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Concise Communication

Preparedness for *Candida auris* in Canadian Nosocomial Infection Surveillance Program (CNISP) hospitals, 2018

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Abstract

We surveyed Canadian Nosocomial Infection Surveillance Program hospitals to evaluate infection prevention and microbiology laboratory preparedness for *Candida auris*. We identified significant gaps: most hospitals were not prepared to screen patients for colonization, and only one-half of laboratories reported identifying all clinically significant *Candida* isolates to the species level.

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Candida auris is a rapidly emerging, multidrug-resistant fungus that has caused outbreaks of severe infection in several countries.[1–4] Difficulties in laboratory identification and lack of information about how best to identify colonized patients and prevent transmission make response to this emerging pathogen challenging.[1,2,5]

In Canada, the first multidrug-resistant *C. auris* was reported in 2017.[6] As of October 2019, 5 provinces had reported 24 cases with variable susceptibility (unpublished information, Public Health Agency of Canada).[7] To date, no program has been implemented for systematic surveillance of *C. auris* in Canada, and data to inform best practices in microbiology and infection prevention and control (IPAC) remain sparse. The Canadian Nosocomial Infection Surveillance Program (CNISP), a collaboration between the Public Health Agency of Canada and the Association of Medical Microbiology and Infectious Diseases Canada, formed a *C. auris* interest group in January 2018. We surveyed CNISP hospitals to assess preparedness for *C. auris*.

Methods

A survey with 5 IPAC and 12 microbiology laboratory questions was developed by the interest group and was pilot tested at 3 CNISP hospitals (see Supplementary material). In January 2018, the survey was e-mailed to IPAC and microbiology lead for all 66 CNISP hospitals, which are served by 32 microbiology laboratories. Three reminder e-mails were sent at biweekly intervals. Data were entered and analyzed using Excel (Microsoft, Redmond, WA) or OpenEpi (www.openepi.com).

Results

We received completed IPAC surveys for 56 of 66 CNISP hospitals (85%): 23 responses (41%) were from Western Canada (British Columbia, Alberta, Saskatchewan, Manitoba), 21 (38%) were from Central Canada (Ontario, Quebec) and 12 (21%) were from Eastern Canada (the Atlantic provinces). Of 56 hospitals, 10 (18%) had a written policy regarding which patients should be screened for *C. auris* colonization, and an additional 11 hospitals (20%) recommended some patient screening (Table 1). The most commonly recommended screening (18 of 21 hospitals, 86%) was for roommates of colonized or infected patients. Three hospitals (14%) recommended admission screening of patients who had recently received health care in the Indian subcontinent, although 28 hospitals (50%) would recommend this screening in the absence of resource limitations (Table 1).

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Table 1. Infection Prevention and Control Measures Related to *Candida auris* in Canadian Nosocomial Infection Surveillance Program (CNISP) Hospitals, 2018

IPAC Questions	Hospitals (N = 56), No. (%)
Does your program have a policy defining screening for *C. auris* colonization?	
Yes	10 (18)
Not yet, but are considering as one will be needed	24 (43)
No, we have more important priorities	12 (21)
No, level of risk in our geographic area does not warrant it	7 (13)
No, the evidence does not support the need for screening	3 (5)
Does your hospital currently recommend patient screening?	
No, we do not currently have a recommendation	35 (63)
Yes, we recommend the following patient screening:	21 (38)
Patients with recent healthcare exposure in the Indian subcontinent	3 (14)
Roommates of patients colonized/infected with any *C. auris*	18 (86)
Roommates of patients colonized/infected with multidrug-resistant *C. auris*	18 (86)
Ward mates of patients colonized/infected with any *C. auris*	7 (33)
Ward mates of patients colonized/infected with multidrug-resistant *C. auris*	10 (48)
What body sites does your program recommend for screening?	
Not applicable, do not recommend screening	18 (32)
Not yet determined	11 (20)
Pooled axilla and groin only	8 (14)
Pooled axilla and groin and at least one other site	12 (21)
If you had no resource limitations, what patient screening would be recommended?	
Patients with recent healthcare exposure in the Indian subcontinent	28 (50)
Patients with recent hospitalization outside Canada (excluding Indian subcontinent)	15 (27)
Roommates of patients colonized/infected with any *C. auris*	42 (75)
Roommates of patients colonized/infected with multidrug-resistant *C. auris*	25 (45)
Ward mates of patients colonized/infected with any *C. auris*	23 (41)
Ward mates of patients colonized/infected with multidrug-resistant *C. auris*	15 (27)

Table 2. Laboratory Practice Related to the Identification and Susceptibility Testing of *Candida spp.*, Canadian Nosocomial Infection Surveillance Program (CNISP) Hospitals, 2018

Laboratory Practice	Laboratories (N = 27), No. (%)
Specimens from which clinically significant[a] *Candida* isolates are identified to the species level	
Any specimen if *Candida* is deemed clinically significant	13 (48)
All sterile site isolates and some isolates from nonsterile sites	9 (33)
Sterile sites only	5 (19)
None	1 (4)
Methods for identification of *Candida* to the species level	
MALDI-TOF MS (Biotyper, Bruker)	10 (37)
MALDI-TOF MS (Vitek MS; clinical database alone)	8 (30)
MALDI-TOF MS (Vitek MS, clinical and research use only database)	4 (15)
Other[b]	4 (15)
Sources of *Candida spp.* for which antifungal susceptibility testing is performed	
All blood and cerebrospinal fluid	23 (85)
All sterile sites	17 (63)
Some nonsterile sites[c]	14 (52)
Antifungals for which susceptibility testing is performed	
Fluconazole	23 (85)
One or more of voriconazole, posaconazole, itraconazole	14 (52)
At least one echinocandin (caspofungin, micafungin, anidulafungin)	22 (81)
Amphotericin B	20 (74)
5-flucytosine	7 (26)

[a]Clinically significant isolates are those for which laboratory standard operating procedures require reporting.
[b]1 laboratory reported using API 20 C AUX (bioMerieux, France); 1 used RapID Yeast Plus (ThermoFisher, Walton, MA) and a nonspecified chromogenic agar, 1 used Vitek 2 YST (bioMerieux, France) and did not specify their nonMALDI-TOF MS method.
[c]Reasons for performing susceptibility testing were request by clinician (n = 9 laboratories), prior antifungal use (n = 2), immunocompromised patients (n = 1), treatment failure (n = 1), isolates from surgical site infections (n = 1), and urine isolates (n = 1). Some laboratories reported >1 reason; 1 did not specify the reason.

Laboratory surveys were received from 27 of 32 CNISP laboratories (84%). Practices related to identification and susceptibility testing of clinically significant *Candida* isolates are shown in Table 2. In addition to the identification methods described in Table 2, 26 laboratories (95%) reported that isolates from sterile sites that were not successfully identified to the species level would be sent to a reference lab and/or would be subjected to sequencing for identification. Among these laboratories, 3 reported using PCR and/or sequencing in-house to identify some isolates.

Overall, 23 laboratories (85%) reported that susceptibility testing was performed on some C*andida* isolates identified in their laboratory (Table 2). Of these, 18 laboratories perform some susceptibility testing in-house: 6 by broth microdilution, 2 using gradient strips, 3 using Vitek 2, and 6 by a combination of these with or without disc diffusion testing (1 laboratory did not specify methodology).

When the 27 laboratories were asked about their confidence that a clinically significant isolate of *C. auris* would be correctly identified in their laboratory, 14 (52%) reported being confident that isolates from sterile sites and nonsterile site isolates resistant to at least 1 antifungal would be correctly identified. Eight laboratories (30%) were confident that isolates from sterile sites but not from nonsterile sites would be correctly identified, and 1 (4%) was confident that resistant isolates, but not susceptible isolates from

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sterile sites, would be correctly identified. Another 4 laboratories (15%) were not confident in their ability to identify any *C. auris*. In only 4 of these laboratories would implementing the now available updated Biomerieux Vitek Maldi system, which correctly identifies *C. auris*, improve *C. auris* identification.

Three laboratories (11%) reported having a standard operating procedure for processing screening swabs to detect *C. auris* colonization: 2 laboratories used their own protocol and 1 used the CDC protocol.[1] Four laboratories, including 2 of the 3 with standard operating procedures for screening swabs, reported identifying 6 patients infected or colonized with *C. auris* between 2014 and 2018. Of 6 cases, 4 had isolates from sterile sites: 3 isolates were resistant to fluconazole and 1 was multidrug-resistant. Of 17 responding hospitals served by laboratories that had previously identified *C. auris*, 16 hospitals recommended some screening for *C. auris* compared to 5 of 39 other hospitals ($P < .001$), and 16 of 17 either had or were considering an IPAC screening policy, compared to 15 of 39 other hospitals ($P < .001$).

Discussion

Despite the identification of multidrug-resistant *C. auris* in Canada, significant gaps remain in preparedness in CNISP hospitals. Only 18% of hospitals had policies defining which patients should be screened for colonization, and only 14% recommended screening any patients at admission. Although most CNISP laboratories perform or obtain susceptibility testing routinely and are confident in species identification for sterile site isolates, only half of these laboratories have processes that would identify clinically significant *C. auris* isolated from a nonsterile site specimen, and few have protocols for *C. auris* colonization detection.

The gaps we identified in IPAC are driven in part by the lack of evidence regarding the epidemiology and burden of disease due to *C. auris*.[3] Despite outbreaks of *C. auris* infection in numerous countries,[1-4] few data exist to quantify the risk among patients with a history of hospitalization in these countries or to determine the threshold of risk at which screening should be implemented. Nonetheless, the regular importation of carbapenemase-producing *Enterobacteriaceae* (CPE) from countries with known *C. auris* risk,[8] the co-occurrence of CPE and *C. auris*,[9] and the rapid spread of *C. auris* in hospitals[1,4] suggest that preparedness is essential. Although evidence shows that our hospitals are responding to the local identification of *C. auris*, recent US data suggest that waiting for the identification of *C. auris* in a sterile site prior to defining a response may permit the establishment of substantial local transmission.[10]

Laboratories are struggling with accurate identification of *C. auris* and with the development of tests to screen for colonization.[1] In 2018, some commonly used organism identification systems did not reliably identify *C. auris*.[5] Although considerable progress has been made in improving identification and in developing screening media since this survey, optimizing the speed of such development requires many laboratories and media suppliers to have access to both isolates and specimens from colonized patients. As new pathogens continue to emerge, further consideration given now to developing global and national processes to optimize laboratory response to novel antimicrobial resistance mechanisms and pathogens could significantly improve future responses.

This survey has several limitations. CNISP hospitals are geographically representative in Canada, but they are predominantly larger teaching hospitals, and preparedness in smaller community hospitals may be different. IPAC and laboratory practices may be different at nonresponding sites and may change over time. The structure of the survey (eg, a limited number of potentially at-risk populations listed in IPAC question no. 1) may have resulted in misinterpretation of opinion or loss of information. Nonetheless, our survey shows that important gaps in IPAC and laboratory preparedness for identifying *C. auris* patients exist among Canadian hospitals.

CNISP members agreed in 2018 to establish surveillance for *C. auris*, national IPAC guidelines are in development, and some provinces have issued preliminary guidance[5] and/or included *C. auris* in laboratory proficiency testing.[11] How effective these responses will be in protecting our patients from transmission of *C. auris* in Canadian hospitals remains to be seen.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/ice.2019.369

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