

led to hospitalization of 119 patients (68%). Pulmonary involvement was recorded for 81% of cases (142/176) and two organs or more were involved in 35% (61/176). An increase in severity was observed mainly in recent years [1988–1997: 1/32 (3%); 1998–2007: 9/54 (17%); 2008–2016: 19/89 (21%); $P = 0.05$]. The overall mortality was 17.6% (31/176); 6% (2/33) in 1988–1997, 20% ($n = 11/54$) in 1998–2007 and 20% in 2008–2016 ($n = 18/89$) ($P = 0.15$). There was also a significant increase in age at diagnosis ($P = 0.005$), the proportion of diabetic patients ($P = 0.03$) and the proportion of immunocompromised patients ($P = 0.009$) over time. The independent risk factors of mortality were age (aOR 1.03 for each additional year, 95% CI 1.0–1.06, $P = 0.05$) and immunosuppression (aOR 3.62, 95% CI 1.54–8.49, $P = 0.003$).

Conclusion. The severity of blastomycosis observed in Quebec over the past 30 years has increased. These changes could be explained in part by an increase in the number of immunosuppressed patients. However, mortality has remained stable in recent years.

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362. Species Distribution and Trends of Invasive Candidiasis in the United States, 2009–2015, Using a Large Electronic Medical Record Database

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Session: 56. Fungal Disease: Management and Outcomes

Thursday, October 4, 2018: 12:30 PM

Background. While 50% of invasive candidiasis (IC) has historically been caused by *C. albicans*, the changing epidemiology and rise in drug-resistant *Candida* necessitates understanding the contribution of specific *Candida* species to IC. To date, species and site-specific trends in IC have not been reported on a large scale using US clinical data.

Methods. Using the Cerner Health Facts electronic health record (EHR) dataset, inpatient hospitalizations with any *Candida* spp. isolated from blood or a sterile site (SS) (abdominal or other) were identified from 2009 to 2015. Patient characteristics were described by species. Significant relationships ($P \leq 0.05$) were assessed using chi-squared or exact binomial tests. Annual percent change in IC incidence by site and species were assessed via Poisson regression.

Results. Overall, 19,310 *Candida* isolates from 10,313 patients were identified. Of these, 46% of isolates were *C. albicans*, 22% *C. glabrata*, 14% *C. parapsilosis*, 7% *C. tropicalis*, and 11% other/unspcated; no *C. auris* infections were identified. The overall incidence of IC was 99 cases/100,000 patients. Compared with *C. albicans*, isolation of other species was 35% more frequent from blood, and 43% and 30% less frequent from non-blood abdominal and non-abdominal SSs, respectively (Table 1). Total IC increased by 1% (95% CI = 0.2–2%) annually; while abdominal and SS IC significantly increased by 6% (4–8%) and 11% (9–13%) per year, respectively, candidemia decreased significantly by 4.5% (3–6%) annually. Among *C. albicans* infections candidemia decreased by 6.5% (5–8%) annually, while abdominal (5%, 3–8%) and other SS infections (10%, 7–13%) increased (Figure 1). Candidemia incidence remained unchanged for the other species. SS infections increased for every species, and abdominal infections increased for all but *C. parapsilosis* (Figure 2).

Conclusion. In this first large-scale study on trends in IC using US hospital EHR data, the species distribution of IC isolates varied between blood and non-blood SSs. The incidence of candidemia is decreasing, but not for potentially drug-resistant species such as *C. glabrata*, which continue to pose treatment challenges.

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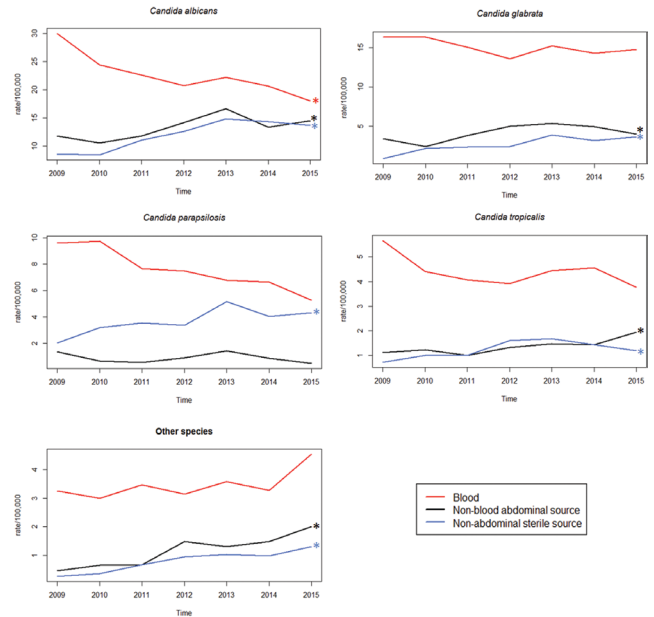


Figure 1. Source-specific incidence trends by species. Significance determined by Poisson regression denoted by *.

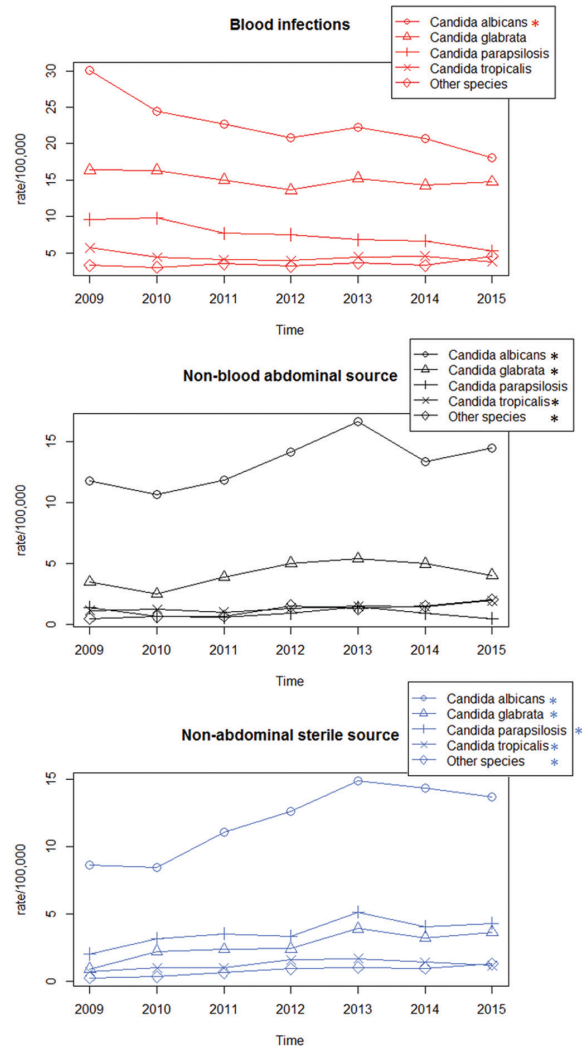


Figure 2. Species-specific incidence trends by infection source. Significance determined by Poisson regression denoted by *.

Table 1. Patient demographics by species					
	<i>C. albicans</i> N (col %) = 5447	<i>C. glabrata</i> N (col %) = 2492	<i>C. parapsilosis</i> N (col %) = 1369	<i>C. tropicalis</i> N (col %) = 778	Other N (col %) = 608
Gender					
Female [N (%) = 5008 (48)]	2639 (48)	1322 (53)*	598 (44)*	358 (46)	279 (46)
Male [5336 (52)]	2807 (52)	1170 (47)*	770 (56)*	420 (54)	329 (54)
Age					
<1 year [N (%) = 173 (2)]	86 (2)	11 (0)	57 (4)	10 (1)	13 (2)
1–17 years [274 (3)]	134 (2)	16 (1)	62 (5)	35 (4)	48 (8)
18–39 years [1155 (11)]	657 (12)	210 (8)	155 (11)	102 (13)	121 (20)
40–64 years [4368 (42)]	2340 (43)	1029 (41)	604 (44)	335 (43)	245 (40)
65+ years [4343 (42)]	2230 (41)	1226 (49)	491 (36)	296 (38)	181 (30)
Neonate (<4 weeks) [N (%) = 106 (1)]	59 (1.1)	<5 (NR)	34 (2.5)*	<5 (NR)	<5 (NR)
Race					
African American [N (%) = 2127 (21)]	947 (17)*	555 (22)	379 (28)*	189 (24)*	121 (20)
Caucasian [7173 (70)]	3965 (73)*	1710 (69)	837 (61)*	512 (66)*	424 (70)
Other [820 (8)]	426 (8)	191 (8)	119 (9)	65 (8)	47 (8)
Unknown [193 (2)]	109 (2)	36 (1)	34 (2)	12 (2)	16 (3)
Census region					
Midwest [N (%) = 1818 (18)]	1106 (20)*	461 (18)	173 (13)*	112 (14)*	104 (17)
Northeast [3239 (31)]	1713 (31)	778 (31)	469 (34)*	205 (26)*	167 (27)*
South [4123 (40)]	1937 (36)*	980 (39)	611 (45)*	406 (52)*	274 (45)*
West [1133 (10)]	691 (13)*	273 (11)	116 (8)*	55 (7)*	63 (10)
Patient encounters (with ≥1 culture positive)	N (%) = 5668	N (%) = 2598	N (%) = 1431	N (%) = 808	N (%) = 629
Infection type (encounters)					
†Candidemia [N (%) = 6011 (55)]	2650 (47)*	1776 (68)*	885 (62)*	503 (62)*	401 (64)*
‡Abdominal [2437 (22)]	1567 (28)*	499 (19)*	103 (7)*	156 (19)*	132 (21)
§Other sterile [2531 (23)]	1451 (26)*	323 (12)*	444 (31)*	149 (18)*	96 (15)*

C. albicans and *C. parapsilosis* had 1 patient each with unknown gender

* $p \leq 0.05$ compared to total sample population

Other species include: *C. catenulata*, *C. ciferrii*, *C. dubliniensis*, *C. famata*, *C. guilliermondii*, *C. haemulonii* (pan-susceptible), *C. kefyr*, *C. lambica*, *C. lipolytica*, *C. lusitanae*, *C. magnoliae*, *C. norvegensis*, *C. pelliculosa*, *C. pulcherrima*, *C. rugosa*, *C. spharctica*, *C. stellatoidea*, *C. utilis*, *C. zeylanoides*

<5 (NR) – Number of cases <5, exact count and percentage not reported to preserve data anonymity

†Candidemia with or without disseminated infection; ‡Abdominal sterile source without candidemia; §Non-abdominal sterile source without candidemia

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363. National Burden of Candidemia, United States, 2017

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Session: 56. Fungal Disease: Management and Outcomes
Thursday, October 4, 2018: 12:30 PM

Background. Candidemia is a common healthcare-associated bloodstream infection associated with high morbidity and mortality. No current estimates exist for understanding its burden in the United States.

Methods. In 2017, CDC's Emerging Infections Program (EIP) performed laboratory- and active population-based candidemia surveillance in 45 counties in nine states (California, Colorado, Georgia, Maryland, Minnesota, New Mexico, New York, Oregon, Tennessee), encompassing ~17 million persons. A case was defined as *Candida* species isolated from blood in a surveillance area resident. EIP site staff reviewed medical records to collect demographic and clinical data. Using 2016 US census data, we created weighted estimates of national and regional incidence rates and mortality in persons with candidemia (defined as death from any cause within 7 days of incident candidemia).

Results. A total of 1,226 candidemia cases were identified in 2017. We estimated 23,000 candidemia cases (95% CI 20,000–25,000) occurred in the United States in 2017. Overall estimated incidence was 7.0/100,000 persons, with elevated rates in adults ≥65 years (20.3/100,000), males (8.0/100,000), and people of Black race (12.6/100,000) (table). Incidence was highest in the South Atlantic region (8.0/100,000) and lowest in the Pacific (6.0/100,000). Estimated number of deaths was 3,000 (1,000–5,000).

Conclusion. Our analysis highlights the substantial burden of candidemia in the US because candidemia is only one form of invasive candidiasis, the true burden of invasive infections due to *Candida* species is likely higher. Ongoing surveillance can support future burden estimates and help assess the impact of prevention interventions.

Table: National projections of candidemia cases and incidence

Demographic group	Cases*	Projected Cases (95% CI)	Incidence Rate per 100,000
Age (yrs)			
<1	17	285 (225-346)	7.2
1-18	14	243 (194-293)	0.3
19-44	271	4,621 (3,809-5,434)	4.1
45-64	431	7,589 (6,221-8,957)	9.0
≥65	493	9,987 (8,124-11,850)	20.3
Sex			
Male	679	12,732 (10,776-14,688)	8.0
Female	547	9,993 (8,515-11,471)	6.1
Race			
Black	394	5,422 (4,099-6,745)	12.6
White	783	16,573 (14,503-18,643)	6.7
Other†	49	730 (461-1,000)	2.3

*Colorado EIP began candidemia surveillance in May 2017.

†Other: Asian, Native Hawaiian/Pacific Islander, and American Indian/Alaska Native

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364. The Capital District of New York State, Likely a New Blastomycosis Endemic Region

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Thursday, October 4, 2018: 12:30 PM

Background. Blastomycosis is a commonly misdiagnosed infection caused by *Blastomyces* spp. It is not reportable in New York State (NYS), but where reportable, yearly incidence is 1–2/100,000 persons. In October 2017, a physician notified the NYS Department of Health (NYSDOH) of six blastomycosis cases seen during April 2016–July 2017 in the nonendemic eastern upstate area known as the Capital District (CD). NYSDOH investigated to determine the possibility of locally acquired blastomycosis.

Methods. NYS hospital blastomycosis discharge codes from the January 2007–December 2016 Statewide Planning and Research Cooperative System dataset were reviewed. To better understand illness in the area of highest incidence, NYSDOH contacted CD physicians to identify patients diagnosed with blastomycosis during April 2016–February 2018. Chart reviews and interviews were conducted to obtain travel and disease progression details.

Results. During 2007–2016, there were 279 blastomycosis diagnoses in NYS. Mean annual blastomycosis diagnoses during 2007–2015 was 24 (incidence: 0.1/100,000 persons); in 2016, there were 59 blastomycosis diagnoses (incidence: 0.3/100,000 persons). A CD county had the highest state incidence, with a rate increase from 2.0/100,000 persons during 2007–2015 to 4.1/100,000 persons during 2016. CD physicians provided contact and clinical information for the six initially-identified patients and two additional patients seen during April 2016–February 2018. All experienced delays in diagnosis, seven lacked travel history, two had cutaneous blastomycosis, three had pulmonary blastomycosis, and three had disseminated blastomycosis. One died from blastomycosis and another required long-term ventilator support. Seven cases were identified by culture or histopathology; the diagnostic method for one was unknown.

Conclusion. One CD county had blastomycosis rates similar to known endemic areas; patients lacked travel history to endemic areas, indicating locally acquired blastomycosis might have occurred. To improve prompt diagnosis, NYS clinicians and laboratorians should consider blastomycosis in patients with pneumonia, even without travel history to endemic areas. Further evaluation is needed to determine whether the endemic area of NYS has expanded.

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365. Candida Bloodstream Infections in a Tertiary Care Hospital in Costa Rica, 5-Year Experience

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Session: 56. Fungal Disease: Management and Outcomes
Thursday, October 4, 2018: 12:30 PM

Background. Invasive fungal bloodstream infections (BSI) display high morbidity and mortality. Epidemiologic data from Central America, including geographic distribution and mortality is scarce.

Methods. Patients of all age groups with a positive *Candida* spp. blood culture from January 2012 to December 2017. Only initial episodes was accounted per patient. Demographic data was retrospectively collected and analyzed. Between-group differences were compared using Chi2, logistic regression used to calculate odds ratios, and survival analysis using Kaplan Meier.

Results. 243 episodes of *Candida* spp. BSI occurred during the study period, increasing over time. A median 21 days of hospital stay to the first episode of candidemia (IQR 14–32). *Candida albicans* represented 51% of episodes, followed by *C. parapsilosis* 27%, *C. glabrata* 9%, *C. tropicalis* 9%, *C. haemulonii* 1.6%, *C. krusei*, *C. pelliculosa*, *C. guilliermondi*. Male sex predominated (62%) over females (38%), median age was 54 years. Age group distribution corresponded to 23 newborns (9%), 6 adolescents (3%), 141 adults (58%), and 72 elders (30%). Surgical wards and surgical ICU comprised for 47% of cases. Admission for intraabdominal pathology; 35% of cases, followed by cancer 21% (63% solid tumors, 37% hematologic malignancies), 11% trauma and orthopedic surgery. Overall resistance rates were 14% fluconazole, 5% voriconazole and 8% for amphotericin B, no resistance to echinocandins detected. Overall mortality was 69%. Mortality by species *C. krusei* 100%, *C. tropicalis* 95%, *C. glabrata* 81%, *C. albicans* 68%, *C. parapsilosis* 59%, *C. haemulonii* 50%, ($P = 0.02$). No fatalities occurred with *C. pelliculosa* and *C. guilliermondi*. Mortality was highest in elderly (69%), followed by adults (65%) and adolescents (50%) ($P = 0.039$). Death OR was 2.13 for elders vs. the adult group ($P = 0.02$, CI 1.097–4.155). A negative correlation was documented between age group and survival ($\rho = -0.3250$ $P < 0.00001$).

Conclusion. *Candida* BSI show an increasing trend over time in our cohort. *Candida parapsilosis* as the second cause of candidemia displays lower mortality than its counterparts. Mortality was higher than previously reported and is highest in the elderly. Antimicrobial stewardship programs, source control in abdominal surgeries and appropriate central venous catheter use need to be implemented to improve outcomes.

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366. Impact of Obesity in Patients With Candida Bloodstream Infections

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