Five (62%) patients had received antimicrobial drugs before the infection. Drug therapy failed in 5 (62%) that had positive cultures during deoxycholate AMB (n = 4) or fluconazole (n = 1) therapy. Among the 7 patients with CVC-associated candidemia, 4 had the CVC removed; 3 of those survived. The 30-day all-cause mortality rate was 50%.

Our study showed a prevalence of 0.3% C. haemulonii among yeast isolates, which was much higher than previously reported (4). Older commercial methods are unable to correctly identify C. haemulonii species, contributing to this underestimation (4). More closely related species such as C. auris, mainly found in South Africa, Asia, and the Middle East, have been misidentified as C. haemulonii and C. famata by using older systems. Thus, matrix-assisted laser desorption/ionization–time of flight mass spectrometry and internal transcribed spacer RNA sequencing are necessary to provide the correct identification (5–7).

The data we document suggest that patients with diabetes mellitus are more likely to have positive cultures for C. duobushaemulonii than for the 2 C. haemulonii species. Moreover, C. duobushaemulonii isolates have higher AMB MICs than the C. haemulonii species. As previously reported (8), echinocandins showed better in vitro activity than azole compounds.

In summary, we demonstrated that C. haemulonii species complex are critical pathogens of chronic lower extremity wounds and that fungemia by such species remains a rare event. The 30–day all-cause mortality rate among patients with candidemia was 50%, lower than previously reported in our institution (9) and other centers in Brazil (10). We believe that in cases of candidemia by C. haemulonii spp. that 1) empirical use of AMB or azole compounds should be avoided; 2) removal of CVC should be performed; and 3) antifungal susceptibility testing should be done to guide antifungal therapy.

Acknowledgments
We thank Maria Isabel Cunha and Regina Munhoz Botelho for the exceptional technical assistance.

This study was supported by FAPESP, research project 2014/10126-4.

References

Address for correspondence: João Nobrega de Almeida, Jr., Laboratorio de Microbiologia, DLC, PAMB, Instituto Central. Av. Dr. Enéas de Carvalho Aguiar, 255–Cerqueira César, 05403-000 São Paulo, Brazil; e-mail: jnaj99@gmail.com

Review of Cases and a Patient Report of Myiasis with Tracheostomy, Peru

Virgilio E. Failoc-Rojas, Heber Silva-Díaz

Author affiliations: Universidad Nacional Pedro Ruiz Gallo, Lambayeque, Peru (V.E. Failoc-Rojas, H. Silva-Díaz); Hospital Regional Lambayeque, Lambayeque (H. Silva-Díaz)

DOI: http://dx.doi.org/10.3201/eid2203.151631

To the Editor: Myiasis is the infestation in humans of larvae of flies (order Diptera). These larvae can infect
skin, necrotic tissues, and natural cavities of living persons. Myiasis can be primary if it infects intact skin or secondary if it infects a previous injury. Depending on the degree of parasitism, myiasis may be obligatory (requiring a live host for parasite survival), facultative (developing in live or dead organic matter), or accidental (developing accidentally in an inappropriate host) (1). In South America, the species that most frequently cause myiasis are Dermatobia hominis and Cochliomyia hominivorax.

Factors contributing to development of myiasis are low socioeconomic status, unhealthy environments, advanced age, alcoholism, neurologic diseases, and lack of personal hygiene (1,2). Myiasis may occur different tissues, but reports of myiasis of the tracheal stoma are rare. We searched PubMed, MedLine, Lilacs, Scopus, and Google Scholar databases for scientific articles published in English or Spanish languages during 1990–2015 by using the search term “myiasis and tracheostomy.” We found reports of 10 patients (Table).

We also report a case of tracheostomal myiasis in a 67-year-old man from Túcume, Peru. The patient had a history of esophageal tumor lesion with considerable airway stenosis related to upper esophageal cancer (stage III). Six months before onset of myiasis, he had respiratory difficulty caused by obstructed airway and underwent a tracheostomy and gastrostomy. When the patient was admitted to the emergency department of a hospital in Lambayeque, located ≈35 km from the patient’s home, mobile larvae were present at the tracheostomy site, which also contained brown secretions with traces of blood and obvious signs of inflammation. A cervical abscess surrounded by necrotic tissue was visible, which, according to family members, developed after the larval infection. We manually removed the larvae and began treatment with ivermectin orally (1 mg, 200 µg/kg), ceftriaxone orally (2 g/d), and metronidazole intravenously (500 mg every 8 h). Three days after admission, with a postdischarge treatment of oral metronidazole (500 mg every 12 h for 3 d).

Three specimens of larvae were sent to the hospital’s parasitology laboratory, which identified the larvae as C. hominivorax stage L-3 (infection began with fly oviposition ≈6 days before admission; L-1, L-2, and L-3 are stages of larval development from hatching until pupation, requiring ≈7 days). The larvae were 10 mm × 3 mm and had a cylindrical, pale yellow body segmented with pigmented tracheal trunks visible in the last 4 posterior segments. Microscopic examination showed that the anterior end had a prominent jaw and segments with small bands of cuticular spines; the rear end had exposed spiracles, each with 3 straight grooves and open peritrematic membranes (reference 13 in the online Technical Appendix, http://wwwnc.cdc.gov/EID/article/22/3/15-1631-Techapp1.pdf).

The life cycle of C. hominivorax is similar to any other species in the Diptera order. Open wounds and body orifices (e.g., a tracheostomy) emitting odors from natural secretions are conducive for oviposition by flies and development of myiasis. A study from Brazil mentions that open wounds are the leading cause of development of the C. hominivorax parasite (2). Chronic extensive wounds are often infested by C. hominivorax (2,5).

Myiasis infection is concerning because it can lead to secondary infections such as Escherichia coli, Serratia marcescens, and Enterococcus faecalis (6). The infection is most dangerous when patients have concurrent conditions such as immunosuppression.

Table. Reports in the literature about myiasis associated with tracheostomy, by date of publication*

<table>
<thead>
<tr>
<th>Country</th>
<th>Patient age, y/sex</th>
<th>Associated conditions</th>
<th>Fly species</th>
<th>Year of publication</th>
<th>Reference†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>85/F</td>
<td>Comatose state for 2 mo</td>
<td>Unidentified</td>
<td>1993</td>
<td>(3)</td>
</tr>
<tr>
<td>Italy</td>
<td>57/M</td>
<td>Persistent vegetative state</td>
<td>Lucilia caesar</td>
<td>2006</td>
<td>(4)</td>
</tr>
<tr>
<td>Brazil</td>
<td>49/M</td>
<td>Neck carcinoma</td>
<td>Cochliomyia hominivorax</td>
<td>2011</td>
<td>(5)</td>
</tr>
<tr>
<td>India</td>
<td>78/M</td>
<td>Tracheostomy by car accident</td>
<td>Chrysomya bezziana</td>
<td>2011</td>
<td>(6)</td>
</tr>
<tr>
<td>Argentina</td>
<td>8/NA</td>
<td>Cerebral palsy</td>
<td>Unidentified</td>
<td>2012</td>
<td>(7)</td>
</tr>
<tr>
<td>India</td>
<td>52/M</td>
<td>Laryngeal cancer</td>
<td>Musca domestica (housefly)</td>
<td>2013</td>
<td>(8)</td>
</tr>
<tr>
<td>Turkey</td>
<td>86/F</td>
<td>Carcinoma supraglottis and diabetes</td>
<td>Chrysomya bezziana</td>
<td>2013</td>
<td>(9)</td>
</tr>
<tr>
<td>India</td>
<td>57/M</td>
<td>Poor hygienic condition and tetraplegia</td>
<td>Lucilia caesar</td>
<td>2014</td>
<td>(10)</td>
</tr>
<tr>
<td>Italy</td>
<td>5/ M</td>
<td>Proliferative ulcer on vocal cords and glottic stenosis</td>
<td>Chrysomya bezziana</td>
<td>2015</td>
<td>(11)</td>
</tr>
<tr>
<td>Peru</td>
<td>67/M</td>
<td>Werdnig-Hoffmann disease</td>
<td>Sarcophaga argyrostoma</td>
<td>2015</td>
<td>(12)</td>
</tr>
</tbody>
</table>

*NA, not available.
Treatment of myiasis involves manual removal of larvae and surgical debridement, in conjunction with ivermectin and systemic broad-spectrum antimicrobial drugs to prevent secondary infections (1,2). Treatment with ivermectin can kill the larvae (1; references 14,15 in the online Technical Appendix) and result in considerable reduction of larvae in infested wounds. Ivermectin has a broad antiparasitic spectrum that causes immobilization of parasites by inducing tonic paralysis of the parasite’s muscles, mainly at the pharyngeal level, resulting in the death of the parasites by suffocation and starvation.

For the patient in this report, the single oral dose (0.2 mg/kg) of ivermectin was an effective treatment for myiasis. However, to control the underlying disease and prevent recurrences, ivermectin should be used with oral antimicrobial drugs and wound care when the wound has a high number of larvae, which are associated with bacterial infections (4,5).

For bedridden patients, patients with superficial wounds who live in myiasis-endemic areas, or patients who undergo a tracheostomy or have open wounds, health workers and caregivers should consider preventive care of wounds, which are risk factors for myiasis infection. This care consists of suitable wound dressing and proper personal and environmental hygiene.

Acknowledgments
We thank Suzanna Rojas Thompson for her constructive comments on an earlier version of this manuscript.

References

Address for correspondence: Virgilio E. Failoc-Rojas, Av Manuel Seoane 1343-La Victoria, Chiclayo, Peru; email: virgiliofr@gmail.com

Trends in Liver Transplantation in Hepatitis C Virus–Infected Persons, United States

Ryan B. Perumpail, Robert J. Wong, Andy Liu, Channa R. Jayasekera, Douglas T. Dieterich, Zobair M. Younossi, Aijaz Ahmed

Author affiliations: Stanford University School of Medicine, Stanford, California, USA (R.B. Perumpail, A. Ahmed); Highland Hospital, Oakland, California, USA (R.J. Wong); Albert Einstein School of Medicine, Bronx, New York, USA (A. Liu); California Pacific Medical Center, San Francisco, California, USA (C.R. Jayasekera); Icahn School of Medicine at Mount Sinai, New York, New York, USA (D.T. Dieterich); Inova Fairfax Hospital Center for Liver Diseases, Falls Church, Virginia, USA (Z.M. Younossi); Inova Health System Betty and Guy Beatty Center for Integrated Research, Falls Church (Z.M. Younossi)

DOI: http://dx.doi.org/10.3201/eid2203.151650

To the Editor: The Centers for Disease Control and Prevention and US Preventive Services Task Force recommend a one-time screening for hepatitis C virus (HCV) infection in adults born during 1945–1965 (birth cohort), a demographic group with a disproportionately high prevalence of HCV infection (1,2). However, some experts have warned against routine HCV screening of persons in the birth cohort, stating that this recommendation is based on unproven assumptions about the benefit of screening in reducing HCV-related mortality, given that only a minority of infected persons develop end-stage liver disease (ESLD) (3). To determine the relative effect of the birth cohort on HCV-related ESLD incidence in the United States, we analyzed trends in liver transplantation (LT) waitlist registrations and LT surgeries during 1995–2012. Using data from the United Network for Organ Sharing national registry, we evaluated birth cohort–specific (birth cohort vs. non–birth cohort) and etiology-specific (HCV vs. non-HCV) trends in LT waitlist registrations and LT surgeries performed in the United States during that 18-year period.

The proportion of HCV-infected persons born during 1945–1965 among all persons with LT waitlist registrations in the United States increased from 17.8% in 1995 to 35.2% in 2012 (Table). The highest proportion of LT