

Survey of Obstetrician-gynecologists in the United States About Trichomoniasis, 2016

Eugene W. Liu, MD,* Kimberly A. Workowski, MD,†‡ Laura H. Taouk, BS,§ Jay Schulkin, PhD,§ William E. Secor, PhD,* and Jeffrey L. Jones, MD, MPH*

Purpose: Trichomoniasis is the most prevalent nonviral sexually transmitted infection (STI) in the United States. It can present with vaginitis in women and urethritis in men, but is most often asymptomatic or occurs with minimal symptoms. It is associated with other STIs, adverse pregnancy outcomes and pelvic inflammatory disease. For these reasons, health care provider awareness of trichomoniasis is of public health importance.

Methods: To assess practitioner knowledge, attitudes, and practices concerning trichomoniasis management, the American College of Obstetricians and Gynecologists conducted an online survey in 2016 of its members, and we analyzed results from 230 respondents.

Results: We note discrepancies between practice and recommendations among surveyed providers: a minority of respondents routinely screen human immunodeficiency virus (HIV)-positive patients for trichomoniasis (10.7%, “most of the time”; 95% confidence interval [CI], 6.7–15.8; 33.0%, “always”; 95% CI, 26.5%–40.0%), treat trichomoniasis in HIV-positive patients with the recommended dose of metronidazole 500 mg twice a day for 7 days (25.8%; 95% CI, 20.0%–32.3%), or retest patients diagnosed with trichomoniasis 3 months after treatment (9.6%; 95% CI, 6.1%–14.3%). Only 29.0% (95% CI, 23.0%–35.5%) retreat with metronidazole 500 mg twice a day for 7 days in patients who have failed prior treatment.

Conclusions: Screening for and treatment of trichomoniasis in HIV-positive patients, and retesting and retreatment for trichomoniasis in the general population appear to be suboptimal. Continuing education for providers is needed for this common but “neglected” STI.

Trichomoniasis is the most prevalent nonviral sexually transmitted disease in the United States affecting an estimated

3.7 million individuals.¹ It is caused by infection with the protozoa *Trichomonas vaginalis*, and can present with vaginitis in women and urethritis, epididymitis, or prostatitis in men. Although most infected individuals are asymptomatic or minimally symptomatic,² trichomoniasis is associated with other concurrent sexually transmitted infections (STIs), such as herpes simplex virus and human immunodeficiency virus (HIV),^{3,4} adverse pregnancy outcomes including preterm birth,⁵ and pelvic inflammatory disease in women infected with HIV.⁶ In light of its high prevalence, asymptomatic presentation, and association with other STIs and with pregnancy complications, appropriate screening and treatment of trichomoniasis may be of public health importance. Recent Centers for Disease

TABLE 1. Demographic Characteristics of Respondents

Characteristics	n	N	% (95% CI)*
Gender			
Male	76	207	36.7 (30.1–43.7)
Female	131	207	63.3 (56.3–69.9)
Race/ethnicity†			
Asian	18	204	8.8 (5.3–13.6)
White	162	204	79.4 (73.2–84.7)
Hispanic	13	204	6.4 (3.4–10.7)
Black	19	204	9.3 (5.7–14.2)
American Indian	2	204	1.0 (0.1–3.5)
Pacific Islander	1	204	0.5 (0.0–2.7)
Primary practice‡			
General obstetrics and gynecology	149	209	71.3 (64.6–77.3)
Obstetrics only	11	209	5.3 (2.7–9.2)
Gynecology only	49	209	23.4 (17.9–29.8)
Current practice type			
Solo private practice	23	209	11.0 (7.1–16.1)
Ob-gyn partnership/group	80	209	38.3 (31.7–45.2)
University full-time faculty and practice	42	209	20.1 (14.9–26.2)
Multispecialty group	28	209	13.4 (9.1–18.8)
Military/government	4	209	1.9 (0.5–4.8)
HMO/staff model	10	209	4.8 (2.3–8.6)
Other	22	209	10.5 (6.7–15.5)
Practice location			
Urban inner city	42	207	20.3 (15.0–26.4)
Urban non-urban city	63	207	30.4 (24.2–37.2)
Suburban	66	207	31.9 (25.6–38.7)
Rural	13	207	6.3 (3.4–10.5)
Midsized town	23	207	11.1 (7.2–16.2)
Characteristics		N	Mean (95% CI)§
Age		206	51.2 (49.8–52.7)
Years in practice		204	19.3 (17.8–20.8)

*95% CI estimated by Clopper-Pearson method.

†Respondents could choose multiple levels for this characteristic, so percentages of levels do not total 100%.

‡Differences between CARN and non-CARN-respondent answer distributions were significant at $P < 0.05$. In the CARN group, 68%, 8%, and 25% had a current practice type of general obstetrics and gynecology, obstetrics only, and gynecology only, respectively. In the non-CARN group, these proportions were 79%, 0%, and 21%, respectively.

§95% CI estimated from one-sample t test.

From the *Division of Parasitic Diseases and Malaria, †Division of STD Prevention, Center for Global Health, Centers for Disease Control and Prevention; ‡Department of Medicine, Emory University, Atlanta, GA; and §Department of Research, American College of Obstetricians and Gynecologists, Washington, DC

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Correspondence: Eugene W. Liu, MD, 1600 Clifton Rd, MS-A06, Atlanta, GA. E-mail: lxq8@cdc.gov.

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Control and Prevention (CDC) recommendations published in 2015⁷ are to screen asymptomatic women with HIV and test for *T. vaginalis* infection in women seeking care for vaginal discharge. Recommended treatment is oral metronidazole or tinidazole 2 g as a single dose. Metronidazole 500 mg twice daily for 7 days is the alternative treatment, which is also recommended in treatment failure or those with HIV coinfection. Sex partners should also undergo concurrent treatment.

There are limited studies evaluating the knowledge, attitudes, and practices (KAP) relating to screening, diagnosis, and treatment of trichomoniasis by health care providers in the United States. These have focused on screening. Eighty-nine percent of prenatal care providers in Georgia reported screening symptomatic pregnant women for trichomoniasis.⁸ Similarly, analysis of data from a network of sexually transmitted disease clinics in the United States found that most clinics tested symptomatic women ($\geq 89\%$); however, only 44% of women infected with HIV were tested or screened for trichomoniasis.⁹ Nevertheless,

recent availability of nucleic acid amplification testing (NAAT) appears to have increased the rate of testing for trichomoniasis in a group of clinics in a metropolitan area.¹⁰ To better understand provider KAP relating to trichomoniasis, the American College of Obstetricians and Gynecologists (ACOG) conducted a survey of its members in 2016. Here, we report results identifying discrepancies in optimal screening and management.

MATERIALS AND METHODS

Study Design and Participants

In October 2016, 1000 members of the ACOG were emailed personalized links to the survey along with information for informed participation through the survey-platform Qualtrics (Qualtrics, Provo, UT). Clicking on the link and answering survey questions was taken as implied physician consent to participate in the study. Of 1000 members, 500 were a randomly selected cohort

TABLE 2. Responses to Questions on Provider Knowledge of *T. vaginalis* Infections

Questions	Answer	n	N	% (95% CI)
Please rate the extent to which you agree or disagree with the following statements:				
<i>T. vaginalis</i> infection can increase the risk of HIV acquisition.*	Strongly agree	59	212	27.8 (21.9–34.4)
	Somewhat agree	83	212	39.2 (32.5–46.1)
	Neither agree nor disagree	59	212	27.8 (21.9–34.4)
	Somewhat disagree	7	212	3.3 (1.3–6.7)
	Strongly disagree	4	212	1.9 (0.5–4.8)
<i>T. vaginalis</i> infections can be transmitted through nonsexual routes.	Strongly agree	28	213	13.1 (8.9–18.4)
	Somewhat agree	70	213	32.9 (26.6–39.6)
	Neither agree nor disagree	44	213	20.7 (15.4–26.7)
	Somewhat disagree	42	213	19.7 (14.6–25.7)
	Strongly disagree	29	213	13.6 (9.3–19.0)
<i>T. vaginalis</i> infections are often asymptomatic.†	Strongly agree	50	213	23.5 (18.0–29.7)
	Somewhat agree	99	213	46.5 (39.6–53.4)
	Neither agree nor disagree	31	213	14.6 (10.1–20.0)
	Somewhat disagree	28	213	13.1 (8.9–18.4)
	Strongly disagree	5	213	2.3 (0.8–5.4)
Infection with <i>T. vaginalis</i> increases the risk of adverse pregnancy outcomes.*	Strongly agree	33	212	15.6 (11.0–21.2)
	Somewhat agree	89	212	42.0 (35.3–48.9)
	Neither agree nor disagree	53	212	25.0 (19.3–31.4)
	Somewhat disagree	34	212	16.0 (11.4–21.7)
	Strongly disagree	3	212	1.4 (0.3–4.1)
Treatments for <i>T. vaginalis</i> infections are associated with adverse pregnancy outcomes.	Strongly agree	8	212	3.8 (1.6–7.3)
	Somewhat agree	36	212	17.0 (12.2–22.7)
	Neither agree nor disagree	55	212	25.9 (20.2–32.4)
	Somewhat disagree	64	212	30.2 (24.1–36.9)
	Strongly disagree	49	212	23.1 (17.6–29.4)
Treatment of <i>T. vaginalis</i> should be deferred for women who are pregnant, as potential risks outweigh potential benefits.‡	Strongly agree	6	211	2.8 (1.1–6.1)
	Somewhat agree	14	211	6.6 (3.7–10.9)
	Neither agree nor disagree	27	211	12.8 (8.6–18.1)
	Somewhat disagree	59	211	28.0 (22.0–34.5)
	Strongly disagree	105	211	49.8 (42.8–56.7)
Since being licensed, have you received any continuing education on infectious diseases that included information on the diagnosis and management of <i>Trichomonas vaginalis</i> ?	Yes	86	214	40.2 (33.6–47.1)
Would you benefit from additional training and/ or resources regarding the diagnosis and management of <i>Trichomonas vaginalis</i> ?	Yes	180	213	84.5 (78.9–89.1)

*Workowski KA, et al. MMWR Recomm Rep. 2010;59 (RR-12):1–110.

†Hobbs, et al. Sex Transm Infect. 2013 Sep; 89 (6): 434–438.

‡Differences between CARN and non-CARN-respondent answer distributions were significant at $P < 0.01$. With respect to deferring treatment in women who are pregnant, in the CARN group, 2%, 10%, 15%, 25%, and 47% strongly agreed, somewhat agreed, neither agreed nor disagreed, somewhat disagreed, and strongly disagreed, respectively. In the non-CARN group, these proportions were 4%, 0%, 7%, 33%, and 55%, respectively.

TABLE 3. Responses to Questions on Provider Attitudes Toward *T. vaginalis* Infections

Questions	Answer	n	N	% (95% CI)
Please rate the extent to which you agree or disagree with the following statements The costs of universal screening for <i>T. vaginalis</i> would outweigh the benefits	Strongly agree	59	213	27.7 (21.8–34.2)
	Somewhat agree	65	213	30.5 (24.4–37.2)
	Neither agree nor disagree	43	213	20.2 (15.0–26.2)
	Somewhat disagree	29	213	13.6 (9.3–19.0)
	Strongly disagree	17	213	8.0 (4.7–12.5)
Asymptomatic women should be routinely screened for <i>T. vaginalis</i> infection.	Strongly agree	7	211	3.3 (1.3–6.7)
	Somewhat agree	16	211	7.6 (4.4–12.0)
	Neither agree nor disagree	35	211	16.6 (11.8–22.3)
	Somewhat disagree	86	211	40.8 (34.1–47.7)
	Strongly disagree	67	211	31.8 (25.5–38.5)
Based on your clinical experience and knowledge, please rate the extent to which you agree or disagree with the following statements: <i>T. vaginalis</i> infection is a significant health issue in the United States	Strongly agree	21	213	9.9 (6.2–14.7)
	Somewhat agree	69	213	32.4 (26.2–39.1)
	Neither agree nor disagree	72	213	33.8 (27.5–40.6)
	Somewhat disagree	45	213	21.1 (15.8–27.2)
	Strongly disagree	6	213	2.8 (1.0–6.0)
<i>T. vaginalis</i> infection is a significant health issue in my practice.	Strongly agree	11	213	5.2 (2.6–9.1)
	Somewhat agree	36	213	16.9 (12.1–22.6)
	Neither agree nor disagree	42	213	19.7 (14.6–25.7)
	Somewhat disagree	76	213	35.7 (29.3–42.5)
	Strongly disagree	48	213	22.5 (17.1–28.7)

of members in the Collaborative Ambulatory Research Network (CARN). The CARN was created to investigate the practice of obstetrics and gynecology in the outpatient setting.¹¹ The CARN members are ACOG members who volunteer to participate in survey studies several times a year; they have been found to be representative of ACOG members by gender ratio, age, and geographic location.¹¹ To prevent overcontact of CARN members from small districts, no stratification by district was performed in the random sampling. The other 500 ACOG members were non-CARN members randomly selected and stratified by nonmilitary ACOG districts, with sample sizes reflecting the proportionate size of each district. Developed at ACOG in consultation with the CDC, the survey assessed providers' screening practices, understanding of diagnosis and treatment, attitudes, and education/training related to trichomoniasis in 17 content-based questions (Tables 2, 3, 4, and 6). Nine demographic questions were also asked in the survey (Table 1). Survey recipients who had yet to take the survey or opt-out within 1- to 2-week intervals were sent reminders through Qualtrics. Up to 5 reminders per recipient were sent before data collection closed in December 2016.

Ethical Approval

This survey was approved as a nonresearch program evaluation activity by the Office of the Associate Director for Science, Center for Global Health at CDC and was determined to be exempt from review by the institutional review board of ACOG. No patient data were collected.

Statistical Analysis

Data were analyzed using R statistical software.¹² Incomplete surveys were defined as those having less than 3 content-based survey questions answered for each respondent and were excluded from analysis. To determine the degree of correlation between the respondent population and the overall ACOG membership by available demographic features of sex, state, and ACOG membership district, we performed χ^2 testing by these features using membership data from January 5, 2017. For survey responses, we calculated proportions of individuals choosing each

response in each question and calculated 95% confidence intervals (95% CI) using the Clopper-Pearson method. We also calculated proportions separately for CARN and non-CARN groups, and compared them using Fisher's exact test. For questions where responses were discrepant from standard practice (denoted by the dagger, †, in the relevant tables), we performed multiple logistic regression to analyze associations between these responses and respondent demographic characteristics. Here, the respondent's years in practice postresidency, number of patients seen, and frequency of testing or treating for trichomonas a month were treated as a continuous covariates, whereas other demographic features (gender, ethnicity, primary practice, current practice type, and practice location) were treated as categorical factors. Respondent age was not included in the logistic regression given collinearity with the number of years in practice postresidency. Tests were considered statistically significant for a *P* less than 0.05. Multiple-comparison corrections were not made.

RESULTS

Survey Response Rate

Of 500 CARN members randomly selected, 470 received electronic surveys (21 opted out, and 9 had undeliverable email addresses), to which 32.6% responded. Of the 500 non-CARN members selected, 487 received electronic surveys (5 opted out, 8 had undeliverable email addresses), to which 16.8% responded. Overall, of the 957 members who received a survey, 235 (24.6%) responded. Five respondents with incomplete surveys were excluded, and the 230 surveys from the remaining respondents were used in subsequent analysis.

Respondent Demographics

The mean age of respondents was 51.2 years (95% CI, 49.8%–52.7%), with a mean of 19.3 years (95% CI, 17.8–20.8) in practice postresidency. The majority of respondents were female (63.3%; 95% CI, 56.3–69.9), of white race/ethnicity (79.4%; 95% CI, 73.2%–84.7%), primarily practicing in general obstetrics and gynecology (71.3%; 95% CI, 64.6%–77.3%). A plurality of respondents had a current practice in an obstetrician-gynecologist (ob-gyn) partnership/group

TABLE 4. Responses to Questions Regarding Diagnosis of *T. vaginalis* Infections

Question	Answer	n	N	% (95% CI)
Do you screen/test patients for trichomoniasis (<i>T. vaginalis</i> infection)?	Yes	210	229	91.7 (87.3–94.9)
Which test(s) do you use to diagnose <i>T. vaginalis</i> infections? (select all that apply)*	NAAT	68	210	32.4 (26.1–39.2)
	Wet mount	162	210	77.1 (70.9–82.6)
	APTIMA	36	210	17.1 (12.3–22.9)
	OSM	3	210	1.4 (0.3–4.1)
	Affirm	64	210	30.5 (24.3–37.2)
	Culture†	13	210	6.2 (3.3–10.4)
	Pap smear‡	4	230	1.7 (0.5–4.4)
Other	1	210	0.5 (0.0–2.6)	
Which test has the best accuracy (high sensitivity and specificity) for detecting a <i>T. vaginalis</i> infection?	NAAT§	126	196	64.3 (57.1–71.0)
	Wet mount	20	196	10.2 (6.3–15.3)
	OSM	2	196	1.0 (0.1–3.6)
	Affirm	28	196	14.3 (9.7–20.0)
	Culture	10	196	5.1 (2.5–9.2)
	Don't know	10	196	5.1 (2.5–9.2)
How often do you perform a diagnostic test for <i>T. vaginalis</i> infection, when patients present with: Another STI	Never	10	210	4.8 (2.3–8.6)
	Sometimes	37	210	17.6 (12.7–23.5)
	About half the time	17	210	8.1 (4.8–12.6)
	Most of the time	59	210	28.1 (22.1–34.7)
	Always	87	210	41.4 (34.7–48.4)
Vaginal discharge¶	Never	1	211	0.5 (0.0–2.6)
	Sometimes	21	211	10.0 (6.3–14.8)
	About half the time	13	211	6.2 (3.3–10.3)
	Most of the time	73	211	34.6 (28.2–41.4)
	Always	103	211	48.8 (41.9–55.8)
Vulvar irritation	Never	14	208	6.7 (3.7–11.0)
	Sometimes	63	208	30.3 (24.1–37.0)
	About half the time	27	208	13.0 (8.7–18.3)
	Most of the time	57	208	27.4 (21.5–34.0)
	Always	47	208	22.6 (17.1–28.9)
Vulva itchinness/pruritus vulvae	Never	11	209	5.3 (2.7–9.2)
	Sometimes	62	209	29.7 (23.6–36.4)
	About half the time	25	209	12.0 (7.9–17.1)
	Most of the time	60	209	28.7 (22.7–35.4)
	Always	51	209	24.4 (18.7–30.8)
Strawberry cervix/colpitis macularis	Never	4	210	1.9 (0.5–4.8)
	Sometimes	19	210	9.0 (5.5–13.8)
	About half the time	8	210	3.8 (1.7–7.4)
	Most of the time	48	210	22.9 (17.4–29.1)
	Always	131	210	62.4 (55.5–69.0)
Pain with urination	Never	27	210	12.9 (8.6–18.2)
	Sometimes	99	210	47.1 (40.2–54.1)
	About half the time	44	210	21.0 (15.7–27.1)
	Most of the time	28	210	13.3 (9.0–18.7)
	Always	12	210	5.7 (3.0–9.8)
Pain during sexual intercourse	Never	28	208	13.5 (9.1–18.9)
	Sometimes	84	208	40.4 (33.7–47.4)
	About half the time	35	208	16.8 (12.0–22.6)
	Most of the time	43	208	20.7 (15.4–26.8)
	Always	18	208	8.7 (5.2–13.3)

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TABLE 4. (Continued)

Question	Answer	n	N	% (95% CI)
Inflammation of cervix, vagina, and/or urethra	Never	1	210	0.5 (0.0–2.6)
	Sometimes	33	210	15.7 (11.1–21.4)
	About half the time	22	210	10.5 (6.7–15.4)
	Most of the time	83	210	39.5 (32.9–46.5)
	Always	71	210	33.8 (27.4–40.6)
How often do you perform a diagnostic test for <i>T. vaginalis</i> infection, when patients: Are sexually active and asymptomatic	Never	99	210	47.1 (40.2–54.1)
	Sometimes	77	210	36.7 (30.1–43.6)
	About half the time	18	210	8.6 (5.2–13.2)
	Most of the time	10	210	4.8 (2.3–8.6)
	Always	6	210	2.9 (1.1–6.1)
Are pregnant	Never	69	202	34.2 (27.6–41.1)
	Sometimes	90	202	44.6 (37.6–51.7)
	About half the time	8	202	4.0 (1.7–7.7)
	Most of the time	11	202	5.4 (2.7–9.5)
	Always	24	202	11.9 (7.8–17.2)
Have an HIV infection**	Never	45	197	22.8 (17.2–29.3)
	Sometimes	54	197	27.4 (21.3–34.2)
	About half the time	12	197	6.1 (3.2–10.4)
	Most of the time	21	197	10.7 (6.7–15.8)
	Always	65	197	33.0 (26.5–40.0)
Have pelvic inflammatory disease (PID)	Never	11	206	5.3 (2.7–9.4)
	Sometimes	31	206	15.0 (10.5–20.7)
	About half the time	17	206	8.3 (4.9–12.9)
	Most of the time	45	206	21.8 (16.4–28.1)
	Always	102	206	49.5 (42.5–56.5)
For patients diagnosed with <i>T. vaginalis</i> infections, which of the following do you recommend? (select all that apply)	Screening for other STIs	201	211	95.3 (91.5–97.7)
	Screening for HIV	117	211	55.5 (48.5–62.3)
	Concurrent treatment of all sex partners	194	211	91.9 (87.4–95.2)
	Abstaining from sex	190	211	90.0 (85.2–93.7)

95% CI estimated by Clopper-Pearson method.

*Respondents could choose multiple levels for this characteristic, so percentages of levels do not total 100%.

†Differences between CARN and non-CARN-respondent answer distributions were significant at $P < 0.01$. Culture was used to diagnose *T. vaginalis* infections in 2% in the CARN group, and 14% in the non-CARN group.

‡This response was not explicitly stated but specified in the “other” possible response.

§NAAT (specifically APTIMA) has the highest sensitivity (Chapin and Andrea, 2011. *Expert. Rev. Mol. Diagn.* 11: 679–688).

¶CDC recommendation is to screen in this population (Workowski KA, et al. *MMWR Recomm Rep.* 2010;59 (RR-12):1–110).

||Differences between Collaborative Ambulatory Research Network (CARN) and non-CARN-respondent answer distributions were significant at $P < 0.05$. For how often a diagnostic test for *T. vaginalis* infection is performed when patients are pregnant, in the CARN group, 39%, 41%, 6%, 3%, and 11% never, sometimes, about half the time, most of the time, and always performed the test, respectively. In the non-CARN group, these proportions were 25%, 51%, 0%, 10%, and 14%, respectively. For how often testing was performed in patients with PID, in the CARN group, the proportions were 5%, 20%, 10%, 23%, and 42%, respectively. In the non-CARN group, the proportions were 5%, 7%, 5%, 19%, and 63%, respectively.

**CDC recommendation is to screen in this population at the time of entry into care and at least annually thereafter (Workowski KA, et al. *MMWR Recomm Rep.* 2010;59 (RR-12):1–110).

(38.3%; 95% CI, 31.7%–45.2%) and practiced in a suburban location (31.9; 95% CI, 25.6%–38.7%). These responses, constituting at least a plurality of all possible responses, were used as the reference levels for factors in subsequent logistic regression.

There were no significant differences in demographic features between CARN and non-CARN members except by primary practice, the number of times testing for trichomoniasis, or number of patients seen in a typical month ($P < 0.05$, < 0.05 , and < 0.01 by Fisher exact test, respectively; Table 1). When comparing all respondents with the ACOG membership by demographic characteristics of gender, state, and ACOG district, there was a significant difference by gender ($\chi^2 = 4.8$, $df = 1$, $P = 0.03$; 36.7% male among respondents, 44.5% male in ACOG membership), but not by state or ACOG district ($\chi^2 = 64.0$, $df = 78$, $P = 0.87$ and $\chi^2 = 7.5$, $df = 10$, $P = 0.68$, respectively).

Provider Knowledge

Questions assessing provider knowledge of trichomoniasis found that the majority of respondents recognize that trichomoniasis increases the risk of HIV acquisition (67.0% at least somewhat agreeing), is often asymptomatic (70.0% at least somewhat agreeing) and increases the risk of adverse pregnancy outcomes (57.6% at least somewhat agreeing). Most respondents recognized that treatments for trichomoniasis are not known to cause adverse pregnancy outcomes¹³ (53.3% disagreed that treatment causes adverse pregnancy outcomes) and felt that treatment should not be deferred in pregnant women (77.8% disagreed treatment should be deferred). Finally, 40.2% (95% CI, 33.6%–47.1%) of the respondents reported receiving continuing education that includes information on the diagnosis and management of *T. vaginalis*, and 84.5% (95% CI, 78.9%–89.1%) see a benefit from additional

training or resources regarding the diagnosis and management of *T. vaginalis* (Table 2).

Provider Attitudes

The majority of respondents agreed that costs of universal screening (testing all women who present for care) would outweigh any potential benefits (58.2% at least somewhat agreeing), and the majority of respondents disagreed that asymptomatic women should be routinely screened for trichomoniasis (72.6% at least somewhat disagreeing), or that trichomoniasis is a significant health issue in their practices (58.2% at least somewhat disagreeing) (Table 3).

Diagnosis

With respect to questions on the diagnosis of trichomoniasis, 91.7% (95% CI, 87.3%–94.9%) of the respondents reported screening (of asymptomatic patients) or testing of symptomatic patients. Wet mount was used by most respondents to diagnose trichomoniasis (77.1%; 95% CI, 70.9%–82.6% of respondents). The majority of respondents (64.3%; 95% CI, 57.1%–71.0%) correctly identified NAAT tests as having the best accuracy for detecting trichomoniasis. In accordance with CDC screening recommendations,¹⁴ 83.4% of respondents reported performing testing “most of the time” or “always” if patients presented with vaginal discharge, whereas only 43.7% performed testing if patients presented with HIV infection. More than half of respondents tested “most of the time” or “always” when patients presented with another STI (69.5%), vulva itchiness (53.1%), strawberry cervix (85.3%), inflammation of the cervix, vagina, and/or urethra (73.3%), or pelvic inflammatory disease (71.3%). Half or less of respondents tested “most of the time” or “always” for trichomoniasis when patients presented with vulvar irritation (50.0%), pain with urination (19.0%), pain during sexual intercourse (29.4%), being sexually active and asymptomatic (7.7%), or pregnancy (17.3%) (Table 4).

For patients diagnosed with trichomoniasis, a majority of respondents recommended screening for other STIs (95.3%; 95% CI, 91.5%–97.7%) and HIV (55.5%; 95% CI, 48.5%–62.3%) (Table 4).

Given the CDC recommendation for screening for trichomoniasis in HIV-positive populations at entry into care and then at least annually,¹⁴ we evaluated key demographic characteristics that may influence screening in this subpopulation. We found the number of times a respondent tested for trichomoniasis in a typical month (odds ratio [OR], 1.03; 95% CI, 1.01–1.05) and being in a solo private practice (OR, 5.18; 95% CI, 1.37–19.66 vs. being in an ob-gyn partnership/group) was associated with screening HIV-positive women “most of the time” or “always” (Table 5).

Treatment

The majority of respondents preferred treatment with one dose of metronidazole 2 g for nonpregnant, non-HIV-positive patients (76.0%; 95% CI, 69.8%–81.6%) and pregnant patients (55.6%; 95% CI, 48.7%–62.3%). Notably, a plurality of respondents preferred the same dosing for HIV-positive patients (41.1%; 95% CI, 34.4%–48.1%), whereas only 25.8% (95% CI, 20.0%–32.3%) preferred the CDC recommended dose of metronidazole 500 mg twice a day for 7 days in this subpopulation (Table 6). We found no association with any demographic characteristics and preferred treatment of HIV-positive patients according to CDC recommendations.

After treatment, only 9.6% (95% CI, 6.1%–14.3%) of respondents followed the CDC recommendations of retesting patients 3 months after treatment, with the remainder not testing at all (61.0%; 95% CI, 54.2%–67.5%) or testing sooner than 3 months. We found that the number of times a respondent tested for

trichomoniasis in a typical month (OR, 1.02; 95% CI, 1.00–1.04) was associated with retesting at 3 months (Table 7). In the event of treatment failure, only 29% of providers followed the CDC recommended retreatment (metronidazole 500 mg twice a day for 7 days, Table 6). We found no association with any demographic characteristics and treating treatment failures according to CDC recommendations.

Less than half of respondents sought consultation from an infectious disease specialist for patients with trichomoniasis who were coinfecting with HIV (38.8%; 95% CI, 32.3%–45.6%) or had hypersensitivity to a nitroimidazole (45.2%; 95% CI, 38.5%–52.1%). A plurality of respondents endorsed seeking consultation for a patient who fails to respond to treatment (53.4%; 95% CI, 46.6%–60.2%). Respondents reported rarely seeking consultation for patients who have only trichomoniasis (0%; 95% CI, 0.0%–1.7%), coinfection with PID (3.2%; 95% CI, 1.3%–6.4%), or are pregnant (2.8%; 95% CI, 1.0%–6.0%) (Table 6). For patients with trichomoniasis, a majority of respondents recommended concurrent treatment of all sex partners (91.9%; 95% CI, 87.4%–95.2%), and abstaining from sex (90.0%; 95% CI, 85.2%–93.7%) (Table 4).

DISCUSSION

This study assesses the knowledge, attitudes, and practices of obstetricians-gynecologists in the US regarding trichomoniasis. Provider knowledge reflects evidence-based understandings of

TABLE 5. Risk Factors for Responses (“Most of the Time” or “Always”) in Line With CDC Recommendations to Screen for Trichomonas in HIV-positive Women as Estimated With a Full Logistic Regression Model

Characteristics	OR (95% CI)
Patients you see in a typical month?*	1.00 (1.00–1.00)
Times do you test for trichomoniasis in a typical month?*	1.03 (1.01–1.05)†
Gender	
Female	Reference
Male	0.64 (0.27–1.51)
Years in practice postresidency*	1.03 (0.99–1.07)
Ethnicity	
White	Reference
Asian	0.86 (0.20–3.70)
Hispanic or Latino	1.22 (0.17–8.72)
Black or African American	0.61 (0.13–2.90)
Mixed	0.27 (0.04–1.89)
Primary practice	
General ob-gyn	Reference
Obstetrics only	2.46 (0.39–15.45)
Gynecologic	1.24 (0.48–3.24)
Current practice type	
Ob-gyn partnership/group	Reference
Solo private practice	5.18 (1.37–19.66)‡
University full-time faculty and practice	1.13 (0.33–3.89)
Multispecialty group	1.38 (0.46–4.18)
Military/government	2.45 (0.24–24.90)
HMO/staff model	0.60 (0.09–4.02)
Other	1.46 (0.35–6.16)
Practice location	
Suburban	Reference
Urban inner city	1.64 (0.52–5.14)
Urban noninner city	1.29 (0.48–3.52)
Rural	1.24 (0.20–7.55)
Midsized town (10,000–50,000)	2.30 (0.71–7.47)

*Treated as a continuous covariate.

† $P < 0.001$.

‡ $P < 0.05$.

TABLE 6. Responses to Questions Regarding Treatment of *T. vaginalis* Infections

Questions	Answers	n	N	% (95% CI)	
Do you treat patients for Trichomoniasis (<i>T. vaginalis</i> infection)?	Yes	225	227	99.1 (96.9–99.9)	
What is your preferred treatment regimen for nonpregnant, non-HIV-positive patients diagnosed with a <i>T. vaginalis</i> infection?	metronidazole 2gx1*	165	217	76.0 (69.8–81.6)	
	metronidazole 2gx7days	1	217	0.5 (0.0–2.5)	
	metronidazole 500mgbidx7days*	40	217	18.4 (13.5–24.2)	
	tinidazole 2gx1*	9	217	4.1 (1.9–7.7)	
	tinidazole 2gx7days	0	217	0.0 (0.0–1.7)	
	Nitroimidazole	0	217	0.0 (0.0–1.7)	
Other	2	217	0.9 (0.1–3.3)		
What is your preferred treatment regimen for pregnant patients who are diagnosed with a <i>T. vaginalis</i> infection?	metronidazole 2gx1*	120	216	55.6 (48.7–62.3)	
	metronidazole 2gx7days	0	216	0.0 (0.0–1.7)	
	metronidazole 500mgbidx7days	72	216	33.3 (27.1–40.0)	
	tinidazole 2gx1	5	216	2.3 (0.8–5.3)	
	tinidazole 2gx7days	0	216	0.0 (0.0–1.7)	
	Nitroimidazole	1	216	0.5 (0.0–2.6)	
	Defer/testing	0	216	0.0 (0.0–1.7)	
Other	18	216	8.3 (5.0–12.9)		
What is your preferred treatment regimen for HIV-positive patients who are diagnosed with a <i>T. vaginalis</i> infection?	metronidazole 2gx1	86	209	41.1 (34.4–48.1)	
	metronidazole 2gx7days	20	209	9.6 (5.9–14.4)	
	metronidazole 500mgbidx7days*	54	209	25.8 (20.0–32.3)	
	tinidazole 2gx1	3	209	1.4 (0.3–4.1)	
	tinidazole 2gx7days	3	209	1.4 (0.3–4.1)	
	Nitroimidazole	0	209	0.0 (0.0–1.7)	
	Defer/testing	15	209	7.2 (4.1–11.6)	
Other	28	209	13.4 (9.1–18.8)		
After treatment, when do you retest patients for trichomoniasis?	3 wk after treatment	25	218	11.5 (7.6–16.5)	
	>3 wk after treatment	39	218	17.9 (13.0–23.6)	
	3 mo after treatment*	21	218	9.6 (6.1–14.3)	
	Do not retest	133	218	61.0 (54.2–67.5)	
In the event of trichomoniasis treatment failure, which of the following would you recommend?	metronidazole 2gx1	7	214	3.3 (1.3–6.6)	
	metronidazole 2gx7days	22	214	10.3 (6.6–15.2)	
	metronidazole 500mgbidx7days*	62	214	29.0 (23.0–35.5)	
	tinidazole 2gx1	58	214	27.1 (21.3–33.6)	
	tinidazole 2gx7days	31	214	14.5 (10.1–19.9)	
	nitroimidazole	0	214	0.0 (0.0–1.7)	
	Defer/testing	21	214	9.8 (6.2–14.6)	
	Other	13	214	6.1 (3.3–10.2)	
For the following cases, would you consult with an infectious disease specialist regarding treatment?					
	The patient has a <i>T. vaginalis</i> infection	Yes	0	218	0.0 (0.0, 1.7)
		Maybe	1	218	0.5 (0.0, 2.5)
	No	217	218	99.5 (97.5, 100.0)	
The patient has both HIV and a <i>T. vaginalis</i> infection†	Yes	85	219	38.8 (32.3, 45.6)	
	Maybe	52	219	23.7 (18.3, 29.9)	
	No	82	219	37.4 (31.0, 44.2)	
The patient has both PID and a <i>T. vaginalis</i> infection	Yes	7	217	3.2 (1.3, 6.5)	
	Maybe	34	217	15.7 (11.1, 21.2)	
	No	176	217	81.1 (75.3, 86.1)	
The patient is pregnant and has a <i>T. vaginalis</i> infection	Yes	6	214	2.8 (1.0, 6.0)	
	Maybe	10	214	4.7 (2.3, 8.4)	
	No	198	214	92.5 (88.1, 95.7)	

Continued next page

TABLE 6. (Continued)

Questions	Answers	n	N	% (95% CI)
The patient has a <i>T. vaginalis</i> infection and fails to respond to treatment	Yes	57	219	26.0 (20.3, 32.4)
	Maybe	117	219	53.4 (46.6, 60.2)
	No	45	219	20.5 (15.4, 26.5)
The patient has a <i>T. vaginalis</i> infection and hypersensitivity to a nitroimidazole	Yes	99	219	45.2 (38.5, 52.1)
	maybe	93	219	42.5 (35.8, 49.3)
	no	27	219	12.3 (8.3, 17.4)

95% CI estimated by Clopper–Pearson method.

*CDC treatment recommendation (Workowski KA, et al. MMWR Recomm Rep. 2010;59 (RR-12):1–110).

†Differences between Collaborative Ambulatory Research Network (CARN) and non-CARN-respondent answer distributions were significant at $P < 0.05$. If a patient has both HIV and a *T. vaginalis* infection, 32% of CARN and 51% of non-CARN respondents would consult an infectious disease specialist.

trichomoniasis; the majority noted trichomoniasis is often asymptomatic² and increases the risk of HIV acquisition³ and adverse pregnancy outcomes.⁵ The majority also test patients seeking care for vaginal discharge according to CDC guidelines¹⁴ and correctly identify NAAT as the test with the highest accuracy (although low sensitivity wet mounts, which can be performed at the point of care, were used by the highest proportion of providers). The majority also treat with standard doses for first line treatment in nonpregnant, non-HIV-positive women, and treat all sex partners concurrently.¹⁴ However, we note asymmetry in testing; nearly all providers recommend testing for other STIs if a patient has trichomoniasis, but only 69.5% test for trichomoniasis at least “most of the

time” if a patient presents with another STI. More importantly, we note discrepancies between CDC recommendations and provider reported practices relating to screening of HIV-positive patients for trichomoniasis, treatment of trichomoniasis in HIV-positive patients with metronidazole 500 mg twice a day for 7 days, retesting cases diagnosed with trichomoniasis 3 months after treatment, and retreatment patients with metronidazole 500 mg twice a day for 7 days after treatment failure.

Examining the demographics of providers may help explain these discrepancies between survey responses and CDC recommendations. We found that the frequency of testing for trichomoniasis patients was associated with following CDC guidelines to screen HIV-positive patients and retest patients 3 months after a course of treatment. The frequency of testing may be a measure of practitioner experience with trichomoniasis, which in turn may be associated with adherence to practice recommendations. Frequency of testing may be a more direct measure of experience specific to trichomoniasis than the number of years in practice, which in prior studies was associated with following practice recommendations in pelvic inflammatory disease¹⁵ but with incorrectly answering management questions on sexually transmitted diseases in accordance to CDC recommendations.¹⁶

This study has limitations. The response rate was 24.6%; responses captured in this study may not represent the knowledge of the ACOG population. Similarly, we noted a difference in primary practice type, and number of patients seen or tests for trichomoniasis in a typical month between CARN and non-CARN respondents (no non-CARN members were in obstetrics only practices, in contrast to 7.7% of CARN members). Despite these limitations, this study highlights important gaps in adherence to recommendations for screening and treatment of HIV-positive patients, and routine retesting and retreatment for trichomoniasis.

Appropriate screening and treatment in subpopulations that are HIV-positive, and repeat testing and providing treatment for trichomoniasis per national guidelines are important tools for controlling this highly prevalent, but “neglected” STI.¹⁷ The need for provider education—focusing especially on care for HIV-positive patients—is highlighted by our finding that the majority of respondents in our survey do not see trichomoniasis as a significant health issue despite its high prevalence and association with other STIs and pregnancy complications. The 2015 CDC STD treatment guidelines available online or as a smartphone app are one resource to assist providers in testing for and managing trichomonas infections.¹³

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TABLE 7. Risk factors for Retesting 3 Months After Treatment of Trichomoniasis in Line With CDC Recommendations as Estimated With a Full Logistic Regression Model

Characteristics	OR (95% CI)
Patients you see in a typical month?*	1.00 (0.99–1.01)
Times do you treat trichomoniasis in a typical month?*	1.02 (1.00–1.04)†
Gender	
Female	Reference
Male	0.21 (0.03–1.22)
Years in practice postresidency*	0.98 (0.93–1.05)
Ethnicity	
White	Reference
Asian	1.07 (0.17–6.58)
Hispanic or Latino	0.00 (0.00 to Inf)
Black or African American	0.33 (0.02–5.53)
Mixed	0.00 (0.00 to Inf)
Primary practice	
General ob-gyn	Reference
Obstetrics only	0.00 (0.00 to Inf)
Gynecologic	1.66 (0.40–6.92)
Current practice type	
Ob-gyn partnership/ group	Reference
Solo private practice	0.00 (0.00 to Inf)
University full-time faculty and practice	1.57 (0.28–8.82)
Multispecialty group	0.32 (0.03–3.15)
Military/government	6.64 (0.30–148.73)
HMO/staff model	4.46 (0.54–36.43)
Other	3.46 (0.56–21.21)
Practice location	
Suburban	Reference
Urban inner city	0.69 (0.10–4.55)
Urban noninner city	0.98 (0.20–4.82)
Rural	2.86 (0.32–25.74)
Midsized town (10,000–50,000)	1.21 (0.20–8.72)

*Treated as a continuous covariate.

† $P < 0.01$.

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