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Brief report

Candida guilliermondii fungemia in hospitalized patients epidemiologically linked to a patient care attendant



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We investigated an outbreak of *Candida guilliermondii* fungemia with a fatality rate of 54% that occurred during a 19-month period among patients hospitalized in a tertiary care hospital. The hiring of an external care attendant during hospitalization was epidemiologically linked to case patients (100% vs 3% of the controls, $P < .001$). Subsequent investigation of the outbreak and disclosure of the findings were associated with an end to the epidemic.

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Health care-associated (HCA) candidemia is a relatively infrequent event, and rates of occurrence range from 0.19-2.5 cases per 1,000 admissions.¹ *Candida* spp account for 7.4% of all HCA bloodstream infections in hospitalized patients in Europe (*C albicans*, 50%-70% of all cases),² with *C guilliermondii* being responsible for <4% of all candidemias.^{3,4}

The occurrence of 4 cases of HCA bloodstream infections by *C guilliermondii* in a tertiary care university hospital during a 2-month period raised suspicion of an ongoing outbreak. We describe the epidemiologic research carried out to find the origin that led to the epidemic being controlled.

METHODS

Four cases of HCA *C guilliermondii* fungemia (CGF) were diagnosed in a tertiary care university hospital in Spain during March-April 2012. A retrospective revision of microbiologic records discovered 9 additional HCA CGF cases during the previous 17 months (epidemic period: October 2010-April 2012).

Because doctors and nurses attending the cases suspected that external (private) care attendants could be linked to the infections, a case-control study was designed to test that hypothesis. Control patients were randomly selected in a 3:1 ratio from noninfected patients admitted to the same ward as the case patient (± 15 days of the onset of bloodstream infection) and matched by sex and age

(± 5 years). In addition to collecting demographic and potential candidemia risk factors, investigators conducted interviews with case and control patients or their relatives to assess exposure to any external care attendant during the hospitalization period.

RESULTS

During the period of the epidemic, 19% of all HCA candidemias were caused by *C guilliermondii* versus 0% during the previous 22 months. All *C guilliermondii* isolates, except 2, showed identical phenotypic characteristics and were fully susceptible to fluconazole, voriconazole, echinocandins, and amphotericin B. Other *Candida* spp, in addition to *C guilliermondii*, were recovered from blood cultures from 6 of the case patients: *C albicans* ($n = 2$), *C tropicalis* ($n = 3$), or both *C albicans* and *C tropicalis* ($n = 1$).

Case patients were older adults (median: 85 years); 85% of patients were women. In-hospital mortality was 54%. Death was attributable to candidemia in 5 cases and was considered a contributory factor in the other 2 cases. On average, total hospital stay of cases exceeded that of the control patients by 28 days. None of the control patients died during hospitalization.

Case patients appeared to be scattered over a 19-month period and in several wards. Seven of the patients (53.8%) were hospitalized in internal medicine wards. Other case patients were under the care of different departments. Three of the case patients were admitted to a single ward, 2 in April 2012 and 1 in March 2011, and another 2 cases were admitted to another ward but with a gap of >12 months. The remaining 8 patients were admitted to different locations. Classic risk factors for candidemia were very uncommon in the case patients (Table 1).

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Conflicts of interest: None to report.

Table 1
Demographics and clinical characteristics of infected patients and matched controls

Characteristics	Cases (n = 13)	Controls (n = 39)	OR	95% CI	P value
Age, median (range)	86 (48-97)	85 (50-99)			
Female sex	11 (84.6)	33 (84.6)			
Charlson index, median (range)	2 (0-3)	4 (0-12)			.017
Mortality	7 (53.8)	0			<.001
Candidemia-related death					
Causal	5 (38.5)				
Contributory	2 (15.4)				
Total hospital stay, days (mean ± SEM)	36.2 ± 4.99	8.6 ± 1.05			<.001
Risk factors					
Parenteral nutrition	3 (23.8)	0	NA		<.001
Steroids	2 (15.4)	14 (35.9)	0.34	0.07-1.7	.19
Previous abdominal surgery	3 (23.1)	5 (12.8)	2.59	0.38-17.6	.33
Central vascular catheter	2 (15.4)	5 (12.8)	1.22	0.22-6.9	.82
External care attendant*	10 (100)	1 (3.1)	NA		<.001
External care attendant A	10 (100)	0	NA		<.001
Antibiotic use [†]					
Any	11 (84.6)	25 (64.1)	2.8	0.58-13.1	.20
No. of antibiotics, median (range)	2 (0-7)	1 (0-5)			.07

NOTE. Values are n (%) or as otherwise indicated.

NA, not applicable.

*Unknown for 3 cases and 7 control patients.

[†]Antibiotic therapy previous to candidemia onset for cases and for the total hospital stay in control patients.

Interviews were possible in 10 out of 13 case patients (77%) and 32 out of 39 controls (82%). All 10 case patients (100%) confirmed having hired an external care attendant during the hospitalization period. The surname, phone number, or physical description provided matched that of a single care attendant (CA-A). Thirty-one control patients (97%) denied having been attended by any care attendant while hospitalized. Only one of them reported having been assisted by a person who was unrelated to CA-A.

After several attempts, CA-A and 2 other care attendants, who were occasionally subcontracted by CA-A, were interviewed. CA-A admitted having provided care for the last 2 case patients but denied having attended to any of the other 11 and, furthermore, was unable to provide a list of the patients attended in the hospital stating that no records were kept. The other 2 care attendants admitted being sporadically subcontracted by CA-A and to working intermittent night shifts; they also admitted that they had cared for some of the case patients but denied keeping any records of those attended. These 3 persons were screened for *C guilliermondii*. Samples were taken from hands, feet, fingernails, toenails, and any cutaneous lesion; however, *C guilliermondii* was not recovered from any sample.

DISCUSSION

The identification of a cluster of CGF cases over a short period of time raised the possibility of an outbreak. Numerous outbreaks of systemic candidiasis have been reported in hospitalized patients⁵⁻¹⁰ and have been associated, among others, with the use of invasive devices, intraoperative contamination, cross-infection by health care workers' hands, and contamination of parenteral nutrition. Nevertheless, to our knowledge, very few outbreaks of fungemia by *C guilliermondii* have previously been described.^{11,12}

The low prevalence of classic risk factors for candidemia among cases was remarkable. Candidemia rarely occurs in non-immunocompromised patients without predisposing conditions, and the most likely sources are related to contamination by *Candida* spp of intravascular catheters or intravenous infusates.^{1,13}

The epidemiologic study proved that all the cases, but none of the controls, had been exposed to a single care attendant. We could not identify the source or the mechanism of transmission for *C guilliermondii*. Nevertheless, the epidemiologic link to CA-A

seems unequivocal, and the investigation suggested that CA-A's practices were probably responsible for this outbreak. Negligence by one of the care attendants when handling the patients' intravenous devices (even if they were not authorized to do so), or even a criminal offence, cannot be ruled out as the cause of this outbreak. Furthermore, after the interview of CA-A, and during the 36 months after the last case in April 2012, no new episodes of *C guilliermondii* bloodstream infection have been identified in the hospital.

Delayed recognition of an unusual infection resulted in this epidemic leading to 7 deaths, approximately 351 additional hospitalization days, the cost of medical diagnostic techniques and treatments dispensed to infected patients, in addition to the suffering of the patients and their relatives. This study highlights the need to prevent persons external to the hospital from providing assistance to hospitalized patients or, alternately, the need for local policies to regulate informal in-hospital care.

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