Screening a High Risk Population for *Trichomonas vaginalis* at a Local Public Health Laboratory Using a NAAT Assay to Improve Sexually Transmitted Infection Case Management Practices

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BACKGROUND

Trichomonas vaginalis (TV) is one of the most common sexually transmitted infectious agents in the U.S. Symptomatic women with trichomoniasis often develop vaginal discharge, vulvovaginal soreness, and/or genital area irritation[1,2]. About 10% to 50% of infected females remain asymptomatic, and even higher proportions in males. Detection of *T. vaginalis* using culture method is technically challenging, and time consuming. Culture sensitivity is 38% to 82% when compared to molecular methods. "Wet-prep" microscopy for *T. vaginalis* is 35% to 80% sensitive compared to culture, but it is dependent on microscopy experience, and specimen detection is sensitive to transport time.[2,3]

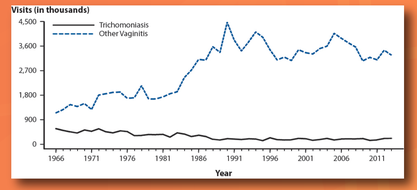

Figure 1. Trichomoniasis and other vaginal infections among women during initial visits to Physicians' Offices, United States, 1966–2013

NOTE: The relative standard errors for trichomoniasis estimates range from 16% to 21% and for other vaginitis estimates range from 8% to 13%.

SOURCE: National Disease and Therapeutic Index, IMS Health, Integrated Promotional Services™, IMS Health Report, 1966–2013.

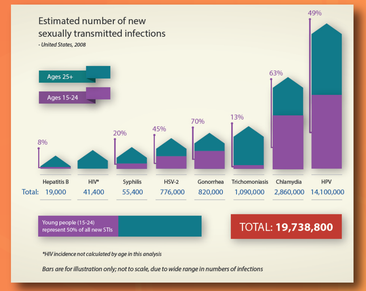

Figure 2. CDC estimates that there are more than 19.7 million new STIs in the United States each year. Young people (ages 15-24) are particularly affected, accounting for half (50 percent) of all new STIs, although they represent just 25 percent of the sexually experienced population.

METHODS

1. An FDA-cleared, APTIMA® *Trichomonas vaginalis* (ATV) nucleic acid amplification test (NAAT) was used on the Panther platform for screening *T. vaginalis* to diagnose trichomoniasis in symptomatic and asymptomatic cases. Specimens included unisex swabs (vaginal, endocervical and male urethral) and urines (male and female).
2. The assay utilizes Target Capture, Transcription-Mediated Amplification (TMA), and Hybridization Protection Assay (HPA) technologies. During the detection step, light emitted from the labeled RNA/DNA hybrid is measured as photon signals in a luminometer and reported as Relative Light Units (RLU).
3. The verification results were assessed by percent agreement to the expected results, repeat rate, and inter-run reproducibility following laboratory-defined acceptance criteria.
4. Clinical case management was performed at the STD clinic based on results from TV screening as established by the CDC.

CDC Screening Guidelines for Trichomonas[1]

Women: Consider for women receiving care in high-prevalence settings (e.g., STD clinics and correctional facilities) and for women at high risk for infection (e.g., women with multiple sex partners, exchanging sex for payment, illicit drug use, and a history of STI).

Persons with HIV: Recommended for sexually active women at entry to care and at least annually thereafter.

RESULTS

1. A total of 259 clinical specimens were analyzed during the validation/verification study. Percentage agreement was 99.4% (168/169), 92.7% (38/41) and 97.9% (48/49) when compared with other NAAT testing, culture, and wet prep respectively (Table 1).
2. This is a highly specific (100%) (95-100% CI) and sensitive assay and has allowed same day detection (average 24 hrs.) of 40-50% more Trichomonas infections than wet mount and culture (Figure 3).
3. During routine screening, 500 females (average age 29 years) were tested for TV by wet-prep microscopy, NAAT-vaginal swab, and NAAT-urine; 10.4 %, 17.8 % and 15.4 % respectively were found positive for TV (Figure 3).
4. TV NAAT vaginal swab is almost twice as sensitive as wet-prep from vaginal source and 3% more sensitive when vaginal swab was compared to urine. A total of 1062 male urines were tested for TV and 5.74 % were found positive by NAAT (Table 2).
5. Co-infection in females positive for *T. vaginalis* with *C. trachomatis* and *N. gonorrheae* was also detected (Figure 4).

RESULTS (continued)

Table 1. Validation Study

	Total Tested	In-agreement	Not In-agreement
Female	179	177 (98.9%)	2
Male	80	77 (96.2%)	3
Total	**259**	**254 (98.1%)**	**5**

Assay Type	Specimens Tested	In-agreement	Not In-agreement
Molecular (TIGRIS)	169	168 (99.4%)	1
Culture (Diamond's media)	41	38 (92.7%)	3
Microscopy (Wet-prep)	49	48 (97.9%)	1
Total Tested	**259**	**254**	**5**

Table 2. Comparison of Hologic APTIMA® Trichomonas with Wet-prep microscopy from female patients screened for *Trichomonas vaginalis*

Wet-prep vs. NAAT Source: Vagina		NAAT	
		Positive	Negative
Wet-prep	Positive	52	0
	Negative	37	411

Vaginal swab vs. Urine as source		Vaginal Swab	
		Positive	Negative
Urine	Positive	74	3
	Negative	15	408

Table 3. Screening for Sexually Transmitted Infections (STIs) using APTIMA® Combo 2 *Chlamydia trachomatis/Neisseria gonorrheae* Assay and APTIMA® *Trichomonas vaginalis* Assay at the City of Milwaukee Health Department Sexually Transmitted Disease (STD) Clinic (Sept. 2015- April 2016)

Hologic APTIMA Combo 2 CT/NG and APTIMA TV Test Results	Sexually Transmitted Infections		
	Trichomonas vaginalis	*Neisseria gonorrheae*	*Chlamydia trachomatis*
Specimen tested	**4174**	**8464**	**6755**
Specimen positive	406 (9.73%)	688 (8.13%)	671 (9.93%)
Patient tested	**2706**	**4645**	**4812**
Patient positive	268 (9.90%)	614 (13.22%)	542 (11.26%)
Female patient tested	**897**	**1179**	**1216**
Female patient positive	155 (17.28%)	149 (12.64%)	92 (7.56%)
Source			
Urine	133	126	64
Vaginal swab	147	0	0
Throat	0	26	48
Rectal	0	12	4
Endocervical	0	2	1
Male patient tested	**1809**	**3466**	**3596**
Male patient positive	112 (6.19%)	465 (13.42%)	449 (12.49%)
Source			
Urine	112	361	306
Throat	0	35	141
Rectal	0	89	70

RESULTS (continued)

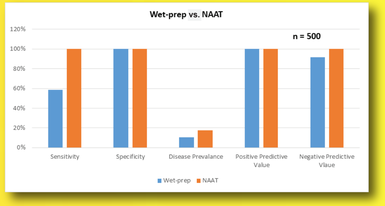

Figure 3. Comparison of sensitivity and specificity of Hologic APTIMA® Trichomonas test against Wet-prep microscopy results from female patients screened for *Trichomonas vaginalis*

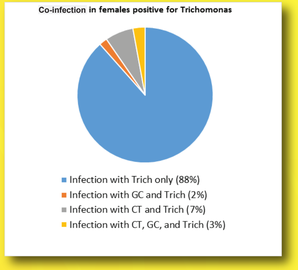

Figure 4. Rate of co-infection in females screened for Trichomonas, Chlamydia and/or Gonorrhea with average age of 29 (Age range 15-62)

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1. Recommendations for the Laboratory-Based Detection of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* — 2014 http://www.cdc.gov/std/laboratory/2014labrec/2014-lab-rec.pdf
2. http://www.cdc.gov/std/tg2015/trichomoniasis.htm
3. http://www.cdc.gov/std/trichomonas/default.htm
4. ATV Panther package insert: http://www.gen-probe.com/inserts/Aptima-trichomonas-vaginalis
5. Panther System Operator's Manual

HIGHLIGHTS

- APTIMA® *T. vaginalis* NAAT assay has allowed simultaneous screening of trichomonas, chlamydia, and gonorrhea from multiple sources in a high-prevalence population at the MHD STD clinic during routine screening (Table 3).
- A single specimen allows detection of co-infection with CT, GC and TV from both females and males (Table 3; Figure 4).
- The age range of *T. vaginalis* detected among the patient population in the clinic setting was 15-62 years (average age 29 years) in females. The women over 30 and men over 40 years old have the highest rates of trichomoniasis.
- Vaginal swab found to be the better source for screening females (~18% detection rate) as compared to urine.
- Ability to detect and treat trichomonas in asymptomatic high-risk populations for HIV, such as MSM, is now much improved due to routine TV screening.
- Higher sensitivity for TV detection compared to current practices and faster turn-around time (<24 hrs.).

Concluding Remarks

TV infection is more common in women than in men. Inclusion of TV with CT/NG NAAT might detect TV in asymptomatic patients, and may also reduce the risk of HIV transmission and improve STI surveillance and case management in public health agencies.

Future Direction

- Screen urine of men and women, and cervical or vaginal swabs in women, for TV.
- Expand screening of high-risk male patients to their partners.
- Add *M. genitalium* NAAT into PHL STI surveillance practices to allow simultaneous detection of multiple agents.
- Explore reimbursement opportunities for public health agencies.

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