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A description of the first *Candida auris*-colonized individuals in New York State, 2016–2017

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Abstract

Candida auris (*C. auris*) is a globally emerging multidrug-resistant yeast. New York State (NYS) first detected *C. auris* in July 2016 and is the state most affected. This brief report describes characteristics of the first 114 individuals colonized with *C. auris* identified through active surveillance/screening by NYS Department of Health. “Colonized/screened” individuals were old (median age, 74 year), had extensive health care exposures and underlying conditions (multiple health care facility admissions in the 90 days prior with more than 80% requiring mechanical ventilation), and had 30- and 90-day mortality rates of 17.5% and 37.7%, respectively (with approximately 60% expired in the 2-year follow-up period). This description is helpful to inform additional prevention measures and add to the collective understanding of *C. auris* in the United States.

Keywords

Candida auris ; Colonization; patient and resident characteristics

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Candida auris (*C. auris*) is a globally emerging multidrug-resistant yeast.[1] New York State (NYS) first detected *C. auris* in July 2016.[2] Since that time, over 2,000 clinical and colonized/screened (in NY known as surveillance) cases have been identified in the state, which is the most affected in the United States as of the writing of this brief report.[2,3]

This pathogen is problematic due to the specialized testing required for identification, potential to develop resistance to multiple classes of antifungal medications, propensity to contaminate health care environmental surfaces and medical equipment, and potential for extensive transmission within health care facilities (HCF).[1,3,4] *C. auris* colonization is likely a risk factor for infection.[1,5] Little aggregate information regarding the profile of individuals with *C. auris* in the United States has been shared. We describe the characteristics of the first 114 individuals colonized with *C. auris* (ie, "colonized/screened")[6] identified through active surveillance by NYS Department of Health (NYSDOH) to help inform additional prevention measures and add to the collective understanding of *C. auris* in the United States.

As part of a multipronged approach to prevent and control *C. auris*, NYSDOH investigated all individuals with suspected or confirmed *C. auris*, for whom standardized case reports were submitted.[6,7] NYSDOH conducted case finding for asymptomatic individuals colonized with *C. auris* through contact tracing and point prevalence surveys (PPS) in HCFs where individuals with *C. auris* clinical infection or colonization had spent time during the 90 days prior to their first positive culture. Wadsworth Center, the NYS public health laboratory, tested specimens for *C. auris*, predominantly from nasal and combined axilla and groin swabs, by polymerase chain reaction and fungal culture.[8] Individuals who were culture or polymerase chain reaction-positive identified during a PPS who did not have evidence of clinical infection were classified as colonization/screening cases (in NY previously referred to as "surveillance cases").[6] The extent of active surveillance through PPS varied across HCFs. In some HCFs, current or former roommates were swabbed as a first step to assess potentially exposed individuals. However, many of the swabs were collected as part of PPSs of individuals on the same unit where the individuals colonized or infected with *C. auris* received care. Descriptive analysis of demographic and clinical data was performed.

Between August 26, 2016 and November 7, 2017, 114 individuals colonized/screened with *C. auris* were identified (81% with axilla/groin and 64% with nasal colonization; 60% had both sample sites positive within 7 days). These cases comprised 7% of the 1,668 total individuals screened (with 3,875 surveillance swabs collected) during 72 PPS and contact tracing efforts at 41 HCFs, including 24 long-term care facilities, 16 hospitals and one long-term acute care facility. Ninety-seven percent were diagnosed in New York City (NYC) HCFs; the majority (95%) in 2 boroughs, Kings (Brooklyn) and Queens.

Of these 114 colonization/screening cases, the median age at time of colonization/screening was 74 years (range 23–100 years); half (50%) were male. Individuals colonized/screened with *C. auris* were of several races (White 37%, Black/African American 35%, Asian/Pacific Island 9%, American Indian or Alaskan Native 1%, other 2%, unknown/missing 17%) reflective of the diverse NYS population.

More than half (54%) had diabetes and more than one quarter (26%) had chronic kidney disease. Colonization/screening cases had a median of 3 HCF admissions within the 90 days before first positive culture (range 0–8). During the 14 days prior to the first positive *C. auris* culture, 49% received systemic antibiotics. During the 7 days prior to the first positive *C. auris* culture, 81% were on mechanical ventilation, 80% had a tracheostomy, and 70% had a percutaneous feeding tube. In contrast, few had documented underlying solid organ tumor (4%) or hematological malignancy (2%), one had chemotherapy in the 14 days prior to the screening culture, one had known HIV/AIDS, and none were bone marrow transplant recipients. Approximately one-third (34%) did not have prior indications to be placed on Contact Precautions (ie, isolation with use of gown and gloves for care) at the time of first positive *C. auris* culture. As of July 31, 2018, 6 (5%) progressed to *C. auris* bloodstream infection (most with indwelling devices and wounds) and 12 (11%) had serial negative *C. auris* surveillance cultures (ie, “cleared” as per NYSDOH protocols. The 30- and 90-day mortality rates for these individuals were 17.5% and 37.7%, respectively (62% were deceased in the 2-year follow-up period). The attributable role of *C. auris* in case morbidity and mortality is uncertain given that most these colonized/screened individuals had multiple underlying comorbidities that could have contributed to the observed outcomes (Table 1).

Our data are limited in that they are retrospective, and some case report forms and medical records were incomplete (eg, antifungals were inconsistently documented). It is unknown when or how many individuals became colonized with *C. auris*. The data presented here comprise a case series; the frequencies of various clinical and demographic characteristics are difficult to interpret fully absent a comparison group. That said, a related but smaller published case-control study found similar factors (health care facility exposure, mechanical ventilation, and antimicrobials) associated with *C. auris*.[9] Our experience in NYS may not be generalizable to *C. auris* colonization in different locations, although early descriptions from other affected Areas in the United States suggest similar, vulnerable patient populations.[10]

Many asymptomatic individuals colonized with *C. auris* were identified in NYS, predominately in NYC. The majority of these colonized individuals had multiple comorbidities including a high proportion with mechanical ventilation or respiratory care needs and extensive exposure to health care facilities. Unlike usual thinking regarding fungal infections, few individuals had underlying malignancy or related conditions. A subset developed *C. auris* bloodstream infection. Approximately 1/3 of the colonized/screened individuals were not on Contact Precautions prior to their diagnosis, which may have contributed to unrecognized transmission. On the other hand, many individuals were already on Contact Precautions suggesting they already had other multidrug-resistant organisms (MDROs). From our previous work and that of others, it is known that *C. auris* can heavily colonize HCF environments and medical equipment.[7,11] Collectively, these facts underscore the clinical significance of *C. auris* for both the vulnerable individual and those individuals within the HCF environment. This speaks to the importance of meticulous hand hygiene, appropriate use of personal protective equipment and interfacility communication. In addition, environmental cleaning with hospital-grade disinfectants from the Environmental Protection Agency’s List P and K Agents [EPA registered surface disinfectants effective against *C. auris* and *Clostridioides difficile* spores] [12] or related agent with attention to

contact times, high touch surfaces and all equipment (many cleaned by staff other than environmental services) is also key. These basics of infection prevention and control are consistent with CDC and NYSDOH *C. auris* recommendations[1–3] and with CDC's larger containment strategies for tiered public health response to contain novel or targeted MDROs.[13] Our individual profile information may be useful to inject practical consideration and aid in the potential implementation of other interventions such as cohorting and admission screening.[1–3,13] Descriptive data about individuals colonized with *C. auris* such as those presented here will continue to be collected, shared, and used to inform the evolving response to this rapidly emerging pathogen. Given the recent reports of *C. auris* clusters affecting COVID units,[14,15] the relevance of these findings take on renewed significance.

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Table 1

Summary of characteristics of *C. auris*-colonized individuals in NYS, 2016–2017

Characteristics	N = 114 (%)[‡]
Demographics	
Gender, male (%)	57 (50%)
Age in years [median (range)]	74 (23–100)
Race (%)	
White	42 (37%)
Black	40 (35%)
Asian	10 (9%)
Other or unknown	22 (19%)
Conditions	
Diabetes (%)	61 (54%)
Chronic kidney disease (%)	30 (26%)
Solid organ tumor	2 (2%)
Hematological malignancy	1 (1%)
Case location	
# HCFs in 90 days before diagnosis [median (range)]	3 (0–8)
Diagnosis location: New York City (%)	111 (97%)
By county: Kings (Brooklyn) & Queens (%)	108 (95%)
Queens (%)	56 (49%)
Kings (%)	52 (48%)
Exposures	
Devices in 7 days before diagnosis:	
Mechanical ventilation	92 (81%)
Tracheostomy	91 (80%)
Percutaneous gastrostomy (G-tube)	80 (70%)
Receipt of systemic antibiotics 14 days before diagnosis [*]	56 (49%)
Clinical course/outcomes[†]	
Not on contact precautions (at time of testing)	39 (34%)
Progressed to bloodstream infection	6 (5%)
Attained serial negative cultures {“cleared”) per NYSDOH protocol	12 (9%)
Expired	71 (62%)

HCF, health care facility.

[*] Receipt of antifungal agents inconsistently documented.

[†] As of last follow-up 7/31/18.

[‡] Represents positive individuals from HCF out of the 1,668 (7%) total individuals tested by contact tracing in the timeframe 8/26/16–11/7/17; with a total of 3,875 swabs collected during 72 point prevalence surveys at 41 HCFs.