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

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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% vs 95% CI, 20.0–32.3%), or retest patients diagnosed with trichomoniasis 3 months after treatment (9.6% vs 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. 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, trichomoniasis is associated with other concurrent sexually transmitted infections (STIs), such as herpes simplex virus and human immunodeficiency virus (HIV). Adverse pregnancy outcomes including preterm birth, and pelvic inflammatory disease in women infected with HIV. 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 Control and Prevention guidelines recommend treating all female partners of HIV-positive men with asymptomatic or minimally symptomatic trichomoniasis.

**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-inner 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)   |
| Mid-sized town  | 23  | 207 | 11.1 (7.2–16.2)  |
| Characteristics  | N   | Mean | (95% CI)§ |
| Age             | 206 | 512 | 49.8 (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-responder 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.
Control and Prevention (CDC) recommendations published in 2015 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. Similarly, analysis of data from a network of sexually transmitted disease clinics in the United States found that most clinics tested symptomatic women (≥89%); however, only 44% of women infected with HIV were tested or screened for trichomoniasis. 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. 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: |              |     |     |            |
| T. vaginalis 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) |
| T. vaginalis 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) |
| T. vaginalis 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 T. vaginalis 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 T. vaginalis 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 T. vaginalis 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 Trichomonas vaginalis?  | Yes | 86  | 214 | 40.2 (33.6–47.1) |
| Would you benefit from additional training and/ or resources regarding the diagnosis and management of Trichomonas vaginalis? | 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.
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. 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. 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. 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 \( \chi^2 \) 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 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

| Questions | Answer | n | N | % (95% CI) |
|-----------|--------|---|---|-----------|
| The costs of universal screening for *T. vaginalis* 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 (15.9–26.2) |
| | 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 *T. vaginalis* 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 | 213 | 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:

| Questions | Answer | n | N | % (95% CI) |
|-----------|--------|---|---|-----------|
| *T. vaginalis* 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) |

| Questions | Answer | n | N | % (95% CI) |
|-----------|--------|---|---|-----------|
| *T. vaginalis* 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) |
**TABLE 4. Responses to Questions Regarding Diagnosis of *T. vaginalis* Infections**

| Question                                                                 | Answer | n   | N          | % (95% CI)        |
|-------------------------------------------------------------------------|--------|-----|------------|-------------------|
| Do you screen/test patients for trichomoniasis (*T. vaginalis* infection)? | Yes    | 210 | 229       | 91.7 (87.3–94.9)  |
| Which test(s) do you use to diagnose *T. vaginalis* 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 *T. vaginalis* 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 *T. vaginalis* 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 itchiness/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)    |

*Continued next page*
How often do you perform a diagnostic test for *T. vaginalis* infection, when patients:

| 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)                |
| 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 *T. vaginalis* 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).

**Changes 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 trichomonia, 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 (χ² = 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 (χ² = 64.0, df = 78, *P* = 0.87 and χ² = 7.5, df = 10, *P* = 0.68, respectively).

**Provider Knowledge**

Questions assessing provider knowledge of trichomonia found that the majority of respondents recognize that trichomonia 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 trichomonia are not known to cause adverse pregnancy outcomes (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 treatment.
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 coinfected with HIV (38.8%; 95% CI, 32.3%–45.6%) or had hypersensitivity to a nitroimidazole (45.2%; 95% CI, 38.3%–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).

**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, 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%), abnormality 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 3).

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.

**DISCUSSION**
This study assesses the knowledge, attitudes, and practices of obstetricians–gynecologists in the US regarding trichomoniasis. Provider knowledge reflects evidence-based understandings of trichomoniasis in HIV-positive women as estimated with a full logistic regression model.

**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 | Reference |
| Female | Reference |
| Male | 0.64 (0.27–1.51) |
| Years in practice postresidency* | 1.03 (0.99–1.07) |
| Ethnicity | Reference |
| 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 | Reference |
| General ob-gyn | 2.46 (0.39–15.45) |
| Gynecologic | 1.24 (0.48–3.24) |
| Current practice type | Reference |
| Ob-gyn partnership/group | Reference |
| Solo private practice | 5.18 (1.17–19.66)‡ |
| 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 | Reference |
| Suburban | 1.64 (0.52–5.14) |
| Urban inner city | 1.29 (0.48–3.52) |
| Urban noninner city | 1.24 (0.20–7.55) |
| Rural | 2.50 (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 (*T. vaginalis* 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 *T. vaginalis* infection? | metronidazole 2gx1*          | 165 | 217   | 76.0 (69.8–81.6)            |
|                                                                           | metronidazole 2gx7days       | 1   | 217   | 0.5 (0.0–2.5)               |
|                                                                           | metronidazole 500mgbid7days* | 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)               |
|                                                                           | metronidazole 2gx7days       | 1   | 217   | 0.5 (0.0–2.5)               |
|                                                                           | metronidazole 500mgbid7days* | 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 *T. vaginalis* infection? | metronidazole 2gx1*          | 120 | 216   | 55.6 (48.7–62.3)            |
|                                                                           | metronidazole 2gx7days       | 0   | 216   | 0.0 (0.0–1.7)               |
|                                                                           | metronidazole 500mgbid7days* | 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 *T. vaginalis* infection? | metronidazole 2gx1*          | 86  | 209   | 41.1 (34.4–48.1)            |
|                                                                           | metronidazole 2gx7days       | 20  | 209   | 9.6 (5.9–14.4)              |
|                                                                           | metronidazole 500mgbid7days* | 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 500mgbid7days* | 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 *T. vaginalis* 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 *T. vaginalis* 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 *T. vaginalis* 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 *T. vaginalis* 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*
Patients you see in a typical month?* 1.00 (0.99–1.00)
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 4.82 (0.54–46.43)
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)

*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.

TABLE 6. 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 | Reference |
| Female | Reference |
| Male | 0.21 (0.03–1.22) |
| Years in practice postresidency* | 0.98 (0.93–1.05) |
| Ethnicity | Reference |
| 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 | Reference |
| General ob-gyn | Reference |
| Obstetrics only | 0.00 (0.00 to Inf) |
| Gynecologic | 1.66 (0.40–6.92) |
| Current practice type | Reference |
| 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 | 4.82 (0.54–46.43) |
| Other | 3.46 (0.56–21.21) |
| Practice location | Reference |
| 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.

95% CI estimated by Clopper-Pearson method.

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