



Vaginal Candidiasis

Vaginal Swab Measurement of Candidiasis in Wave I of the National Social Life Health & Aging Project

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Contents

- Rationale
- Measurement
- Population Norms
- Specimen Collection
- Shipping and Storage
- Assay
- Performance Characteristics
- Quality Control
- Availability
- References

Rationale

Vaginal candidiasis, is caused by the overgrowth of a fungal species, *Candida albicans*, in the vaginal flora (Sobel, Faro et al. 1998). The symptoms of vulvovaginal candidiasis include pruritus (itching), soreness, change in vaginal discharge, and dyspareunia (Sobel 1997; Sobel 2007), and can disrupt sexual and social functioning (Nyirjesy, Peyton et al. 2006). Vaginal candidiasis can be sexually transmitted or associated with sexual activity, but commonly occurs in women who are not sexually active

(Lindau, Hoffmann et al. Under Review). Risk factors associated with vaginal candidiasis include elevated estrogen, diabetes mellitus, use of antibiotics and immune suppression (Sobel 2005).

Measurement

Physical examination often reveals discharge that is characterized as thick, adherent, and "cottage cheese-like." However, the discharge may also be thin and loose, and may be similar to the discharge found in other types of vaginitis. The vaginal pH is typically 4 to 4.5, which distinguishes candidiasis from trichomoniasis or bacterial vaginosis (where the pH is elevated) (Sobel 2007). Clinical diagnosis involves microscopic examination of the vaginal secretions to diagnose and characterize vaginal infections.

Population Prevalence

In 20% of healthy asymptomatic women, *Candida* species can be found in the lower genital tract flora (Sobel 2005). Vulvovaginal candidiasis is common in adults: 70-75% of women are affected by this infection at least once in their lives. Nearly 50% of adult women will experience a second case and 5-8% of women will report four or more episodes (Sobel 2007). Among clinical populations of postmenopausal women not using estrogen therapy, vulvovaginal candidiasis is less common than in younger women (Sobel 2005).

- In a study conducted at Ghent University Hospital over the course of 14 weeks, 612 patients (237 post-menopausal) participated. The participants included both those who had complaints of vaginitis and those who did not. Samples from each participant were taken from the lateral vaginal walls and were identified for yeast colonization. This study showed that yeast was present in 20.1% of the overall sample and 18.6% of the post-menopausal women (Bauters, Dhont et al. 2002).
- In a longitudinal study of 1248 asymptomatic women ages 18-30 years, conducted over a period of four hospital visits in one year, 1,248 asymptomatic (18-30 years old) participated. In this study, yeast was present in 70% of the women at least once and in 30% of the women during all four visits over a one year period (Beigi, Meyn et al. 2004).


Specimen Collection

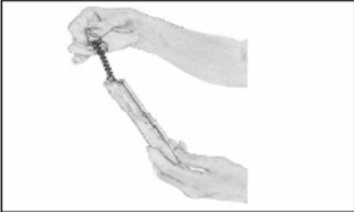
The Vaginal Swab Protocol was designed to collect vaginal specimens for Bacterial Vaginosis (BV), Vaginal Candidiasis (VC), Human Papillomavirus (HPV) testing, and vaginal cytology analysis. All female respondents were asked to provide a vaginal self-swab specimen. Procedures were explained using a scripted description aided by illustrated instructions, developed for NSHAP by a medical illustrator in conjunction with a study investigator who is a gynecologist (figure 1). Participant questions were addressed using a "frequently asked questions" document to ensure consistency of responses across field staff. Field staff read each step of the illustrated instructions to the respondent and asked for questions. Participants were given the instruction card with the collection materials (Female Swab Specimen Collection Kit, Catalog No. 5123-1220; Digene Corporation, Gaithersburg, MD and BBL™ CultureSwab™ Plus, Catalog No. 220117; Becton, Dickinson and Company, Franklin Lakes, NJ) and directed to a bathroom or other private room in the home. When the respondent returned, the interviewer then secured the Digene swab inside a tube containing 1 mL Specimen Transport Medium™ (STM; Digene Corp.) and the BBL™ CultureSwab™ inside a tube containing Amies medium without charcoal (Becton, Dickinson and Company). The interviewer labeled both tubes with the unique, numeric identification number. At the end of each home encounter, field staff stored the vaginal swab transport tubes in an insulated cooler with ice packs. Vaginal swabs were shipped daily on cold packs in a Styrofoam container to the University of Pittsburgh, Magee-Women's Hospital Department of Pathology clinical microbiology laboratory via overnight delivery. The swabs were packaged in accordance with the federal shipping guidelines for diagnostic biological material. Following processing at Magee-Women's, one BBL™ CultureSwab™ for each respondent was repackaged and shipped overnight on cold packs to the University of Chicago Institute for Mind and Biology laboratory for cytological analysis. An interactive

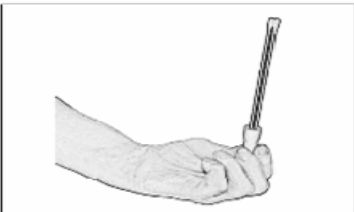
reconciliation system facilitated remote tracking of vaginal swabs. Vaginal swab specimens were collected from all willing female respondents (n = 1,028), with an adjusted cooperation rate of 67.6% (Lindau, Hoffmann et al. Under Review).

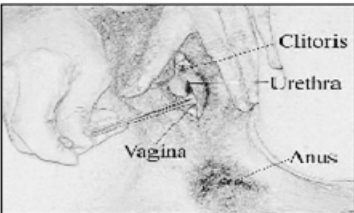
Figure 1. Self Collection of Vaginal Epithelial cells using Dacron Swab


Vaginal Swab Instructions

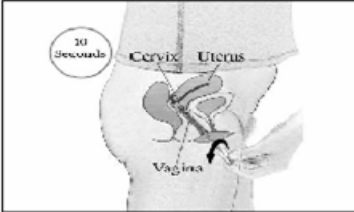
① 
Choose a comfortable position. Either gently squat by bending at the knees, or sit on the toilet.


② 
Remove swabs from packaging.

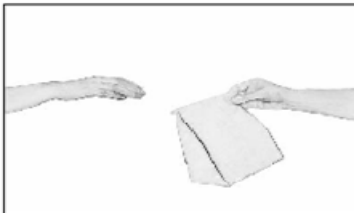
③ 
Hold swabs with the tip up. You may do all the swabs at once or one or two at a time.


④ 
Relax and gently insert the swabs into the vagina.


⑤ 
Stop when your fingers reach the vaginal opening or if you feel discomfort.

⑥ 
Turn the swabs inside the vagina as you count to 'ten.'

⑦ 
Place swabs and packaging directly inside the bag.


⑧ 
Return the bag to the interviewer.





**Do not throw anything in the trash.
Please place all packaging into the bag.**

You may notice a small amount of discharge or blood on the swab.
This is common and is not a cause for concern.



Instructions developed by medical illustrator Rachel Seelen in conjunction with Stacy Lindau, MD.

Shipping and Storage

After collection, the vaginal swab tubes were given to the interviewer and stored at 2-8°F, in an insulated bag with two reusable ice packs.

Prior to shipping, collection tubes containing specimens were removed from the insulated bag, placed in a small Ziploc™ bag with a handful of cotton balls, and then placed in a Styrofoam™ container and 8" x 7" x 7" cardboard box with a disposable ice pack. They were shipped to The University of Pittsburgh Department of Pathology, Magee-Women's Research Institute Laboratory by overnight FedEx Express, The swabs were packaged in accordance with the federal shipping guidelines for diagnostic biological material and were placed in a drop box or calling for pickup by FedEx. Specimens were shipped daily.

Weekly reconciliation, using a remote and interactive vaginal swab tracking system, between NORC and the Magee-Women's laboratory, compared questionnaire data (indicating whether a sample was recorded as collected) with laboratory data (indicating whether a sample was recorded as received). Discrepancies in reconciliation were resolved and recorded. (Lindau, Hoffmann et al. Under Review)

<i>Method</i>	FedEx Express: placed in drop box or picked up by FedEx
<i>Shipping Address</i>	Jeanne Jordan Magee-Women's Hospital Clinical Microbiology Lab 300 Halket Street, Room 4680 Pittsburgh, PA 15213 (412) 641-4104

Assay

Preparation for the vaginal Candidiasis assay began with rolling of the culture swab onto the surface of a glass slide, thus transferring the vaginal cellular specimen from the swab to the slide. The slide was air dried and fixed with 95% methanol and then stained using a standard gram stain protocol. (Burke 1922)

The same gram stained slides used to assess the presence of bacterial vaginosis, were also evaluated for the presence of yeast, by using the 1000x objective under oil. A dichotomous score was assigned to each specimen slide, after the reader viewed and examined the entire area of each stained slide to determine the presence or absence of yeast cells showing blastoconidia (cell buds) (Lindau, Hoffmann et al. Under Review).

Technical details of the vaginal swab laboratory assays have been previously described (Lindau, Drum et al. Under Review). The vaginal Candidiasis assay method is detailed below:

Assay Type	Collection Device	Manufacturer	Laboratory	Assay Type	Protocol
Vaginal Candidiasis (VC)	Double Copan swab with Dacron tip	BBL™ CultureSwab™ Plus, Catalog No. 220117; Becton, Dickinson and Company, Franklin Lakes, NJ	UP-MWRI	Gram stain of vaginal material on glass slide (Burke, 1922)	Clinical

Magee-Womens Research Institute laboratory performed a Gram stained slide of a smear made from the vaginal swab samples. The smear was read for the presence of yeast, which stains gram-positive.

Table 2. NSHAP Vaginal Swab testing performed by Magee-Women's Research Institute			
Assay Type	Assay principle	Regulatory Status	Samples
Gram stain smear	Evaluation for the presence of yeast	None	Vaginal or cervical self-collected swab

Standard clinical procedures were used by Jeanne A. Jordan, Ph.D., Associate Professor in Pathology, University of Pittsburgh, Director-Microbiology, Virology, Molecular Diagnostics and Immunology at Magee-Women's Hospital, Associate Director, Magee-Women's Research Institute (Burke et al.).

Performance Characteristics

Each stained slide was read by two independent observers who were blinded to the other's results. Discordant results were re-reviewed by the initial two readers as well as reviewed by a third observer to resolve the discrepancies.

Quality Control

The laboratory participates in semi-annual proficiency testing for gram staining, and must achieve greater than 90% overall agreement with these challenges. Gram stain reagents are checked weekly with each new lot of stain before it is put into use. Gram stain reagents were evaluated by staining ATCC 25923 *Staphylococcus aureus*, ATCC 25922 *E. coli*, and ATCC 26555 *Candida albicans*.

Availability

STM Vaginal Swab		Blue-Tipped Vaginal Swab (double swab)
Product Name	Female Swab Specimen Collection Kit *Collection kit includes: sterile Dacron® swab and tube with 1 mL of Specimen Transport Medium™	BD BBL™ CultureSwab™ Plus Amies without Charcoal
Manufacturer	Digene Corporation	Becton, Dickinson and Company
Location of Manufacturer	Gaithersburg, MD	Franklin Lakes, NJ
Product Number	5123-1220	220117
Interviewer Instructions	When respondent returns, insert the swab into the STM tube and break off the extra handle of the swab by pressing it along the side of the tube. Label the tube with Respondent's SUID number using a Sharpie pen and a blank lab label.	When respondent returns, remove cap from tube with gel and tightly insert blue tipped swab in gel. Label tube with Respondent's SUID number using a Sharpie pen and a blank lab label.

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