

in Infection Control and Epidemiology (APIC) Basic Principles of an Outbreak Investigation, to conduct the epidemiological investigation of the outbreak. Results: All 15 CVCs required replacement, and 1 case of bacteremia was recorded. We suspect that the underlying cause was related to changes in the manufacturing process of hubs along with the product used to prepare the hubs prior to access (Table 1). Conclusions: Following an outbreak investigation process to investigate a noninfectious related outbreak can ensure that a thorough and comprehensive investigation is being completed. Early recognition of an outbreak is essential to recognition of the outbreak and the implementation of mitigation strategies. Inconsistent reporting of adverse events related to mechanical issues with the catheters may have contributed to a delay in recognition.

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Presentation Type:

Poster Presentation

Using Data Collected from a Commercial Sensor System to Inform Mathematical Models of Healthcare-Associated Infections

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Background: Hospital-acquired infections are commonly spread through the movement of healthcare professionals (HCPs). Computational simulations provide a powerful tool for understanding how HCP behavior contributes to these infections, but how well they reflect the real world rests on a number of critical parameters. Our goal is to provide accurate, fine-grained estimates of real HCP movement and interaction parameters suitable for simulating the potential spread of pathogens over different types of inpatient facilities. **Methods:** We obtained a commercial data set with 44 million deidentified elements compiled from >27,000 HCPs from >30 job types. The data were collected over 27 months from >20 facilities of varying size using a proprietary electronic sensor system. Each observation recorded an HCP visiting 1 of 12,000 rooms (38% being patient rooms) and consisted of the entry and exit time stamps, hand hygiene behavior, and for many rooms, their (x, y) geometric coordinates within the facility. From these data, we can reconstruct the behavior (including location and hand-hygiene adherence) of each instrumented HCP across multiple shifts. **Results:** Distributions describing various aspects of HCP behavior (eg, arrival rates and dwell times) were derived using HCP job function, department or unit assignment, type of shift (day vs night), time of day, facility size, and staffing of facility. In a similar fashion, we constructed HCP cross-table transition probabilities using job type, room type, department type, unit type, and facility type. These distributions were used to generate reasonable HCP movement and behavior patterns in a simulation environment. Distributions of dwell time were, for the most part, heavy tailed, but they varied by type of job and facility: dwell times over all facilities, job types, and room types averaged ~339 seconds (SD, 495 seconds), with a mean of maximums by job type of ~37,168 seconds. However, these distributions differ within job type but across facilities (ie, nurses in 1 facility averaged 397

seconds, but 277 seconds in another) and within facility but across job type. For example, physicians averaged 292 seconds, whereas nurses averaged 397 seconds and physical therapists averaged 861 seconds. **Conclusions:** Our results provide a unique resource for disease modelers who wish to build meaningful simulations of the transmission of hospital-acquired infections. The scale and diversity of the data gave us the unique capability to provide, with confidence, distinct parameter sets for different types and sizes of healthcare facilities across a wide range of situations.

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Utilizing a Risk-Based Criteria Framework to Identify Infection Prevention and Control Risks in Australian Dental Settings

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Background: A dental practitioner must comply with the Dental Board of Australia's guidelines on infection control. In this project, we developed a risk-based criteria framework to assess a practitioner's infection prevention and control (IPC) systems and processes. This project allowed for the provision of the highest standard of infection control continuing education and advice relevant to the needs of members of the Australian Dental Association (NSW Branch). **Methods:** A review of 1,050 continuing professional development (CPD) IPC course evaluation forms was conducted to determine the key IPC areas that participants have the most difficulty with. All core IPC documents that practitioners are expected to understand and comply with were determined and any regulator- and profession-led compliance checklists were collated. These data were consolidated to generate a risk-based criteria framework that was then applied to 99 private, office-based, dental practices to determine IPC compliance. **Results:** After the review of 99 dental practices, the total aggregate compliance score was 78%, and the 15 key IPC areas were ranked from highest to lowest. These data assisted with the development of a full-day IPC course focusing on the top 5 risks in each category. The five areas of opportunity identified were Hand Hygiene (52%), Surgical Procedures and Aseptic Technique (59%), Documentation, Policy and Knowledge (61%), Sharps (72%), Steam Sterilisers (72%). **Conclusions:** This project identified key IPC risks for office-based dental practices from the capture of performance-based data. This data formed a targeted education framework that prioritized areas of opportunity to improve IPC standards in Australian dental practices.

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Utilizing Telemedicine During Outbreak Events to Reduce Exposure Risk

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Background: As of October 2019, the United States has seen the greatest number of annual measles cases reported since 1992, of

which 2 outbreaks originated in Los Angeles County, California. Media reports and public awareness during outbreak events can result in large numbers of worried well patients or patients with outbreak mimics seeking medical attention. In densely populated cities, utilizing alternative approaches to in-person physician appointments can be beneficial to decrease both the overburden of healthcare resources as well as the spread of potential virus. During these measles outbreaks, we employed the use of telemedicine visits to facilitate triage and determination of in-person examination and testing needs. **Methods:** During the measles outbreak periods, patients who contacted the patient call center at our institution requesting an appointment for fever, rash, or expressing concerns for acute measles infection were instead routed for a telemedicine visit with a physician. All patients were all seen by the same physician, who was trained in internal medicine and pediatrics. During the telemedicine visit, patients were assessed for signs and symptoms consistent with acute measles based on CDC definition. If there was high enough clinical suspicion to warrant testing for measles, infection prevention coordinated logistics with clinic staff, including ensuring the use of appropriate personal protective equipment (PPE), end-of-day appointment scheduling, and appropriate diagnostic testing. **Results:** During this outbreak timeline, 7 patients were seen through telemedicine visits with ages ranging 13 months to 49 years. Also, 6 patients were scheduled due to a chief complaint of acute rash and 1 was due to a potential exposure to measles. Of 7 patients, 4 had received 1 dose of the MMR vaccine, and the remaining 3 were immune, unvaccinated, or had unknown immunity. The unvaccinated patient was further tested for measles but was IgM negative. Of those with chief complaint of rash, the diagnosis was determined to be some form of nonmeasles viral exanthem, allergic dermatitis/eczema, or hives. The exposed patient was deemed to be asymptomatic. **Conclusions:** During an outbreak, patients presenting to clinics with suspected measles symptoms can cause tremendous disruption, including concerns about exposure of staff and patients, need for contact tracing, and anxiety. Utilizing telemedicine appointments aided the management of patients during this outbreak by shifting physician evaluation outside the clinic. When evaluating suspect measles cases during an outbreak with patients who do not require further levels of care, telemedicine can prove to be useful in reducing the burden of potential exposure to others in the community and to the healthcare system.

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Vaccinating to Prevent Antibiotic Use: Potential Impact of a Group A *Streptococcus* Vaccine on Acute Respiratory Infections

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Background: Group A *Streptococcus* (GAS) causes acute upper respiratory tract infections that are frequently treated with antibiotics. GAS vaccines in development may prevent both disease and outpatient antibiotic prescribing. We estimated (1) the incidences of GAS-attributable pharyngitis, sinusitis, and acute otitis media (AOM) infections in the United States; (2) the proportion of these infections

resulting in antibiotic prescriptions; and (3) the incidence of infection and antibiotic prescribing potentially preventable by vaccination against GAS. **Methods:** We estimated annual rates of US outpatient visits and antibiotic prescriptions for pharyngitis, sinusitis, and AOM using physician office and emergency department visit data in the National Ambulatory Care Survey and National Hospital Ambulatory Medical Care Survey from 2012 to 2015. We supplemented this with visits to other outpatient settings (eg, urgent care) from the 2016 IBM MarketScan Commercial Database. We estimated the proportion of episodes attributable to GAS and to GAS *emm* types targeted by a 30-valent vaccine in development using data from previously conducted etiology studies. We estimated the incidence of disease and antibiotic prescribing preventable by a vaccine meeting the WHO 80% efficacy target for preventing noninvasive GAS disease, with doses administered during infancy and at age 4 years. We estimated the proportion of outpatient antibiotic prescribing preventable by vaccination by dividing estimates by total antibiotic dispensations, estimated from the IQVIA TM dataset. **Results:** Among individuals aged 0–64 years, GAS causes 27.3 (95% CI, 24.6–30.6) ambulatory care visits and 16.4 (95% CI, 14.5–18.6) outpatient antibiotic prescriptions per 1,000 population annually for pharyngitis, sinusitis, and AOM combined, representing 2.1% (95% CI, 1.8%–2.4%) of all outpatient antibiotic prescriptions. Among children aged 3–9 years, GAS-attributable incidence includes 124.4 (95% CI, 109.0–142.1) visits and 77.1 (95% CI, 65.7–90.6) antibiotic prescriptions per 1,000 population annually, representing 8.6% (95% CI, 7.3%–10.1%) of antibiotic prescriptions in this age group. Individual-level direct protection from a 30-valent vaccine meeting the WHO target could prevent 26.0% (95% CI, 24.0%–28.1%) of pharyngitis visits; 17.3% (95% CI, 15.5%–19.5%) of pharyngitis, sinusitis, and AOM visits; and 5.5% (95% CI, 4.7%–6.4%) of outpatient antibiotic prescriptions among children aged 3–9 years. If vaccination eliminated the need for antibiotic treatment of pharyngitis (for which GAS is the only etiology warranting antibiotic treatment), the total effects of vaccination could include the prevention of up to 17.2% (95% CI, 15.0%–19.6%) and 6.8% (95% CI, 6.3%–7.3%) of antibiotic prescriptions among persons 3–9 years and 0–64 years of age, respectively. **Conclusions:** In addition to preventing infections and healthcare visits, an efficacious GAS vaccine could prevent a substantial volume of outpatient antibiotic prescribing in the United States.

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Validation Methodology of Healthcare-Associated Infection Device Day Denominators When Switching Electronic Medical Records

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