

OREGON PUBLIC HEALTH DIVISION • OREGON HEALTH AUTHORITY

CANDIDEMIA: CENTRAL LINE AND MAIN LINE

Most patients seek medical care in hope of curing what ails. Unfortunately, approximately 1.7 million patients develop nosocomial infections each year in the U.S.<sup>1</sup> Candidemia is the fourth most common cause of healthcare-acquired bloodstream infections in the U.S.<sup>2</sup> Patients at high risk for candidemia include those with a central venous catheter (CVC), those undergoing complicated surgeries, and immunocompromised patients. The risk of candidal infection increases with increasing length of stay at the healthcare facility and increasing complexity of care.<sup>3</sup> This *CD Summary* offers data on candidemia in Oregon.

*Candida* and other yeasts are normal commensals found on human skin, in the gastrointestinal tract and in the environment. Oral yeast infection (“thrush”) most commonly afflicts babies and immunocompromised individuals, and 75% of women suffer a vaginal yeast infection some time during their lives.<sup>4</sup> These types of candidiasis are easily treated. However, given the right host and portal of entry, *Candida* can be lethal.

**OREGON DATA**

Oregon is one of four states funded by the U.S. Centers for Disease Control and Prevention (CDC) to conduct active, population-based surveillance for candidemia. In Oregon, surveillance is conducted in the Portland tri-county area, with a population of approximately 1.7 million.

Since surveillance began in 2011, the incidence of candidemia here has been relatively low: over the three years, 192 cases have been reported. In 2013, the incidence was 3.4 cases per 100,000 population (Table 1) — considerably lower than the 9.1–12.7 cases per 100,000 preliminarily reported in the other three participating states. Forty-seven percent of Oregon cases were female, and 35% were aged 50–64 years.

**RISK FACTORS**

Among 181 candidemia cases whose medical records have been reviewed, the most commonly recorded comorbidities have been surgery (40%), diabetes (27%), cancer (18%), and liver disease (18%) (Table 2, *verso*). In the 14 days before blood culture was drawn, 68% of cases had received systemic antibacterial agents, and 24% had been given total parenteral nutrition.

Ninety-eight percent of candidemia cases were hospitalized, and 24% died. Among the four cases not hospitalized, three were infected with *C. parapsilosis* and seen at the emergency department. Eighty-one percent of deaths were in adults aged ≥50 years. Death did not differ by sex but varied by age group; most deaths occurred in cases 50–64 years of age (n=23, 37% mortality), but the highest mortality was in cases ≥80 years of age (n=7, 44% mortality).

Cases who died were significantly more likely than survivors to have had a CVC within 2 days before culture (85% vs. 65%, *P*=0.012) or to have been admitted to intensive care (84% vs. 40%, *P*<0.001).

Blood isolates from cases are sent to CDC for species confirmation and antifungal susceptibility testing. *C. albicans* was the most common species (40%), followed by *C. glabrata* (26%) and *C. parapsilosis* (16%). Nine cases were infected with more than

**Table 1. Portland tri-county candidemia cases by age and sex, 2011–2013**

Age (years)	Cases	2013 incidence, per 100,000	Deaths n (%)
<5	12	0.9	0 (0)
5–17	9	1.1	2 (22)
18–34	32	1.7	1 (3)
35–49	27	2.5	5 (19)
50–64	68	6.0	23 (37)
65–79	27	7.4	5 (22)
≥80	17	7.4	7 (44)
Total	192	3.4	43 (24)

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one *Candida* species. *C. glabrata* was more often isolated from patients with diabetes and cancer than were other common species. The species with the highest case-fatality rates were *C. dublinensis* (4/6, 67%), *C. krusei* (2/6, 33%), and *C. glabrata* (14/46, 30%). Five of 6 *C. krusei* isolates were taken from patients with cancer.

**TREATMENT**

Rapid initiation of antifungal therapy is indicated for all patients with candidemia.<sup>2</sup> Fluconazole may be used in patients who are less critically ill and from whom *C. albicans* or *C. parapsilosis* is isolated. An echinocandin is recommended for moderately severe to severely ill patients, including neutropenic patients and patients with *C. glabrata*.

Of 120 *Candida* spp. isolates from Oregon tested at CDC, 34 (29.5%) exhibited dose-dependent susceptibility (DD) to fluconazole, meaning that a maximized dose of fluconazole is required; 30 (88%) of the DD organisms were *C. glabrata*. Only 4 (3.5%) of the 120 isolates were resistant to an antifungal medication — all to fluconazole — two *C. glabrata* and two *C. krusei*; the two cases with *C. krusei* died.

**PREVENTING CANDIDEMIA**

Candidemia in Oregon is primarily nosocomial, so prevention efforts should focus on healthcare facilities, clinicians, and at-risk patients. Those most at risk for candidemia include:<sup>4</sup>

- Patients with CVCs
- Surgical patients



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**Table 2: Candidemia cases by age, comorbidity, and healthcare-associated risk factor, Portland tri-county area, 2011–2013**

Age (years)	Total n	Comorbidity				Healthcare Risk Factor				
		Cancer n (%)	Diabetes n (%)	Liver diagnoses n (%)	Chronic renal failure n (%)	Abdominal surgery n (%)	Other surgery n (%)	CVC (within 2 days of culture) n (%)	Systemic antibacterials n (%)	Total parenteral nutrition n (%)
<5	12	1 (8)	0 (0)	0 (0)	0 (0)	4 (33)	2 (17)	10 (83)	7 (58)	7 (58)
5–17	9	5 (56)	0 (0)	0 (0)	1 (11)	0 (0)	1 (11)	9 (100)	8 (89)	4 (44)
18–34	32	1 (3)	5 (16)	3 (9)	0 (0)	3 (9)	4 (13)	18 (56)	19 (59)	5 (16)
35–49	27	3 (12)	4 (15)	8 (31)	3 (12)	2 (8)	5 (19)	18 (69)	19 (73)	3 (12)
50–64	68	13 (21)	24 (38)	19 (30)	11 (17)	10 (16)	13 (21)	48 (76)	49 (78)	18 (29)
65–79	27	6 (26)	11 (48)	1 (4)	2 (9)	2 (9)	9 (39)	14 (61)	13 (57)	5 (22)
≥80	17	4 (25)	5 (31)	1 (6)	1 (6)	4 (25)	6 (38)	6 (38)	8 (50)	2 (13)
Total	192	33 (18)	49 (27)	32 (18)	18 (10)	25 (14)	40 (22)	123 (68)	123 (68)	44 (24)

- Cancer patients and other immunocompromised patients
- Patients with liver disease
- Dialysis patients

**Clinicians:** Those caring for patients who have CVCs should follow CDC's guidelines for infection prevention.<sup>5</sup>

- Practice proper catheter insertion
- Maintain central lines appropriately
- Remove unnecessary central lines

**Patients:** CDC recommends:

- Ask whether a central line is needed and, if so, for how long
- Ensure healthcare professionals wash hands before caring for the central line
- Say something to the caregiver if skin around a central line is sore or red, or if bandages are wet or dirty

**LANE COUNTY OUTBREAK**

Community-acquired outbreaks of candidemia are unusual. In April 2013, a clinician in Lane County noted that three male injection-drug users (IDUs) had recently been admitted to the hospital with candidemia. Over the summer four more Lane County IDUs were

diagnosed with candidemia. Compared with a 2009–2012 baseline, these seven cases lifted the fungemia rate from 0.5 to 8.6 cases per 10,000 hospital admissions in Lane County in 2013.

Epidemiologists interviewed the seven IDU candidemia cases about injection practices, equipment used, heroin sources, and symptoms. Interviews revealed several possible causes of the surge in cases. Heroin is often smuggled into the country via hard-to-search body cavities and cut with substances (e.g., brown sugar, tar) not intended for direct injection into one's veins. Boiling heroin serves not only to dissolve the drug for injection but kills bacteria and fungi present in the mixture. Apparently, however, some users discourage boiling because it is rumored to render the heroin less potent; as a result, the practice of "cold cooking," whereby users dissolve the drug in cold water without heating, may have increased in popularity. We are still trying to tease out the precise

cause of the candidemia outbreak among IDUs.

**RESOURCES**

For more information, visit CDC's Candidiasis website: [www.cdc.gov/fungal/candidiasis/index.html](http://www.cdc.gov/fungal/candidiasis/index.html)

You can review Oregon's monthly Candidemia reports at the Healthcare-Associated Infections Surveillance website: [www.healthoregon.org/eip](http://www.healthoregon.org/eip)

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