

CASE SERIES

EPIDEMIOLOGICAL ANALYSIS AND SUCCESSFUL MANAGEMENT OF A *CANDIDA AURIS* OUTBREAK IN A SECONDARY CARE HOSPITAL SETTING IN SAUDI ARABIA; AN OUTBREAK REPORT

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Candida auris has emerged as a major diagnostic and therapeutic challenge in the hospital environment. *C. auris* is resistant to many antifungals, making it a newer example of one of the world's most problematic and feared health threats. We recently confronted a cluster of *C. auris* cases at our hospital during the spring of 2020. This outbreak investigation took place at the ICU of King Khalid hospital Al Majmaah Saudi Arabia. Considering its potential to cause an outbreak with serious consequences, strict control measures were implemented thus effectively controlling the outbreak.

Keywords: *Candida auris*; Outbreak; Multi drug resistance

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INTRODUCTION

A progressive shift from predominance of candidiasis due to non-albicans *Candida* species has been observed in the recent few years.¹ This change in pattern of candida infection has essentially increased with the advent of *C. auris*. This newly emerged multidrug-resistant fungal pathogen, is now among the world's most feared microbe. It is associated with a high mortality and outbreaks of severe infections.² Initially isolated from the external ear of a Japanese patient in 2009, *Candida auris* has now been reported from different parts of the world.³ It exhibits a capacity to efficiently form biofilms and displays capability of nosocomial transmission.⁴

We present here the experience of the outbreak at our hospital.

Outbreak report

We encountered this fungal pathogen at our ICU at King Khalid hospital AlMajmaah (KKHM), between April to May 2020. The *Candida* scoring system proposed by Leon *et al*⁵ was used to define patients at high risk of invasive infection. Based on

this criteria, patients were grouped as follows: colonized by *Candida*, a possible *Candida* infection and a proven candida infection. The case was defined as a patient with positive *C. auris* culture with same phenotypic characteristics as the index case.

Index case was a 79 years old female referred from a nearby Tumair General Hospital in April 2020. She tested positive for Candiduria on three separate occasions within a span of two weeks and later positive for candidemia.

Second case was also a referred patient from Al Ghat hospital and the laboratory reported isolation of *Candida species* in urine and Blood culture of this patient. The second case was placed on the bed next to the index case.

This is in coherence with our laboratory finding of *Candida species* on the environmental samples collected from beds of both, the index case and the second case. Subsequently, *C. auris* was isolated from three more patients over a period of one month.

Table-1: *C. auris* outbreak in ICU of King Khalid Hospital AlMajmaah, KSA, in 2020: Patient summaries

Patient no.	Age (years),	sex	Specimen type	Date of isolation of <i>C. auris</i> .
1	79	F	Urine	27 /3/ 2020
			Blood	29 /3/ 2020
2	80	F	Blood	20/4/2020
3	65	M	Urine	22/4/2020
4	94	M	Urine	22/4/2020
5	92	M	Urine	22/4/2020
6	32	F (staff nurse)	Nasal Swab	26/4/2020
7	36	F (cleaner)	Nail Swab	26/4/2020

All the above samples were tested in the microbiology lab and the results were immediately notified to ICU and Infection Control Department and health directorate Riyadh as Critical Reports. An outbreak was declared by the infection control department. An outbreak ad hoc committee was formed to investigate the situation.

To find out the source of outbreak, environmental screening and surveillance was carried out. Infection Control department ordered surveillance swabs from 75 health care workers to be sent to the Microbiology laboratory of KKMH, as a part of screening protocol for a suspected outbreak of *Candida species* in the ICU. Health care workers included all attending Physicians, nursing staff from ICU and the cleaners assigned to the area

Sterile swabs were used to collect environmental surveillance samples from various surfaces and equipment in the ICU. Urine and blood specimens were drawn from all patients admitted to the intensive care unit during that time period. Finger and nasal swabs from healthcare workers were also collected for culture. All the above samples were tested in the microbiology laboratory of the KKMH as per standard laboratory protocols. *Candida* isolates were sent to Riyadh regional lab for further speciation and antifungal sensitivity testing. Confirmation and susceptibility testing of antifungal drugs were performed by Vitek 2 YST card

All the health care workers were negative, except a staff nurse and a cleaner working in the ICU. The staff nurse was 6 months pregnant and *Candida* was isolated from nasal swab. She was the primary care giver of the two candidemia patients and was also been assigned to provide care to patient 3 and 4 (Table-1). She was also responsible for cleaning the suction apparatus. The other health care worker who tested positive for candida was a cleaner and, in this patient, *Candida* was isolated from the nail swab. Both the cleaner and nurse were quarantined and exempted from work for 2 weeks and given complete treatment for candidiasis. They were rescreened after 2 weeks and tested negative. The blood culture report for patient 1 and 2 was again positive for *Candida* with similar profile.

Almost 50 Environmental Samples collected from the ICU (samples from all beds, computer, wash areas, hand rub containers, high touch areas like door handles, door knobs, nursing station, chairs, all ventilators, and suction machines) were received in the Microbiology Laboratory. All the environmental samples were negative for *Candida sp*, except the samples from the Beds of the patients 1,2 and 3 (Table-1), and the samples of Suction Machine which was used for patient 1 and 2 (Table-1). The affected equipment and beds were immediately

decontaminated and rescreened for *Candida* carriage. The process of daily cleaning protocol for the bed linen, bed rails and immediate patient surroundings was reevaluated and monitored.

Multidrug resistant *Candida auris* was identified in all the positive samples from the patients. All the patients except one (patient 2) expired due to the multidrug resistant *Candida auris* infection.

DISCUSSION

Public health experts have forewarned for decades that the misuse of antimicrobials is reducing their effectiveness. In recent years, fungi resistant to commonly used antifungals have raised their ugly heads adding a frightening dimension to the phenomenon that is destabilizing the foundations of current medical practice.⁶

Health care institutions worldwide are hesitant to disclose outbreaks by resistant microorganisms for fear of being perceived as infection hubs and losing reputation. All the while, these superbugs are transmitted by infected persons from hospital to community and back.⁷

Candida auris is one of the dozens of these superbugs that have developed significant antimicrobial resistance making it one of the unbeatable infectious aetiologies. About 90% of *C auris* is resistant to at least one antifungal and 30% are resistant to two or more than two.⁸ Only isolated a few years back; this new threat has taken roots and is spreading like a wild fire.

Our result provides several insights. In this outbreak all patients expired except one. According to CDC, Atlanta, USA, almost half of the patients infected with *C auris* die within ninety days.⁹ Secondly, a delay in identification of index case plays a major role in infection transmission among the patients. After initial isolation, it took almost one month to reach a final diagnosis as *Candida auris* infection outbreak. This delay was due in part to difficulty in laboratory identification. *Candida auris* is misidentified and easily confused with other candida species by routine laboratories procedures.⁸ This common situation highlights an urgent need to develop a standard protocol yielding the most accurate and rapid identification. Third, almost all patients in this outbreak exhibited poor response to standard treatment. Data from across the world highlights that most *Candida auris* strains are resistant to azoles, and amphotericin B, with a few being resistant to echinocandins.⁸ Biofilm formations and efflux pumps are proposed resistance mechanisms.⁴ Micafungin is recommended as first line therapy.⁸ However this

drug is not readily available especially in resource limited settings and is expensive

Another observation augmented by this and the previous studies, is that the long term hospitalized and immunocompromised patients with central venous catheter, or other tubes/lines entering their body, or who those have received long term antimicrobials, appear to be at higher risk of fatal infection with this organism.

Finally, *C. auris* has few crucial attributes: misidentification, multi drug resistance, higher risk of fatal infection, rapid and easy colonization and spread. For these reasons, if outbreaks with this pathogen occurs, containing the situation will be extremely hard. Consequently, this microbe should be sufficiently understood

REFERENCES

1. Seyoum E, Bitew A, Mihret A. Distribution of *Candida albicans* and non-*albicans Candida* species isolated in different clinical samples and their in vitro antifungal susceptibility profile in Ethiopia. *BMC Infect Dis* 2020;20(1):231.
2. Lone SA, Ahmad A. *Candida auris*—the growing menace to global health. *Mycoses* 2019;62(8):620–37.
3. Iguchi S, Itakura Y, Yoshida A, Kamada K, Mizushima R, Arai Y, *et al.* *Candida auris*: A pathogen difficult to identify, treat, and eradicate and its characteristics in Japanese strains. *J Infect Chemother* 2019;25(10):743–9.
4. Horton MV, Nett JE. *Candida auris* Infection and Biofilm Formation: Going Beyond the Surface. *Curr Clin Micro Rep* 2020;7(3):51–6.
5. León C, Ruiz-Santana S, Saavedra P, Almirante B, Nolla-Salas J, Alvarez-Lerma F, *et al.* EPCAN Study Group. A bedside scoring system ("Candida score") for early antifungal treatment in nonneutropenic critically ill patients with *Candida* colonization. *Crit Care Med* 2006;34(3):730–7.
6. Cloeckaert A, Kuchler K. Grand Challenges in Infectious Diseases: Are We Prepared for Worst-Case Scenarios? *Front Microbiol* 2020;11:613383.
7. Zetts RM, Stoesz A, Garcia AM, Doctor JN, Gerber JS, Linder JA, *et al.* Primary care physicians' attitudes and perceptions towards antibiotic resistance and outpatient antibiotic stewardship in the USA: a qualitative study. *BMJ Open* 2020;10(7):e034983.
8. Forsberg K, Woodworth K, Walters M, Berkow EL, Jackson B, Chiller T, *et al.* *Candida auris*: The recent emergence of a multidrug-resistant fungal pathogen. *Med Mycol* 2019;57(1):1–12.
9. Arensman K, Miller JL, Chiang A, Mai N, Levato J, LaChance E, *et al.* Clinical Outcomes of Patients Treated for *Candida auris* Infections in a Multisite Health System, Illinois, USA. *Emerg Infect Dis* 2020;26(5):876–80.

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