and sepsis in a tertiary care 30-bedded chemotherapy oncology unit is the first human outbreak to the best of our knowledge.

Methods. *Prototheca wickerhamii* algaemia was confirmed on consecutive isolation. Person to person transmission was hypothesized considering all patients in the unit at risk. Clinico-demographic, diagnostic and treatment profile were correlated. Both manual and automated systems were used for blood culture, isolation, identification, and susceptibility of *Prototheca*. Liposomal amphotericin B was given. Outbreak surveillance of faeces, fingertips and environmental reservoirs, retrospective surveillance during past 15 years and prospective surveillance was continued for 2 years.

Results. The outbreak affected 12 neutropenic patients over 50 days. No specific clinical features were noted. The hypothesis could not be substantiated. *P. wickerhamii* was isolated as yeast-like colonies revealing Gram positive yeast-like cells without budding and pseudohyphae which were confirmed by automated system. Post amphotericin B blood cultures were negative for *Prototheca*. Surveillance studies were not contributory.

Conclusion. *Prototheca wickerhamii* has no documented reservoirs or transmission. Endogenous colonization in the gut followed by translocation during chemotherapy-induced immunosuppression is likely to cause algaemia and sepsis. Outbreaks are difficult to detect and control as incubation period is variable and clinical presentation is muted, emphasizing the need to strengthen hospital and laboratory-based surveillance systems to ensure adequate preparedness, rapid detection, and response to outbreaks.

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406. Achievement of Clinical Isavuconazole (ISA) Serum and Plasma Drug Concentrations in Two Patients With Isavuconazonium Capsules Administered via Nasogastric Feeding Tube (NGT)

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Background. Isavuconazole is a broad-spectrum antifungal available in both intravenous (IV) and oral capsule formulations for the treatment of invasive aspergillosis and mucormycosis. Oral administration can be challenging as FDA prescribing information states capsules should not be chewed, crushed, dissolved, or opened. We describe the first two cases, to our knowledge, of patients who received isavuconazonium capsules sprinkled via NGT with concomitant therapeutic drug monitoring (TDM).

Methods. All ISA serum and plasma assays resulted from January 1, 2016 to February 1, 2018 at a tertiary academic medical center were assessed. Isavuconazole assays were performed by Viracor Eurofins, Inc. using liquid chromatography-tandem mass spectrometry. Retrospective chart review was performed for all patients. Assay results from patients receiving whole capsules by mouth (PO) were compared with NGT.

Results. Nineteen unique patients had 33 ISA assays during the study period. Two patients received capsules via NGT. The first patient was a 59-year-old female treated empirically for fungal rhinosinusitis who received 5 days of IV therapy prior to switching to NGT. Trough ISA levels on days 11 and 23 were 1.9 and 1.5 μg/mL, respectively. The second patient was a 66-year-old male treated for presumed invasive pulmonary aspergillosis who received 7 days of NGT therapy; trough level on day 8 was 2.9 μg/mL. Both patients received continuous tube feedings and were liver transplant recipients. In comparison, trough concentrations in the PO group ($N = 17$) ranged from 1.1 to 8.0 μg/mL (3.79 ± 1.68). All patients received FDA-approved loading and maintenance dosing.

Conclusion. Patients receiving isavuconazonium via NGT (opened sprinkled capsules) achieved clinically detectable serum ISA levels in a therapeutic range comparable to patients receiving PO. This study provides the first evidence that enteral routes other than PO may be effective for isavuconazonium administration. While the establishment of a trough concentration threshold predicting ISA therapeutic efficacy remains to be determined, TDM in patients receiving capsules by an enteral route other than PO may play an important role.

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407. Changes in the Utilization Patterns of Antifungal Agents, Medical cost, and Clinical Outcomes of Candidemia by Healthcare Benefit Expansion to Include Newer Antifungal Agents

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Background. Candidemia is a major life-threatening fungal infection in hospitalized patients worldwide. In 2014, South Korea's national health insurance expanded its coverage for newer antifungal agents such as echinocandins. This study investigated the effects of change in insurance coverage on the prescription patterns of antifungals, medical costs, and treatment outcomes of candidemia.

Methods. A retrospective cohort study was conducted for all hospitalized patients with candidemia at three tertiary care hospitals in South Korea from January 2012 to December 2015. The utilization of antifungal agents, medical cost, and treatment outcomes before and after the healthcare benefit expansion were compared and the factors associated with 28-day mortality during the study period were analyzed.

Results. A total of 769 candidemia patients were identified during the study period: from 2012 to 2015, there were 196, 199, 201, and 173 patients, respectively. The incidence of candidemia did not change during the study period ($P = 0.253$). The proportion of echinocandins as the initial antifungal agent and direct medical costs for candidemia significantly increased since the change in insurance coverage ($P < 0.001$). There was no significant difference in 28-day mortality of candidemia before and after the healthcare benefit expansion ($P = 0.067$). On multivariable analysis, independent factors associated with the 28-day mortality were Charlson comorbidity score (odds ratio [95% confidence interval]: 1.171 [1.080–1.269]), SOFA score (1.258 [1.185–1.335]) and initial treatment with amphotericin B (vs.: fluconazole (0.624 [0.428–0.912]) and caspofungin (0.517 [0.269–0.993]).

Conclusion. Although the utilization of newer antifungal agents and medical cost for candidemia has significantly increased since the healthcare benefit expansion, to include newer antifungal agents, the policy change does not seem to change the mortality rate of candidemia in South Korea.

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408. Invasive Fungal Petrositis and Carotiditis (IFPAC) Syndrome in Immunocompromised Hosts: An Unrecognized, Often Catastrophic Invasive Fungal Disease (IFD)

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Background. Infections involving the petro-clival junction of the temporal bone are rare and primarily caused by *Pseudomonas aeruginosa* in the setting of progressive malignant otitis externa (skull base osteomyelitis). IFD, including invasive aspergillosis (IA), are not often considered in the evaluation of these patients.

Methods. We conducted a retrospective study of patients diagnosed with fungal skull base petrositis at our institution from 2003 to 2018. We collected data including demographics, clinical presentation, imaging, diagnostic evaluation, treatment, microbiology, and outcomes.

Results. We identified four cases of IFPAC. Median age at presentation was 73 years (range, 66–79), 3 were male. IFD risk factors included diabetes ($n = 3$), glucocorticoid use ($n = 3$), and lymphoid malignancy ($n = 2$). Two patients were on additional T-cell immunosuppressants. Patients presented with otalgia ($n = 2$) or headaches ($n = 2$). Two patients developed cranial nerve deficits (III, V, VI), two had hearing loss and trigeminal neuralgia. All cases were caused by *Aspergillus* spp. (3 proven, one probable IA). Two cases were otogenic, two were sinusal in origin. Proven cases were confirmed by biopsy of mastoid cortex or sinus tissue. Median time from symptom onset to diagnosis was 17 weeks (range, 6–36). All patients were treated with anti-*Aspergillus* antifungals with initial improvement in symptoms, imaging, or decrease in galactomannan levels. All patients eventually presented with occlusion of the internal carotid artery (ICA) and multiple cerebral infarcts. Two patients were diagnosed with mycotic aneurysms involving (a) ICA with rupture necessitating endovascular intervention and vessel sacrifice; (b) basilar summit with subarachnoid hemorrhage. Three patients died following these vascular events, while one patient underwent left ICA bypass with improvement in symptoms.

Conclusion. IFPAC is a rare, but distinct manifestation of IFD and was caused by IA in this series. All patients experienced carotid vascular events and two patients had associated mycotic aneurysms despite symptomatic and radiologic improvement on antifungal therapy, raising the question if more aggressive surgical or endovascular interventions need to be considered in this syndrome.

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409. Changing Epidemiology of Fungal Bloodstream Infections in a Tertiary Care Center in India

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