and of those, 43% (16/37) sought healthcare. Four were hospitalized, including one in intensive care, for a median of 7 days (range 3–12). Only six (6%) had previously heard of coccidioidomycosis. One-third (32%, 24/75) tested LFA positive, 10 (13%, 10/75) EIA positive, and eight (11%, 8/75) ID positive. Seventy-one percent (17/24) with positive LFA reported symptoms, compared with 83% (10/12) with positive EIA, 100% (10/10) with positive ID (8/8), and 31% (16/51) with negative LFA. Of 51 travelers with negative LFA, we observed one positive EIA and no positive ID.

Conclusion. In this outbreak that resulted in a high attack rate and prolonged hospitalizations, the rapid one-hour LFA appeared as a useful screening tool compared with standard blood testing, which took at least 7 days to return. The proportion of symptomatic LFA-positive travelers was nearly as high as for those with positive EIA, and we observed agreement with EIA and ID-negative results. Whether 12 people with positive LFA but negative EIA and ID truly had infection is unclear. Further evaluation to examine sensitivity and specificity of LFA are needed. Additionally, greater education is needed for groups traveling to coccidioidomycosis-endemic areas.

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1610. Implementation of Clinical Care Pathway Reduces Measles Exposures During Outbreak in New York
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Background. The United States is currently experiencing the largest measles outbreak since 1994. The New York outbreak started in October 2018 in several communities with low immunization rates for measles. Our institution is a referral center for the Hudson Valley and New York City. Failure to immediately recognize the disease early in the outbreak resulted in several exposure investigations and significant expenditure of time and resources. With evidence of ongoing transmission in local communities, we initiated a multi-pronged approach to recognize and limit potential measles exposures.

Methods. We developed a clinical pathway to alert Emergency Department (ED) staff and local Emergency Medical Service (EMS) agencies to the signs and symptoms of exposed patients, and provided steps for isolation, care, and testing for patients with possible measles. The ED staff and EMS personnel were educated in meetings and by posters, emails, and huddles. Reports of cases were made to infection control in real time, and local Departments of Health (DOH) were subsequently notified of suspected cases and exposures. We describe data pre and post-intervention. Chi-square was used to compare the number of patients requiring contact investigations for staff and patient exposures pre- and post-pathway implementation.

Results. From October 2018 through April 2019, 31 patients were evaluated for measles. Measles was diagnosed in 15 patients (1 adult, 14 children). Eight patients were admitted to the hospital, 3 required Pediatric ICU care. Pre-pathway implementation, 2 out of 9 (22%) evaluated patients resulted in exposure investigations; post implementation, 1 out of 22 (4.5%) evaluated patients required an exposure investigation (P = 0.18). The investigations conducted by our infection control department included 153 patients, 141 pre-intervention vs. 12 post-intervention. Nine patients required prophylaxis with immunoglobulin, and 10 patients received MMR vaccine as prophylaxis. No exposures resulted in clinical cases of measles.

Conclusion. Implementation of a clinical pathway to recognize and isolate suspect measles exposures pre-ED staff and EMS personnel resulted in reduced exposure and improvement in communication with Infection Control and local DOH.

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1611. Interventions to Decrease the Absolute Number of Individuals Not Immune to Measles at Princeton University (PU)
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Background. PU’s dormitories house ~100% of undergraduate and ~70% of graduate students. MMR is required for all students by NJ law, allowing for medical and religious exemptions (RE). Information on immunization requirements is widely available and accessible. If a student is found not compliant, measures include monetary fines, class registration holds, and contact by residential staff. Visiting short-term students should submit immunization records, but, due to rolling matriculation dates, enforcement measures may not be applicable. In the fall of 2018, a measles outbreak was reported close to campus. We sought to engage all students not immune to measles with proactive messaging.

Methods. Starting on December 3, 2018, the electronic health record (EHR) was used to generate a weekly report of active students not immune to measles following the CDC’s immunity criteria. Notifications and education material were sent via secure message to students with no immunization data or those with RE. Students were prompted to schedule an appointment to review medical history and obtain the missing immunization. Students with PMR were offered blood tests for measles immunity. Alerts were placed in the EHR of all non-immune students so every encounter would serve as reminder. Student travelers on PU sponsored trips were informed about measles outbreaks and, often, MMR became a trip requirement.

Results. On December 3, 2018, 84 students were measles non-immune: 2 with medical and 23 with RE; 59 lacking second MMR or with no immunization data. The 23 RE became 24 when a student in absence returned. Since, 3 of the students with RE had blood tests revealing measles immunity; 2 received MMR to travel; 3 decided that their RE was not current. On 4/22/19, there were 18 students lacking second MMR or with no immunization data, most of them new visiting students. Overall, 57% reduction of absolute number of measles nonimmune students.

Conclusion. This community intervention shows that students who remained measles non-immune despite the regular immunization compliance activities, could become compliant through active messaging, education and continued engagement. Importantly, 8 of 24 students with RE, when engaged and provided with information and potential consequences of unimmunized status, were found already immunized or not opposed to receiving immunizations.

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1612. Listeriosis in Mainland China: A Systematic Review
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Background. The aim of present study is to conduct a systematic review to better understand the epidemiological and clinical characteristics of listeriosis cases in mainland China.

Methods. The six most widely used Chinese and English databases were searched. Records on cases of listeriosis in mainland China reported from 2011 to 2017 were extracted. Clinical data of patients and information on clinical isolates of Listeria were collected and analyzed.

Results. A total of 136 records and 562 listeriosis cases were reported. The number of cases was much higher than that reported in the past decade. The 227 included non-perinatal listeriosis cases had a mortality rate of 23.78%. Of the 231 perinatal listeriosis cases, 32.68% resulted in abortion and/or newborn death. All listeriosis cases were reported as sporadic cases. Only 3 cases were traced to a meat product, while 33.12% were healthcare-associated cases.

Conclusion. The number of listeriosis cases in China may have previously been underestimated. Perinatal cases in mainland China took a much higher proportion compared with what is usually described. Considering the high number of listeriosis patients in China, a comprehensive monitoring system for listeria is urgently needed in China.

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1613. Rates of Hospitalization for Community-Acquired Pneumonia Among US Adults: A Systematic Review
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Background. Community-acquired pneumonia (CAP) develops in persons outside of a healthcare facility and is associated with significant morbidity and mortality. Estimating the incidence of CAP is challenging because it lacks a standardized case definition and because study designs and selection criteria vary. Reconciling these differences across studies is critical for understanding the true burden of CAP which, in turn, informs prevention strategies, including vaccination.

Methods. We performed a systematic literature review of studies describing the incidence of hospitalized CAP among adults in the United States. Specifically, we examined the impact of the following study characteristics on estimates of incidence: (i) study population, (ii) study type and data source, and (iii) diagnostic criteria for pneumonia.
Results. After review of 8361 articles as of January 31, 2019, we identified 26 studies which contained 39 unique CAP estimates. Among adults ≥65 years of age, annual rates of hospitalized CAP ranged from 847 to 3,500 per 100,000 persons with median = 1,830. Rates were lower in studies that excluded patients with health-care-associated (but community-onset) pneumonia (HCAP; median = 2,003 vs. 2,186; P = 0.02) or immunocompromising conditions (median = 1,895 vs. 1,609; P = 0.29). Rates of CAP were also lower in studies that used more restrictive criteria for diagnosing pneumonia (e.g., pneumonia coded in any diagnosis position [median = 2,246] vs. pneumonia coded in the first position only [median = 1,575] in studies of administrative claims; P = 0.03). For adults <65 years of age, annual rates of CAP were lower (range = 89 to 1,024 per 100,000; median = 210).

Conclusion. CAP causes a significant disease burden among adults, particularly among those ≥65 years of age where the incidence of hospitalization is approximately 2,000 per 100,000 annually. Commonly-applied exclusion criteria (e.g., with HCAP or immunocompromising conditions) or restrictive case definitions (e.g., only including pneumonias coded in the primary diagnosis position) have led to systematic underestimation of CAP incidence in many previous studies. Understanding the true burden of adult CAP is critical for highlighting the ongoing need for expanded prevention programs, including vaccination.

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1614. Single-Dose Doxycycline as Lyme Disease Post-Exposure Prophylaxis in a National Commercial Insurance Claims Database—the United States, 2014–2017
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Background. Approximately 300,000 cases of Lyme disease occur annually in the UNITED STATES, with children aged 5–9 years disproportionately affected. A single dose of doxycycline recommended by Infectious Prevention and Control efforts. We aimed to describe recent patterns of single-dose doxycycline medication claims in states with high and low Lyme disease incidence, and the associated patient and prescription characteristics in a large national commercial insurance claims database.

Methods. Outpatient medication claims in the IBM Watson Health MarketScan Database, a large nation-wide database of insured claims, were reviewed. Claims of single-dose doxycycline were identified and associated patient demographics and medication characteristics were analyzed.

Results. During 2014-2017, 66,210 medication claims for single-dose doxycycline were filed by 63,112 enrollees; mean annual incidence of receiving at least one single-dose doxycycline prescription was 56 per 100,000 enrollees. Mean patient age was 43 years (IQR 33–56 years); only 8% were for children aged <18 years. About half (46%) were male patients. Most claims (71%) were made by patients residing from outbreak zip codes were flagged in our electronic medical records. Screening for symptoms, mass exposure, vaccine opportunities and education were provided when patients presented for care. Enhanced controls for premature infants and immunocompromised patients were enacted. Automated emails to providers caring for patients from the outbreak area served as reminders to offer vaccines in differential diagnosis. As most cases of measles occurred in children, specific efforts were taken to prevent transmissions in pediatrics. Patients room on multiple inpatient floors were converted to negative pressure with respect to corridor, as admitted patients developed symptomatic (contagious) illness while hospitalized. We limited all immunomune visitors <5 years from entering inpatient units. Patients were contacted prior to ambulatory visits, procedures, and surgery to ensure patients from outbreak zip codes were triaged appropriately. Automated alerts to Infection Control when measles testing was ordered allowed timely implementation of prevention measures and surveillance. Finally, educational materials for patients and visitors were translated into 7 languages and shared with other NYC hospitals.

Results. To date, 95 patients with suspect measles presented to our system, with 20 patients (16 pediatric and 4 adult) laboratory-confirmed cases requiring hospital admission due to measles pneumonia, hepatitis, and encephalitis. There was no evidence of transmission to hospital and ambulatory setting to patients or staff. Patients residing from outbreak zip codes were flagged in our electronic medical records. Screening for symptoms, mass exposure, vaccine opportunities and education were provided when patients presented for care. Enhanced controls for premature infants and immunocompromised patients were enacted. Automated emails to providers caring for patients from the outbreak area served as reminders to offer vaccines in differential diagnosis. As most cases of measles occurred in children, specific efforts were taken to prevent transmissions in pediatrics. Patients room on multiple inpatient floors were converted to negative pressure with respect to corridor, as admitted patients developed symptomatic (contagious) illness while hospitalized. We limited all immunomune visitors <5 years from entering inpatient units. Patients were contacted prior to ambulatory visits, procedures, and surgery to ensure patients from outbreak zip codes were triaged appropriately. Automated alerts to Infection Control when measles testing was ordered allowed timely implementation of prevention measures and surveillance. Finally, educational materials for patients and visitors were translated into 7 languages and shared with other NYC hospitals.

Results. During this influenza season, 32 confirmed influenza outbreaks were identified in Dallas County LTCFs; 17 in skilled nursing facilities (SNF), 13 in assisted-living facilities (ALF) and 2 in hybrid SNF/ALF. The average attack rate in residents was 9.8% (range: 1–35%). Influenza hospitalization rates were higher in ALF compared with SNF outbreaks (OR: 2.2). Influenza-associated mortality rates were higher in ALF compared to SNF (OR: 3.1). Of the 32 outbreaks, 20 (63%) were self-reported by facilities to public health and 12 (38%) were identified through health department review of influenza-associated ICU hospitalizations. Facilities where outbreak cases were identified through public health surveillance of ICU admissions had significantly lower overall attack rates (5.9% vs. 13.6%, P = 0.01) and shorter time to initiation of facility-wide chemoprophylaxis (0.4 vs. 2.4 days, P = 0.05).

Conclusion. Active surveillance of influenza-associated ICU admissions in acute-care hospitals facilitated the early identification of influenza outbreaks in LTCFs, which was associated with lower overall attack rates and shorter time to initiation of facility-wide chemoprophylaxis.

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1616. Confronting Measles: The View from a New York City Health System at the Center of the Outbreak
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Background. A measles outbreak was identified in NYC in October, 2018. Over 430 cases have been confirmed to date, mostly in under-vaccinated children. Due to referral patterns, our health system provided care to a large number of these patients in the ambulatory, Emergency Department and inpatient settings, placing significant burden on our Emergency Department and Control efforts. Our response utilized the engineering, administrative, protective equipment and educational hierarchy of controls to prevent transmission to patients, visitors and staff.

Methods. Patients residing from outbreak zip codes were flagged in our electronic medical records. Screening for symptoms, mass exposure, vaccine opportunities and education were provided when patients presented for care. Enhanced controls for premature infants and immunocompromised patients were enacted. Automated emails to providers caring for patients from the outbreak area served as reminders to offer vaccines in differential diagnosis. As most cases of measles occurred in children, specific efforts were taken to prevent transmissions in pediatrics. Patients room on multiple inpatient floors were converted to negative pressure with respect to corridor, as admitted patients developed symptomatic (contagious) illness while hospitalized. We limited all immunomune visitors <5 years from entering inpatient units. Patients were contacted prior to ambulatory visits, procedures, and surgery to ensure patients from outbreak zip codes were triaged appropriately. Automated alerts to Infection Control when measles testing was ordered allowed timely implementation of prevention measures and surveillance. Finally, educational materials for patients and visitors were translated into 7 languages and shared with other NYC hospitals.

Results. To date, 95 patients with suspect measles presented to our system, with 20 patients (16 pediatric and 4 adult) laboratory-confirmed cases requiring hospital admission due to measles pneumonia, hepatitis, and encephalitis. There was no evidence of transmission to hospital and ambulatory setting to patients or staff.

Conclusion. A coordinated response involving engineering and administrative controls, PPE training and education is necessary when confronting a large urban measles outbreak.

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1617. Mumps in Detention Facilities that House Detained Migrants—United States, September 2018–April 2019
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Background. Starting in September 2018, an unusually high number of mumps cases were reported in US adult detention facilities. Detention facilities usually involve close contact among detainees, facilitating transmission of mumps. Detainees in close contact with a mumps patient are at increased risk for acquiring mumps and should be offered a dose of MMR vaccine. We summarize the epidemiologic, clinical, and laboratory data for mumps cases in adult detention facilities during September 2018–April 2019.

Methods. Data were collected by health departments and US Immigration and Customs Enforcement (ICE) Health Service Corps and reported to CDC. Cases were classified according to the CSTE case definition for mumps and confirmed by RT-qPCR; molecular sequencing was performed on mumps-positive specimens.

Results. From September 2018–April 2019, 389 confirmed and probable mumps cases in adult migrants detained by ICE in 44 detention facilities were reported in 16