Infection Control & Hospital Epidemiology (2021), **42**, 1301–1306
doi:10.1017/ice.2021.12

Original Article

Preparedness and response to an emerging health threat—Lessons learned from *Candida auris* outbreaks in the United States

Diane Meyer MPH[1], Elena K. Martin MPH[1], Syra Madad DHSc[2], Priya Dhagat MS[2] and Jennifer B. Nuzzo DrPH[1]

[1]Johns Hopkins Center for Health Security, Baltimore, Maryland and [2]New York City Health and Hospitals, New York, New York

Abstract

Objective: *Candida auris* infections continue to occur across the United States and abroad, and healthcare facilities that care for vulnerable populations must improve their readiness to respond to this emerging organism. We aimed to identify and better understand challenges faced and lessons learned by those healthcare facilities who have experienced *C. auris* cases and outbreaks to better prepare those who have yet to experience or respond to this pathogen.

Design: Semi-structured qualitative interviews.

Setting: Health departments, long-term care facilities, acute-care hospitals, and healthcare organizations in New York, Illinois, and California.

Participants: Infectious disease physicians and nurses, clinical and environmental services, hospital leadership, hospital epidemiology, infection preventionists, emergency management, and laboratory scientists who had experiences either preparing for or responding to *C. auris* cases or outbreaks.

Methods: In total, 25 interviews were conducted with 84 participants. Interviews were coded using NVivo qualitative coding software by 2 separate researchers. Emergent themes were then iteratively discussed among the research team.

Results: Key themes included surveillance and laboratory capacity, inter- and intrafacility communication, infection prevention and control, environmental cleaning and disinfection, clinical management of cases, and media concerns and stigma.

Conclusions: Many of the operational challenges noted in this research are not unique to *C. auris*, and the ways in which we address future outbreaks should be informed by previous experiences and lessons learned, including the recent outbreaks of *C. auris* in the United States.

(Received 22 September 2020; accepted 28 December 2020; electronically published 9 February 2021)

Candida auris is an emerging, multidrug-resistant infectious fungus that first appeared in the United States in 2013.[1,2] As of October 31, 2020, the US Centers for Disease Control and Prevention (CDC) had reported 1,518 confirmed clinical cases in 21 states.[3] States that have reported the greatest number of clinical cases include New York (n = 655), New Jersey (n = 195), Illinois (n = 397), Florida (n = 100), and California (n = 102).[3] Cases have also been reported in several other countries.[3]

To date, *C. auris* has been primarily identified in healthcare settings, including hospitals and postacute and long-term care facilities that care for long-term ventilator-dependent patients. It can be transmitted person-to-person (eg, by poor hand hygiene) and through contact with contaminated surfaces or sharing of contaminated equipment.[1] It is extremely persistent in the environment, and meticulous disinfection and infection prevention and control procedures are required to prevent transmission.

Author for correspondence: Diane Meyer, E-mail: dmeyer10@jhmi.edu

Cite this article: Meyer D, *et al.* (2021). Preparedness and response to an emerging health threat—Lessons learned from *Candida auris* outbreaks in the United States. *Infection Control & Hospital Epidemiology*, 42: 1301–1306, https://doi.org/10.1017/ice.2021.12

Candida auris can colonize a variety of different body sites; it is identified via screening protocols, such as swabbing key body sites for clinical laboratory analysis. Although those who are colonized do not have active infection (ie, they are asymptomatic), the organism is still capable of spreading throughout the environment and the person is at risk for developing invasive candidiasis. Those at risk for *C. auris* colonization and infection (ie, invasive candidemia) include people who have weakened immune systems, live in long-term care settings, have invasive long-term medical devices, and are on broad-spectrum antibiotics and antifungals.[1] The CDC estimates that between 30% and 60% of those with invasive *C. auris* infections die, but this statistic is based on limited cases and may not capture other risk factors or comorbidities that might increase the risk of death.[1]

Although the number of health facilities that have had direct experience with this organism is relatively limited, the incidence of *C. auris* infections and outbreaks continues to rise across the United States. Thus, healthcare facilities that care for vulnerable populations must improve their readiness to respond to *C. auris*. To inform efforts to prepare for and respond to *C. auris* cases in health facilities, we conducted interviews with healthcare facilities, organizations, and

public health departments in New York, California, and Illinois that have responded to cases and outbreaks of *C. auris*. The purpose of this research was to identify and better understand challenges faced and lessons learned to better prepare healthcare facilities who have yet to experience or respond to *C. auris*.

Methods

Semi-structured interviews were conducted with staff from healthcare facilities, public health departments, and healthcare organizations in New York, California, and Illinois from October 2019 to January 2020. One interview was also conducted with an epidemiologist from the CDC who was involved in the response in one of the locations. Prior to the interviews, a nonsystematic literature review was conducted to identify existing literature and reports on *C. auris* and associated challenges with preventing, detecting, reporting, and treating this emerging fungus. A preliminary meeting was also conducted between the Johns Hopkins research team and their partner, New York City Health + Hospitals, to also identify potential interview topics of interest. These helped to inform the drafting of a semi-structured interview script (Appendix A online), which was used to help guide the interview process but was not strictly adhered to.

Potential facilities were contacted by both the Johns Hopkins University Center for Health Security and New York City Health + Hospitals partners. The facilities then self-identified relevant personnel for the study based on their involvement in *C. auris* outbreak preparedness and response activities. Potential interviewees were also identified through the nonsystematic literature review and through snowball sampling. Recruitment commenced when thematic saturation was reached.

In total, 25 interviews were conducted with 84 participants. Although some interviews took place with a single person, others were conducted as a larger group. Interviewees included staff from health departments, long-term care facilities, hospitals, and healthcare organizations located primarily in New York, which has seen the greatest burden of *C. auris* cases (Table 1). Additional interviewees from California and Illinois were also recruited, as both states have experienced *C. auris* outbreaks. Participants covered a vast range of expertise, including infectious disease physicians and nurses, clinical and environmental services (EVS), hospital leadership (eg, director of nursing), hospital epidemiology, infection preventionists, emergency management, and laboratory scientists. All interviews were jointly led by 2 interviewers (D.M. and J.B.N.). Interviews were conducted on a not-for-attribution basis, meaning that no comments were directly attributable to a person or organization. Notes and audio recordings were taken during each interview with the participant's consent.

After completion of the interviews, all notes were coded using NVivo qualitative coding software. A thematic coding framework was developed prior to the coding process using the interview guide, with the addition of interview themes that had arisen during the interviews. Each interview was coded by 2 of the authors (D.M. and E.M.), and the coding results were then analyzed by the Johns Hopkins authors (D.M., E.M., and J.B.N.). Emergent themes were then iteratively discussed amongst the Johns Hopkins authors and their New York City Health + Hospitals partners to identify lessons learned and challenges faced that might help inform other's preparedness and response efforts to *C. auris* or other similar emerging infectious diseases.

This research was determined to not be human subjects research by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

Table 1. Facility Type of All Interview Key Informants

Facility Type	Total	No. of Key Informants
Acute and ambulatory care facility	8	62
Long-term care facility	1	6
Health department (state and local)	4	9
Hospital association	2	6
US CDC	N/A	1
Total	15	84

Note. US CDC, United States Centers for Disease Control and Prevention.

Results

Each of the thematic areas that emerged in the interviews are summarized below. Key lessons learned are highlighted in Table 2.

Surveillance and laboratory capacity

Candida auris surveillance policies varied among the facilities interviewed. Many facilities conducted point prevalence surveys and environmental sampling of high-touch surfaces to determine *C. auris* presence within the facility. Facilities also conducted a variety of different screening mechanisms to identify potential cases, including within the emergency department and the intensive care units. Screening questions often included whether the individual had a history of hospitalization overseas, history of infection with a multidrug-resistant organism (MDRO), or whether they currently had a medically invasive device. Another facility noted that they were not conducting active surveillance cultures but that they had started speciating all yeasts (including those obtained from nonsterile sites) to make sure that *C. auris* cases were not going unrecognized. Most facilities agreed that screening protocols should be tailored to match the risk of the population served. For example, one facility noted that a blanket-wide screening protocol for *C. auris* is not necessary because the disease is relatively rare and that knowing the population well (eg, those who engage in medical tourism) may help identify those at higher risk for infection who should be screened.

Lack of laboratory capacity to test for *C. auris* was also noted as a limitation. Key informants spoke of the "double-edged sword" of surveillance, where increased surveillance could improve case detection, decrease transmission, and potentially improve clinical outcomes. However, they added that it could also strain healthcare resources, including bed, isolation, laboratory, and staffing capacity. Additionally, few facilities had the ability to conduct on-site PCR testing. Instead, they had to send samples to state public health laboratories. Some facilities isolated "patients under investigation" in single rooms, which were often in short supply, until their test results came back, which for some facilities took weeks. As a result, patients were often discharged before their test results came back. Enhanced surveillance also inherently meant enhanced detection of colonized individuals, who were often more difficult to discharge to long-term care facilities.

Inter- and intrafacility communication

Lack of communication around patient colonization status was a challenge, according to key informants. In some instances, individuals who presented for care did not divulge their status because they did not know that they had *C. auris*. Others spoke of

https://doi.org/10.1017/ice.2021.12 Published online by Cambridge University Press

Table 2. Summary of Key Informant Recommendations

Surveillance and laboratory capacity	Additional guidelines on surveillance within acute, sub-acute, and long-term care facilities for *Candida auris* are needed and should be adaptable to local epidemiological contexts. Increased local laboratory capacity is needed to test for *C. auris* so that screening can be enhanced. Specifically, this will require the training of additional laboratory technicians, who are already in short supply.
Infection prevention and control	Follow basic infection prevention and control principles (eg, hand hygiene, PPE use) because they will prevent spread of *C. auris*. Additional guidelines are needed on the disinfection of mobile equipment (eg, ultrasounds), as federal and other guidelines often conflict with manufacturer's recommendations. Have dedicated staff (including clinical and support staff) take care of colonized patients to decrease the chances of further nosocomial transmission. Conduct regular "huddles" to discuss patient isolation status. EVS and other support staff who directly interact with patients should be included. Reduce internal movement of *C. auris* patients as much as possible (eg, bring ultrasound to patient) and as last case of the day for procedures to enable more time for cleaning and disinfection.
Communication between facilities	A state-level database would be helpful in tracking individuals who have been identified as being colonized with *C. auris*. Universal transfer forms that include *C. auris* colonization status should be utilized, and these should be integrated with existing electronic medical records (including inpatient and outpatient).
Education and communication	Facilities should use consistent and evidence-based messaging to communicate about *C. auris* with their staff. Just-in-time training should be conducted to educate staff about *C. auris* and the precautions necessary to prevent its spread (eg, decontamination, PPE donning and doffing). Programs should be combined with structural changes to support behavior change. Balancing emphasizing the importance of this emerging infection without inducing fear and panic among staff.

Note. PPE, personal protective equipment; EVS, environmental services.

communication challenges when accepting or discharging colonized patients, particularly between facilities that were in different healthcare systems that did not utilize the same electronic medical record (EMR) system. Occasionally, information on *C. auris* status was intentionally left out because some facilities would otherwise refuse admission of that patient. Notifying emergency medical system transport about a patient's status was also identified as a gap.

To address these communication challenges, one facility educated its transfer center nurses to ask about previous isolation precautions when getting in-coming patient histories and paged the on-call infection preventionist when a positive *C. auris* history was identified. Others used the CDC infection control transfer form to communicate isolation history or flagged it in the patient's EMR. One health department shepherded colonized patients from facility to facility (ie, conducted follow-up phone calls), recognizing that they had not found a method for facilities to track this information on their own. Another facility made identification cards for discharged patients to bring with them the next time they needed to get medical care. Finally, a close network of infection preventionists and other infection prevention and control (IPC) staff was highlighted as critical to communication and information exchange between different facilities regarding *C. auris* status.

Although they are not currently in use, most key informants believed that the creation of state-level databases that could track individuals who had previously been identified as being colonized with *C. auris* would be extremely useful. One state had implemented a similar database to track infections with MDROs, so there was a precedent for this kind of repository. However, limitations remained, including the funding required to establish this system and the inability to track patients across state lines.

Infection prevention and control

Infection prevention and control was an issue presented across all facilities, which often implemented stringent IPC guidelines like those used for *Clostridoides difficile*. Facilities implemented a range of interventions including just-in-time training for clinical and nonclinical staff, tailored to the specific needs of different healthcare worker roles. Some facilities also implemented additional interventions such as computer screen savers and signage to remind staff of measures that needed to be taken when caring for *C. auris* patients. Facilities repeatedly emphasized that the key to preventing *C. auris* transmission was "bread and butter infection control": cleaning and disinfection, diligent hand hygiene, and personal protective equipment. Wherever possible, facilities tried to reduce other responsibilities for staff caring for *C. auris* patients to assure adequate time to comply with the additional IPC measures that were put into place. Infection prevention and control was particularly challenging in the long-term care setting due to lack of dedicated IPC staff, fewer resources for EVS, and high staff turnover.

In the outpatient setting, facilities reported the need for coordinated logistics in scheduling colonized patients to ensure that proper IPC measures could be taken. Facilities recommended scheduling patients as "last of the day" or planning for a room to be out of use after the patient was seen to ensure adequate cleaning. In the outpatient setting, the biggest barrier to implementing proper IPC was knowing the status of the patient. Additional education with patients and families around notifying new facilities of colonization status to allow for implementation of IPC measures was important.

Environmental cleaning and disinfection

Facilities implemented additional training for staff who cleaned *C. auris* rooms, dedicated certain staff and equipment to these rooms to enable more time for cleaning, and used disposable supplies wherever possible. Some facilities implemented additional technologies, such as vaporized hydrogen peroxide after routine cleaning and disinfection and ATP environmental surface sampling, to ensure that cleaning and disinfection were completed appropriately. Emphasizing that cleaning assessments were nonpunitive was noted as key to earning buy-in from staff and to improved communication

https://doi.org/10.1017/ice.2021.12 Published online by Cambridge University Press

and collaboration between frontline staff and management. Some facilities collaborated with state and local health officials to conduct cleaning and disinfection assessments of high-touch surfaces to ensure patient safety and better understand the dynamics of how *C. auris* persists and moves through the environment.

Tailoring education and training for EVS staff required a balance of emphasizing the importance of diligent cleaning and disinfection, the threat posed by *C. auris*, and the significance of their roles, without inducing fear among staff. In addition, care needed to be taken to ensure that frontline EVS staff received training in a way that they understood and was cognizant of potential language barriers. High staff turnover and understaffing was also noted as a challenge, creating a barrier to having dedicated EVS staff for rooms occupied by patients either infected or colonized with *C. auris*. One facility suggested an "EVS staff-to-patient" staffing ratio, like current regulations and requirements for nurse-to-patient staffing ratios.

Clinical management

Clinical care of patients was not a significant challenge for patients at the facilities interviewed. Patients who were clinically infected were noted to be critically ill due to other comorbidities; therefore, the only additional treatment required was an antifungal. Facilities did note concerns regarding the potential occurrence of pan-resistant organisms, but they had not encountered a clinical case for which there were no treatment options. Clinical management did become a challenge when the site of *C. auris* infection was not the bloodstream due to poor penetration of echinocandins. Clinicians did not recommend cohorting *C. auris* patients due to disruptions in workflow and concern for polymicrobial colonization of patients contributing to nosocomial spread of MDROs.

Media concerns and stigma

Media attention around *C. auris* created concern and stigma for facilities caring for patients who were colonized or infected because nosocomial spread was often associated with poor IPC measures. In one state, information on what facilities had *C. auris* patients was released to the public by the state health department. This, coupled with poor communication around the true risks of *C. auris* to the general population and the lack of distinction between *C. auris* colonization versus infection, further propagated fear in the community and stigmatized facilities. Interviewees noted that the disclosure of which facilities had *C. auris* patients was not tied to additional resources, so it felt very punitive. Additionally, some acute-care facilities found it difficult to discharge patients with *C. auris* colonization to subacute facilities, leading to unnecessarily long lengths of stay.

Discussion

Long-term care facilities care for some of the nation's most vulnerable populations, who are often elderly and suffer from a variety of underlying illnesses that put them at increased risk for infection. Unfortunately, these facilities often lack the infection prevention measures that are critical to reducing disease transmission, and they have been implicated in numerous disease outbreaks, including respiratory, gastrointestinal, and skin and soft-tissue infections.[4] For example, 61% of nursing home IPC managers who responded to a 2016 survey reported having no specific IPC training.[5] Additional training within these facilities pertaining to infection control, as well as addressing other challenges that might facilitate disease transmission, such as understaffing, could help prevent outbreaks of *C. auris* and other highly transmissible diseases.

Hospitals noted having limited tools to prevent *C. auris* transmission within their facilities. Colonized patients may be transferred from a long-term care facility or present via emergency departments without accompanying documentation of *C. auris* history, thereby preventing prompt isolation and increasing the risk for interfacility transmission. Furthermore, limited internal testing capacity for patients with an unknown history or potential active infection creates the possibly for transmission and environmental contamination before it is recognized. Expanded access to testing and the creation of a case registry that would enable facilities to search for a patient's colonization status may help to limit introduction and spread of *C. auris* in hospitals.

Media reporting around outbreaks and cases of *C. auris* in one state created challenges for health facilities. Efforts to disclose those facilities at which patients tested positive for *C. auris* was thought to stigmatize health facilities that had cases and created disincentives for others to accepting patients with a positive colonization history. Additional research on the true prevalence of *C. auris* colonization within the community could help reduce this stigma. Efforts to more clearly communicate about the case fatality rate of *C. auris* should also be undertaken, which can help clarify the broader risk to the general public.

Incentivizing long-term care facilities to accept patients with *C. auris* colonization history through Medicare or Medicaid reimbursements could help allay challenges in identifying postacute care options for patients. Additionally, identifying funding mechanisms to support emergency preparedness and response efforts within long-term care facilities could also help improve the readiness of these facilities for disease outbreaks like *C. auris*. For example, funding provided via the Assistant Secretary of Preparedness and Response's Hospital Preparedness Program has previously been used by New York City to build emergency response capabilities, including training on emergency management fundamentals, logistics, and resident evacuation.[6]

Additional research is needed to better understand how to prevent *C. auris* outbreaks in healthcare settings. An estimated 1.5 million people die each year from fungal diseases, a threat that has "been continually neglected over the years despite their alarming impact on human health."[7] Unfortunately, lack of funding has stymied the research and development of tools needed to prevent, detect, and treat fungal infections.[8] For *C. auris* and other invasive fungal infections, additional research is imperative to better understand disease prevalence and epidemiology, to identify best practices for infection control, to understand case fatality, and to develop rapid diagnostics and new antifungals.[8,9]

This study has several limitations. Some of the interviews were conducted in groups, which may have biased individual's responses to the interview questions. Additionally, the results of this study may not be generalizable to all facilities. However, we do believe that many of the operational challenges noted in this research are not unique to *C. auris*. The need for improved disease surveillance, increased testing capacity, enhanced infection prevention and control measures, and prompt risk communication is generalizable to other emerging infectious diseases. The ways we address these and other challenges that might emerge in the future should be informed by previous experiences and lessons learned responding to other outbreaks, including the recent outbreaks of *C. auris* in the United States.

https://doi.org/10.1017/ice.2021.12 Published online by Cambridge University Press

Acknowledgments. The authors would like to acknowledge the interview participants who contributed their time and knowledge to this study.

Financial support. This research was funded by the Open Philanthropy Project.

Conflicts of interest. The authors declare no conflicts of interest related to this article.

References

1. General information about *Candida auris*. US Centers for Disease Control and Prevention website. https://www.cdc.gov/fungal/candida-auris/candida-auris-qanda.html. Published 2019. Accessed December 22, 2020.
2. First cases of *Candida auris* reported in the United States. US Centers for Disease Control and Prevention website. https://www.cdc.gov/media/releases/2016/p1104-candida-auris.html. Published 2016. Accessed July 15, 2020.
3. Tracking *Candida auris*. US Centers for Disease Control and Prevention website. https://www.cdc.gov/fungal/candida-auris/tracking-c-auris.html. Published 2020. Accessed December 22, 2020.
4. Strausbaugh LJ, Sukumar SR, Joseph CL, High KP. Infectious disease outbreaks in nursing homes: An unappreciated hazard for frail elderly persons. *Clin Infect Dis* 2003;36:870–876.
5. Herzig CT, Stone PW, Castle N, Pogorzelska-Maziarz M, Larson EL, Dick AW. Infection prevention and control programs in US nursing homes: results of a national survey. *J Am Med Dir Assoc* 2016;17:85–88.
6. New York City invests hospital preparedness program funds to protect residents in long-term care facilities. Association of State and Territorial Health Officials website. https://www.astho.org/Preparedness/Documents/NYC-Invests-Hospital-Preparedness-Program-Funds-to-Protect-Residents-in-Long%E2%80%90Term-Care-Facilities/. Published 2018. Accessed July 15, 2020.
7. Rodrigues ML, Albuquerque PC. Searching for a change: the need for increased support for public health and research on fungal diseases. *PLOS Negl Trop Dis* 2018;12(6):e0006479.
8. Tsay S, Kallen A, Jackson BR, Chiller TM, Vallabhaneni S. Approach to the investigation and management of patients with *Candida auris*, an emerging multidrug-resistant yeast. *Clin Infect Dis* 2018;66:306–311.
9. Jeffery-Smith A, Taori SK, Schelenz S, *et al. Candida auris*: a review of the literature. *Clin Microbiol Rev* 2018;31(1):e00029–17.

Appendix A. Interview Guide

General:

1. What kind of healthcare facility do you work in? (hospital, long-term care facility etc.)
2. Can you tell us about your role at the healthcare facility and your involvement in preparing for or responding to *Candida auris* outbreaks?
3. How has your healthcare facility prepared for *C. auris* cases (irrespective of whether they have experienced cases)?
   a. How have preparedness and response efforts to the ongoing *C. auris* outbreak been the same as efforts to prepare for other infectious disease outbreaks? How has it been different?
4. Can you describe some of the strategies, interventions, and policies that your hospital has implemented to prevent the spread of *C. auris*?
   a. What have been the biggest challenges in preparing for/responding to *C. auris*?
   b. What have been the biggest successes in preparing for/responding to *C. auris*?
5. Can you talk about the different departments/stakeholder groups involved with outbreak preparedness and response efforts at your healthcare facility?
6. What recommendations would you have for other hospitals to better prepare for or respond to *C. auris* outbreaks?
   a. If there was one aspect of your hospital's preparedness and/or response efforts that you could change, what would it be?
7. Do you feel that the threat of *C. auris* will grow increasingly challenging to address? Or do you feel it will get easier to address/control

Surveillance:

8. Has your facility implemented any surveillance strategies to identify potential *C. auris* cases?
   a. Which patients are being screened?
   b. How are decisions being made about which patients to test?
   c. How are identified clinical cases or colonized patients being reported?
9. What kinds of laboratory techniques are being used to diagnose cases of *C. auris*?
10. What has your facility been doing to address the challenge of misdiagnosis of *C. auris*?
11. What resources have been involved with conducting surveillance for clinical cases and colonized patients?
12. How have these surveillance efforts been successful?

Contact Tracing:

13. What has your facility been doing to address the challenge of delayed diagnosis of cases?
14. What is being done to identify and notify patients who have been exposed to a patient with *C. auris*?
15. Does your facility have a risk communication strategy to notify patients and their families about *C. auris*? If so, has this strategy been successful?

Communication and Partnerships:

16. Which departments within your facility are involved with efforts to prepare for or respond to *C. auris* outbreaks?
   a. Has your facility experienced any challenges with interdepartmental communication?
17. Have you or your facility had to communicate with other facilities when transferring or accepting a patient with *C. auris*? If so, what communication methods/strategies have you found to be most effective?
18. What partnerships (both within and outside of the facility) have been leveraged to help support your facility's preparedness and response efforts to *C. auris* outbreaks?

Infection Control Interventions:

19. How is your facility isolating clinically infected patients?
   a. Is this the same or different for patients who are colonized with *C. auris*?
20. What types of PPE are being used to prevent nosocomial transmission?
21. What have been the greatest infection control challenges in preventing transmission within the hospital?
22. How is your facility preparing healthcare workers to respond to *C. auris* cases?

https://doi.org/10.1017/ice.2021.12 Published online by Cambridge University Press

a. Have staff been supportive of and responsive to increased infection control measures for patients with *C. auris*?

Environmental Cleaning and Disinfection:

1. What environmental cleaning and disinfection practices is your facility using to prevent transmission of *C. auris*?
   a. How are these the same and different from other cleaning and disinfection practices used in the hospital?
   b. What have been the biggest challenges in achieving effective environmental cleaning and disinfection?
2. What has been the role of frontline environmental service workers and environmental services leadership in the outbreak response?

Cost of Preparedness and Response

1. What have been the direct costs of preparing for and responding to *C. auris*?
2. How many personnel hours have been spent preparing for and responding to *C. auris*?
3. Which preparedness and response efforts demanded the most resources/time?

https://doi.org/10.1017/ice.2021.12 Published online by Cambridge University Press