotic use were analyzed for an association with the protocol change using the Fisher exact test.

Results: Cultures had an overall 20% rate of resistance to fluoroquinolones, representing 40% of the cultures that grew *Escherichia coli*. Before the protocol change 602 of 635 patients (94.8%) received a preprocedural antibiotic compared to 426 of 610 (69.9%) after protocol initiation ($p < 0.01$). A total of 19 patients (3.0%) had a symptomatic urinary tract infection prior to the protocol change while 16 (2.6%) had a urinary tract infection after the change ($p = 0.69$). Regarding resistance, fluoroquinolone resistant organisms grew in the cultures of 12 of 19 patients (63.2%) with a urinary tract infection before the protocol change compared to 5 of 16 (31.3%) with a urinary tract infection after the change. Recent antibiotic administration, hospitalization and chronic catheterization were associated with urinary tract infection in the entire cohort (all $p \leq 0.01$).

Conclusions: A local antibiogram with infection related risk data effectively risk stratifies patients before cystourethroscopy, decreasing the use of antibiotics without increasing the rate of symptomatic urinary tract infection.

Key Words: urinary bladder, urethra, urinary tract infections, cystoscopy, antibiotic prophylaxis

URINARY tract infection is a well-known complication following flexible cystourethroscopy, which is one of the most common outpatient procedures done in urology. Despite its minimally invasive technique and relatively low risks, cystoscopy is associated with infectious complication (UTI) rates

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ranging from less than 1% to 10%.[1,2] The administration of prophylactic antibiotics prior to instrumentation to prevent or reduce the risk of symptomatic UTIs is a controversial and widely debated topic. With increasing concerns for unnecessary antibiotic use, microorganism resistance and rising health care expenditures strict antibiotic stewardship is universally emphasized and the need for antibiotics prior to cystoscopy has come into question.[3–5]

Current AUA practice guidelines recommend a 1-time dose of preprocedural antibiotics only in patients considered at high risk for UTI.[6] However, a significant proportion of urological patients have risk factors such as advanced age, urinary tract anomalies, indwelling catheters and additional medical conditions that predispose them to infection. This contrasts with EAU (European Association of Urology) guidelines, which recommend prophylactic antibiotics only in cases of urinary tract manipulation.[7] At our institution only recent antibiotic use or hospitalization has been shown to be associated with post-procedural symptomatic UTIs.[2] Moreover, the effectiveness of prophylactic antibiotics to prevent post-procedural infections, bacteriuria and adverse events remains uncertain.[1,4,8]

In this context we aimed to develop an evidence-based protocol for antibiotic prophylaxis prior to outpatient cystourethroscopy based on institutional risk related data and an outpatient antibiogram. We then prospectively evaluated the efficacy of the protocol for its effect on the rates of symptomatic UTIs and antibiotic use by analyzing cases before and after protocol initiation. We hypothesized that our newly developed protocol would minimize unnecessary antibiotic administration while avoiding an increase in the infection rate.

METHODS

Clinic Protocol Development

We first aimed to develop an evidence-based protocol for the preprocedural administration of antibiotic prophylaxis in patients undergoing outpatient cystourethroscopy. The protocol was developed in consultation with the chief epidemiologist (TRT) at our hospital and with members of the Division of Infectious Disease and Pharmacology. First an outpatient antibiogram was assembled by examining all urine cultures ordered from 2 outpatient urology clinics from April 2012 through May 2014. All cultures showing growth of 1 or more bacteria were then pooled and examined for antibiotic resistance. These data were reviewed and a standard antibiotic regimen was chosen for patients who were to receive antibiotic prophylaxis.

Regarding patient eligibility for prophylaxis, the protocol was incorporated with prior guideline data along with institutional risk related data. Based on a previous nested case-control study of patients who underwent outpatient cystourethroscopy at our institution, we included all patients with antibiotic use within the prior 6 months, recent hospitalization and an indwelling catheter in the prophylactic group due to the likely increased risk of symptomatic UTI.[5] We also used AUA[6] and IDSA (Infectious Diseases Society of America)[9] guidelines to determine patients at risk who would likely benefit from prophylaxis. At the request of the renal transplantation service patients who had undergone prior transplantation were excluded from analysis.

After the protocol was created it was presented to and approved by the institutional Pharmacy and Therapeutics Committee. After clinic staff education, which included multiple in-service meetings and posting of antibiotic use details, the protocol was formally implemented beginning on January 1, 2016. Prior to protocol implementation prophylactic antibiotics were given at physician discretion with fluoroquinolones almost universally used when possible. Cystoscopy was generally omitted in patients with preprocedural, nitrite positive urinalysis.

Protocol Evaluation

After obtaining institutional review board approval we reviewed the charts of consecutive patients who were eligible for the new clinic protocol who underwent outpatient cystourethroscopy before and after implementation. All procedures were performed as previously described.[2,10] Patient and procedure related characteristics of interest were extracted from the electronic medical record using REDCap (Research Electronic Data Capture) software.[11] All charts were reviewed for the presence of a symptomatic UTI within 30 days of the procedure. The definition of symptomatic UTI has been previously described.[2,10] Briefly, patients with at least 1 symptom consisting of fever or lower urinary tract symptom who had a culture showing 10^5 or greater microorganisms or those with multiple symptoms, other signs of UTI or physician diagnosis were classified as having a symptomatic UTI.

Our primary outcomes were the diagnosis of a symptomatic UTI and antibiotic use before and after clinic protocol implementation. We also examined patient characteristics for an association with symptomatic UTIs. The chi-square test, the Fisher exact test and the Student t-test were used when appropriate. The chi-square and Fisher exact tests were 2-sided and all tests at $p < 0.05$ were considered significant. Calculations were completed with STATA,® release 13.1.

We anticipated that approximately 4% of patients prior to the intervention would have a symptomatic UTI. If 1% of patients had a UTI after the new protocol was implemented, we would need to study 488 experimental subjects and 488 control subjects to be able to reject the null hypothesis that the failure rates in experimental and control subjects were equal with a probability (power) of 0.8. The type I error probability associated with the test of this null hypothesis was 0.05.

RESULTS

We first assembled an institutional outpatient urology clinic antibiogram based on 2 years of urine