Original Study

A New Strategy for Trichomonas Testing Female Adolescents in the Emergency Department

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A B S T R A C T

Study Objective: Sensitive trichomonas diagnostic testing has become available, including nucleic acid amplification tests (NAATs) and a rapid antigen test. The study purpose was to determine if adding sensitive trichomonas testing to routine female sexually transmitted infection (STI) evaluations would increase trichomonas identification and treatment.
Design: Two study time periods. Study time 1 (T1) was used for a retrospective review. Study time 2 (T2) was used for a prospective study.
Setting: Emergency Department.
Participants: Symptomatic female patients aged 13-20 years (N = 447).
Interventions: Implementation of routing trichomonas testing in the Emergency Department during T2.
Main Outcome Measures: Trichomonas diagnosis and treatment rates were compared during T1 and T2.
Results: During T1 31 of 234 of eligible patients (13%) were trichomonas-tested. Laboratory-confirmed trichomonas was identified in 3 of 234 (1.3%). During T2, 212 of 213 of eligible patients (99.5%) were trichomonas-tested; 39 of 212 tested trichomonas-positive (18.4%); 29 of 212 tested rapid trichomonas antigen test-positive (13.6%; $P < .001$), and 33 of 188 tested trichomonas NAAT-positive (15.5%; $P < .001$). Trichomonas treatment was given to 3 of 3 laboratory-confirmed trichomonas cases during T1 (100%) compared with 37 of 39 during T2 (95%; $P = .688$). During T1, 14 of 17 women who received trichomonas treatment (82.4%) did not have a laboratory-confirmed trichomonas diagnosis and during T2 13 of 52 women without a laboratory-confirmed trichomonas diagnosis (25%) were treated for trichomonas ($P < .001$). Rapid trichomonas antigen tests and trichomonas NAATs were concordant in 178 of 188 patients (94.6%).
Conclusion: Incorporating trichomonas rapid antigen tests and NAATs into routine female adolescent STI testing significantly increased the number of laboratory-confirmed adolescent trichomonas diagnosis and treatment and are useful Emergency Department STI screening tools.
Key Words: Trichomonas vaginalis, OSOM rapid Trichomonas Testing, Adolescents

Introduction

Trichomonas, caused by the flagellated protozoan *Trichomonas vaginalis*[1–3] is one of the most common sexually transmitted infections (STIs) in the world.[1,3–8] In the United States, there are an estimated 7.4 million new cases reported each year.[7,9] Trichomonas infection appears to be more common than gonorrhea infection and is nearly as prevalent as chlamydia.[10,11] The overall prevalence in adolescents is estimated at 2.3% with rates approaching 12.9% to 14.4% in high-risk female adolescent populations.[4,12] Trichomonas has been associated with increased risk of low birth weight and preterm delivery.[4,5] It has also been linked to enhanced transmission of HIV infection.[1,2,4,5,13–15]

Trichomonas can present as a range from asymptomatic infection to vaginal discharge, vaginal itching or irritation, or abdominal pain.[1,5] Emergency Department (ED) testing is usually performed only for symptomatic patients; however, asymptomatic infection has been reported in 50%-85% of patients.[12,16] The ability to diagnose trichomonas on the basis of physical findings alone has proven to be unreliable. The most common laboratory test used is direct microscopy of vaginal secretions (wet mount), which is dependent on clinician skill and experience, and has been shown to have a sensitivity of 50%-70%.[1,7,13,17]

Newer diagnostic tests have become available. The OSOM Trichomonas Rapid Test (Sekisui Diagnostics, Lexington, MA) is a Clinical Laboratory Improvement Amendments-waived, rapid, color immunochromatographic capillary-flow immunoassay dipstick test that can be performed with a vaginal swab specimen and results can be read within 10 minutes. It has a sensitivity of 83% and a specificity of 99%.[7] The *Trichomonas vaginalis* nucleic acid amplification test (NAAT; Aptima, Hologic, Inc, San Diego, CA) is commercially available and has a sensitivity of 96.7% and specificity of 97.5%.[18] Several studies have compared NAAT directly with wet prep and have reported NAAT to be superior.[19,20]

Huppert el al[21] recently published a study comparing wet mount, culture, rapid antigen, and nucleic amplification and found that wet mount was significantly inferior to the other 3 tests and trichomonas NAAT sensitivity was only slightly higher than the rapid antigen test. Although the trichomonas NAAT is more sensitive than the trichomonas

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rapid antigen test, results can take several days to process and adolescent patient follow-up can be challenging.[5] The ED is a common site for patients to seek STI diagnosis and treatment, especially for urban, underserved populations in whom STI prevalence is often high.[22] The purpose of this study was to determine if routine use of trichomonas testing would lead to improved identification of trichomonas, correct treatment of infection, and a decrease in return ED visits in our adolescent patient population presenting to the ED for care. We also performed a cost estimate to adding routine trichomonas testing.

Materials and Methods

Study Design

We performed a retrospective analysis and a prospective observational study. The study was approved by the institutional review board. A letter of written consent was used to obtain consent or assent from female adolescents to partake in the prospective arm of the study.

Study Setting and Participants

Female patients aged 13-20 years who presented to an urban, academic children's hospital ED from April 2011 to October 2012 with STI-related signs or symptoms were eligible for the study. Patients were excluded from the study if they did not have mental capacity to sign informed consent.

Study Protocol

The study was divided into 2 time periods. Study time 1 (T1), April to September, 2011, was the time before routine ED trichomonas testing implementation. Study time 2 (T2), November 2011 to October 2012, was the time after trichomonas testing was incorporated as part of routine ED STI evaluation. Trichomonas testing included trichomonas rapid testing as well as a trichomonas NAAT.

In T1 we performed a retrospective review of consecutive medical records of female patients aged 13-20 years who presented to the ED with STI-related signs and symptoms, which included abdominal pain, vaginal discharge, vaginal odor, vaginal pruritus, vaginal bleeding, dysuria, and dyspareunia. Medical records were selected if patients had STI testing (gonorrhea and chlamydia) and STI signs or symptoms. Demographic information (age at presentation and race), history of previous STIs, and pertinent findings from initial history and physical examination were extracted from the chart. Examination findings collected included vaginal and/or cervical discharge, appearance of the cervix, and cervical motion tenderness. Results of diagnostic tests, including identification of trichomonas using microscopic examination and chlamydia and gonorrhea NAAT results, were also extracted. Treatment at time of initial presentation was noted as well as whether there were any repeat ED visits for the same complaint.

The T2 arm was a prospective study that enrolled female patients who visited the ED with signs or symptoms of an STI. The same signs and symptoms used in T1 were used in T2. The same demographic, pertinent history and physical findings, diagnostic results, and treatments were recorded for each patient. In this arm, the trichomonas rapid antigen test and trichomonas NAAT were ordered for enrolled patients. The trichomonas rapid antigen test was performed in the ED by either an ED provider or the research staff. Controls for rapid testing were maintained by the research staff. NAATs were sent to a central laboratory for processing.

Measurements and Data Analysis

Descriptive characteristics for participants were computed according to time period. Categorical variables were reported as proportions in percentage, and continuous level variables as mean and standard deviation. An independent t test and χ^2 tests were used to assess whether there were any differences between T1 and T2 for age, race, and previous STI history, respectively. Rates of female adolescents tested for trichomonas, gonorrhea, and chlamydia at T1 and T2 were computed along with the percentage of positive tests. Separate χ^2 tests were used to compare differences in rates of patients treated for trichomonas as well as the rate of return visits to the ED for T1 and T2. We also computed concordance in test results between trichomonas rapid antigen and NAAT tests. Rates of testing were computed, and percentage of positive results for trichomonas, chlamydia, and gonorrhea were determined. To estimate additional trichomonas testing costs in the ED, Center for Medicare and Medicaid Services Medicaid reimbursement costs of $16.49 for a trichomonas rapid antigen test and $48.24 for a trichomonas NAAT were used.[23] All statistical tests were assessed assuming 2-tailed hypotheses and with an α of 0.05. All analyses were conducted using Systat 13 (SYSTAT Software, Inc, San Jose, CA).

Results

A total of 447 female patients were enrolled in the study; 234 in T1 and 213 in T2. The patient's ages ranged from 13 to 20 years with a mean age of 18.3 years. More than half of all patients were African American (59%; n = 263). There was no statistical difference between T1 and T2 for age or race. Documentation of previous STI was only 20% (47 of 234) in T1 but was 52% (111 of 213) in T2 (Table 1).

During T1, female trichomonas testing, if performed, consisted of direct microscopy of vaginal secretions. Only 13% of female patients who presented for STI-related signs and symptoms (31 of 234) in T1 were tested for

Table 1
Demographic Characteristics of Enrolled Emergency Department Female Patients

Characteristic	T1 (n = 234)	T2 (n = 213)	*P*
Mean age (SD), years	18.2 (1.8)	18.4 (1.7)	.254
Age range, years	13.2-20.9	14.1-21.0	
Race, %			.332
African American	56	62	
White	17	13	
Other	27	25	
Previous STI history, %	20	52	<.001

STI, sexually transmitted infection; T1, study time 1; T2, study time 2