HHS Public Access

Author manuscript

Am J Obstet Gynecol. Author manuscript; available in PMC 2025 September 01.

Published in final edited form as:

Am J Obstet Gynecol. 2024 September ; 231(3): e101–e104. doi:10.1016/j.ajog.2024.04.048.

Vulvovaginal candidiasis culture results from a major national commercial laboratory, United States, 2019–2023

Kaitlin BENEDICT, MPH,
Dallas J. SMITH, PharmD,
Meghan LYMAN, MD,
Jeremy A.W. GOLD, MD

Centers for Disease Control and Prevention, Atlanta, Georgia, USA

Keywords

vulvovaginal candidiasis; *Candida* ; yeast; culture; United States

Objective

Vulvovaginal candidiasis (VVC) affects >50% of U.S. women during their lifetime.[1] Although most VVC cases respond to short-course azole therapy, ~10–20% are more difficult to treat, involving severe or recurrent infections or certain non-*albicans Candida* (NAC) species that are more frequently azole-resistant than *C. albicans*.[1] In a 2003–2007 PCR-based study, NAC comprised 11% of isolates from women with suspected VVC.[2] To inform clinical practice, we describe recent VVC species distribution and culture-based testing patterns in a major U.S. commercial laboratory dataset.

Study design

Using nationwide Labcorp data sent to the CDC's National Syndromic Surveillance Program (https://www.cdc.gov/nssp/index.html), we identified *Candida* culture results from vulvovaginal specimens ordered during 3/1/2019–11/1/2023. We compared patient characteristics, ordering provider type, and temporal trends for *C. albicans* vs. NAC.

Results

Among 9,910 *Candida* culture results, species were 83.8% *albicans*, 8.8% *glabrata*, 3.6% *parapsilosis*, 1.0% *krusei*, and 2.8% other. Compared with *C. albicans*, NAC were more frequently from older women (median age 45.0 vs. 32.0 years, p<0.001) and ordered by

Correspondence: Kaitlin Benedict, 1600 Clifton Road NE, Mailstop H24-9, Atlanta, Georgia, USA 30329, jsy8@cdc.gov.

Conflict of interest statement: all authors declare no conflicts of interest.

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

This activity was reviewed by the CDC and was conducted consistent with applicable federal law and CDC policy (e.g., 45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S.C. §552a; 44 U.S.C. §3501 et seq.). These data are fully de-identified, so this analysis was not subject to review by the Centers for Disease Control and Prevention institutional review board.

OBGYNs (77.9% vs. 68.3%, p<0.001) and by Northeast-based providers (67.8% vs. 52.1%, p<0.001). Median time from culture order to result was 6 days (interquartile range 4–8). The number of *Candida* results increased during 2023 compared with previous years; however, the proportion of NAC remained relatively stable over time (Supplemental figure).

Conclusion

C. albicans remains the most common species implicated in VVC, and the proportion of NAC (16%) was stable in recent years but higher than the previous nationwide study (11%) nearly two decades ago.[2] Although NAC appear to be less virulent than *C. albicans*,[3] it is concerning that 13% of culture results were *C. glabrata* or *C. krusei*, which are inherently less susceptible (*glabrata*) or resistant (*krusei*) to fluconazole. This finding highlights the utility of diagnostic testing, which is CDC-recommended for all women with suspected VVC[1] but is routinely performed by <25% of healthcare providers.[4] Further research is needed to understand barriers to ordering testing, but culture turnaround time (nearly a week in this analysis) might contribute.

That most cultures were ordered by OBGYNs is consistent with previous studies.[4] The higher proportion of cultures and NAC results from the Northeast might reflect true regional variation in NAC prevalence or differences in populations served by Labcorp or in testing practices; prior studies have found higher VVC testing rates in the Midwest.[4] The association between older age and NAC has previously been attributed to hormonal or immune-related factors.[2] Study limitations include possible referral bias (i.e., cultures more frequently ordered for recurrent or refractory VVC) and the inability to distinguish infection from commensalism, multiple results per patient, repeat testing, and reasons for the increase in testing volume. Additionally, data about risk factors (e.g., antibiotic or estrogen use), clinical features, treatment, and resistance were unavailable.

Overall, this update to the epidemiology of species involved in VVC highlights a potential increase in NAC compared with previous data and supports the need for continued diagnostic testing (including improved point-of-care tests) and monitoring of causative species to inform treatment guidelines.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Funding:

No specific funding was received for this work.

Data sharing statement:

This study used third-party data that we cannot legally distribute. All relevant summary data is contained within the manuscript.

References

1. CDC. Sexually Transmitted Infections Treatment Guidelines, 2021. Vulvovaginal Candidiasis (VVC). Accessed 12/12/2023, https://www.cdc.gov/std/treatment-guidelines/candidiasis.htm
2. Vermitsky JP, Self MJ, Chadwick SG, et al. Survey of vaginal-flora Candida species isolates from women of different age groups by use of species-specific PCR detection. J Clin Microbiol. Apr 2008;46(4):1501–3. doi:10.1128/jcm.02485-07 [PubMed: 18305136]
3. Willems HME, Lowes DJ, Barker KS, Palmer GE, Peters BM. Comparative Analysis of the Capacity of the Candida Species To Elicit Vaginal Immunopathology. Infect Immun. Dec 2018;86(12)doi:10.1128/iai.00527-18
4. Benedict K, Moret R, Molinari NAM, Jackson BR. Survey of healthcare providers' testing practices for vulvovaginal candidiasis and treatment outcomes–United States, 2021. PLOS ONE. 2022;17(12):e0278630. doi:10.1371/journal.pone.0278630 [PubMed: 36584109]

Tweetable statement:

Among nearly 10,000 *Candida* culture results from vulvovaginal specimens at a large U.S. commercial laboratory, 16% were non-*albicans* species.

AJOG at a Glance:

a. **Why was this study conducted?** To provide an update on the epidemiology of *Candida* species involved in vulvovaginal candidiasis.

b. **Key findings** Sixteen percent of vulvovaginal cultures yielded non-*albicans Candida* species.

c. **What does this add to what is already known?** Given that certain non-*albicans Candida* species are less susceptible to fluconazole, our findings support the importance of diagnostic testing for VVC and the need for monitoring of causative species to inform treatment guidelines.

Table.

Vulvovaginal candidiasis culture results from a large national commercial laboratory, United States, March 1, 2019 to November 1, 2023

	Total		***Candida albicans***		**non-*albicans Candida***		
Characteristic	**n=9,910**	**%**	**n=8,307**	**%**	**n=1,603**	**%**	**p-value***
Median age, years (IQR)	34.0	(25.0–46.0)	32.0	(25.0–43.0)	45.0	(34.0–59.0)	<0.001
Age group, years (n=9,862)							<0.001
0 to 17	386	3.9%	367	4.4%	19	1.2%	
18 to 44	6,851	69.5%	6,089	73.6%	762	48.0%	
45 to 64	1,914	19.4%	1,340	16.2%	574	36.1%	
≥65	711	7.2%	478	5.8%	233	14.7%	
U.S. census region of provider (n=9,895)							<0.001
Midwest	737	7.4%	629	7.6%	108	6.8%	
Northeast	5,407	54.6%	4,323	52.1%	1,084	67.8%	
South	2,529	25.6%	2,271	27.4%	258	16.1%	
West	1,222	12.3%	1,074	12.9%	148	9.3%	
Provider type (n=8,942)							<0.001
OB/GYN	6,247	69.9%	5,109	68.3%	1,138	77.9%	
Family, general practice, internal medicine	889	9.9%	778	10.4%	111	7.6%	
Hospital	648	7.2%	566	7.6%	82	5.6%	
Other	1,158	13.0%	1,028	13.7%	130	8.9%	
Median time from order to result, days (IQR)	6.0	(4.0–8.0)	6.0	(4.0–8.0)	6.0	(4.0–8.0)	0.485
Reason for testing (ICD-10-CM code) (n=9,184)							
Candidiasis of vulva and vagina (B37.3)	3,735	40.7%	3,038	39.5%	697	46.5%	<0.001
Other specified noninflammatory disorders of vagina (N89.8)	1,851	20.2%	1,598	20.8%	253	16.9%	<0.001
Acute vaginitis (N76.0)	1,412	15.4%	1,234	16.1%	178	11.9%	<0.001
Subacute and chronic vaginitis (N76.1)	269	2.9%	213	2.8%	56	3.7%	0.043
Subacute and chronic vulvitis (N76.3)	137	1.5%	116	1.5%	21	1.4%	0.751
Acute vulvitis (N76.2)	88	1.0%	80	1.0%	88	5.9%	0.065
***Candida* species**							
C. albicans	8,307	83.8%					
C. glabrata	868	8.8%					
C. parapsilosis	358	3.6%					
C. krusei	102	1.0%					
C. dubliniensis	86	0.9%					
C. lusitaniae	64	0.6%					
C. tropicalis	63	0.6%					
C. guilliermondii	12	0.1%					

	Total		***Candida albicans***		**non-*albicans Candida***		
Characteristic	**n=9,910**	**%**	**n=8,307**	**%**	**n=1,603**	**%**	**p-value***
Other *Candida* species**	50	0.5%					

*Chi-square test or student's t-test

**C. orthopsilosis, C. kefyr, C. lipolytica, C. ciferrii, C. famata, C. rugosa, C. lambica, C. norvegensis, C. freyschussii, C. inconspicua, C. intermedia, C. nivariensis, C. pelliculosa, C. utilis