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Letters to the Editor

Candida auris outbreak on a vascular ward – the unexpected arrival of an anticipated pathogen

Sir,

We read with interest the journal article describing 49 cases of *Candida auris* infections in Moscow [1]. *C. auris* in England continues to evolve with Public Health England (PHE) reporting 200 patients (colonized or infected) and three large nosocomial outbreaks [2–4]. A series of recent articles in the *New York Times* highlighted a growing anxiety regarding *C. auris* [5–7].

Between week 49 2018 and week 4 2019, an outbreak of *C. auris* occurred at St George's Hospital (SGH), comprising four colonized patients, all of whom had peripheral vascular disease (Table I). Prior to this, *C. auris* had never been detected at SGH. The index case was in a six-bedded bay on a vascular surgical ward (week 49 2018). All bay contacts were screened. One bay contact (case two) had two negative *C. auris* screens during his admission and was subsequently transferred to another hospital where a third *C. auris* screen was positive (week 52 2018). Case three was a ward contact, though never a bay contact of the index case, and was discharged prior to commencement of a screening programme. A toe tissue sample at the transfer hospital cultured *C. auris* (week 3 2019). The fourth case was admitted to the same bay as the index case 36 days after his discharge (week 6 2019).

All four cases were English residents with no history of foreign travel, hospitalization abroad or admissions to UK hospitals with known *C. auris*-infected or -colonized patients. Only case four had recent antifungal exposure; anidulafungin for an aortic graft infected with *C. albicans* and *C. glabrata*. No case required antifungal treatment for *C. auris* infection. Antifungal susceptibility testing at the Mycology Reference Laboratory (MRL, Bristol, UK) demonstrated reduced susceptibility to echinocandins in two of the four cases (Table I); a concerning finding given echinocandins are recommended as first-line therapy by PHE and the Centers for Disease Control (CDC) [4,8].

An outbreak-management team (OMT) was convened comprising PHE and the local Health Protection Team. Contact tracing of patients admitted to the affected vascular ward and the cardiothoracic intensive care unit (CT-ICU), where the index case, case three and case four had postoperative admissions, identified 167 patients for screening (nose/throat, groin, axilla, wounds ± drain fluid, cannula or central line entry sites, urine, rectal swabs/stool): all of which were negative. Contact was made with nursing homes and other NHS Trusts ($N = 9$) regarding 50 discharged patients to arrange screening; there have been no positive results to date. An extensive screening of the environment and medical devices of the vascular ward, CT-ICU and an operating theatre was performed: no positives were identified in 203 environmental swabs. Additional cleaning utilizing hydrogen peroxide and hypochlorite were instigated. Microbiology laboratory protocols were changed to identify any Candida isolated from ICUs (general, neurosurgical, cardiothoracic, neonatal, paediatric), diabetic foot clinic and vascular ward samples to species level: to date, no further cases have been identified.

Key learning points from this outbreak are (i) early activation of the OMT, (ii) potential for *C. auris* outbreaks in non-ICU patients including diabetic foot/peripheral vascular disease patients, (iii) speciate Candida isolated from sterile sites and in all critical-care patient samples, (iv) engage with the MRL regarding isolate susceptibilities to facilitate an individualized treatment plan in the event of invasive infection, (v) potential long time interval between *C. auris* contact and culture-positivity and (vi) communication between Trusts (positive cultures for case two and three were identified post-discharge).

Table I
Demographic, epidemiological and microbiological characteristics of cases

Case	Gender	Age	Past medical/ surgical history	Date of admission	Reason for admission	Date of operative procedure	Positive *Candida auris* clinical specimens at St George's Hospital	Clinical course	Positive *C. auris* clinical specimens post-discharge/ transfer	Antifungal susceptibility results (MIC, mg/L) (results from MRL, Bristol, UK)		
										Antifungal	MIC	Interpretation
Index	Male	64	T2DM PVD	Week 48 2018	Right foot pain	Week 49 2018	Wound swab right foot week 49 2018 Intraoperative sample — bone right foot week 49 2018 (sample sent to MRL, Bristol, UK) Wound swab right foot week 51 2018	Discharged week 51 2018	None	Amphotericin B Anidulafungin Flucytosine Fluconazole Voriconazole	0.5 0.5 0.25 >64 >16	S I S R R
2	Male	82	PVD Smoker	Week 48 2018	Gangrenous toe	Week 49 2018	None	Transferred week 52 2018	Nose and groin screen at transfer hospital week 52 2018	Anidulafungin Flucytosine Fluconazole Itraconazole	0.25 <0.125 >32 0.125	S S R S
3	Male	73	T2DM PVD Smoker	Week 49 2018	Gangrenous toe	Week 50 2018	None	Transferred week 51 2018	Toe tissue at transfer hospital week 3 2019	Amphotericin B Caspofungin Flucytosine Fluconazole Voriconazole	1 0.5 NT >64 NT	S I NT R NT
4	Male	70	PVD Left above knee amputation Aorto-bifemoral graft CABG	Week 52 2018	Infected left knee amputation stump site	Week 4 2019	Wound swab abdomen week 6 2019 Tip central line week 6 2019 — two concurrent blood cultures negative (sample sent to MRL, Bristol, UK)	Died week 7 2019 (death not attributable to *C. auris* infection)	Not applicable	Amphotericin B Anidulafungin Flucytosine Fluconazole Voriconazole Isuvaconazole Posaconazole	1 0.125 0.25 32 1 <0.03 0.06	S S S R S S S

CABG, coronary artery bypass graft; I, intermediate; MIC, minimum inhibitory concentration; MRL, Mycology Reference Laboratory; NT, not tested; PVD, peripheral vascular disease; R, resistant; S, sensitive; T2DM, type 2 diabetes mellitus.

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Conflict of interest statement
None declared.

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Candida auris outbreak report from Pakistan: a success story of infection control in ICUs of a tertiary care hospital

Sir,

Over the past few years, *Candida auris* has emerged as a deadly nosocomial multi-drug-resistant (MDR) pathogen around the globe [1]. There is a danger of *C. auris* transmission in hospitals of developing countries due to their limited facilities for fungal identification and antifungal susceptibility testing [2]. Excessive use of fluconazole empirically has made a shift of invasive candida infections from *albicans* to non-*albicans Candida* spp. It has also contributed to the emergence of MDR yeasts in hospital environments [3].

We encountered a cluster of *C. auris* cases from July 2018 to October 2018. The outbreak investigation was carried out in 45-bedded intensive care units (ICU) (medical and surgical) at the Combined Military Hospital, Rawalpindi, Pakistan. All cases were confirmed by Vitek 2 Version 8.01 (bioMérieux, Marcy l'Etoile, France) at the Department of Microbiology, Armed Forces Institute of Pathology. The bedside Leon scoring system was used to identify risk groups [4]. A case was defined, based on the Leon scoring system, as a patient with persistently raised C-reactive protein, and microbiological criteria of positive *C. auris* cultures with similar phenotypic profiles as that of the index case. Colonization was defined as a positive culture from a central venous catheter (CVC) tip, skin and/or urine in the absence of clinical findings, or treatment given. A positive culture from urine or a CVC tip with negative blood culture but treated with an antifungal drug was deemed to be a possible *C. auris* infection. Candidaemia was defined as clinical and laboratory evidence of sepsis, including positive blood cultures.

To investigate the source of spread, active surveillance and environmental screening were carried out in September 2018. Sterile swabs were taken from various surfaces, including