

We defined a confirmed case as a probable case that was laboratory confirmed by throat culture. We collected line list of probable and confirmed diphtheria cases, population details in Bijapur district and antibiotic sensitivity of culture reports. We calculated attack rates and case fatality rate by taluks of Bijapur district. We calculated proportion of antibiotic resistance among lab confirmed cases.

Results. There were 229 probable cases and 26 confirmed cases of diphtheria. Attack rate was 110/million and case fatality rate was 2% (5/255). Median age of males was 5 years (range: 3 months to 18 years) and females was 6 years (range: 1 year to 18 years). Highest attack rate (290/million) was in Bagewadi taluk, followed by Sindagi taluk (130/ million). Attack rate in Bijapur, Indi and Muddebihal were 80, 80 and 70 per million respectively. Incidence of diphtheria cases was 3/million in 2012, 15/million in 2013, 80/million in 2014 and 14/million in 2015. Penicillin resistance was found among 92% (24/26) of cases, cotrimoxazole resistance among 27% cases (7/26) and ampicillin resistance among 15% cases (4/26). Multidrug resistance for penicillin and cotrimoxazole was found among 23% (6/26) of cases. Multidrug resistance to penicillin and ampicillin was found among 15% (4/26) of cases. All cases were sensitive to azithromycin, erythromycin, doxycycline, clindamycin, ciprofloxacin, cefotaxime, gentamycin and tetracycline.

Conclusion. Diphtheria incidence increased between 2012 and 2014. Incidence reduced in 2015. Penicillin resistance was common. We recommend sensitising health workers about penicillin resistance and educating them not to use penicillin. We recommend estimating vaccine coverage and vaccine effectiveness among children.

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675. Current Physician Knowledge, Attitudes, and Clinical Practice Regarding Legionnaires' Disease in the Aftermath of the Flint Water Crisis in Genesee County, Michigan

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Background. Legionnaires' disease (LD) is a respiratory illness caused by the inhalation of aerosolized water contaminated with Legionella bacteria. For reasons not yet understood, the incidence of LD has steadily increased across the United States during the past 10 years. In 2014 and 2015, the City of Flint in Genesee County (GC), Michigan underwent a change in the city's water source, which resulted in the third largest recorded LD outbreak in American history and over 100,000 residents being exposed to contaminated water. In order to reduce the incidence of LD in at-risk populations it is imperative that we evaluate and improve LD knowledge and clinical practice among healthcare personnel.

Methods. This investigation surveyed clinicians practicing in Genesee County who are also members of the Genesee County Medical Society (GCMS). A survey was designed to assess current clinical knowledge, attitudes, and practices related to LD, in addition to measuring the uptake and utility of the LD clinical guidelines. The survey and the LD clinical guidelines were distributed to all GCMS members over a 6-month period. Prompts to complete the survey using Qualtrics programming were emailed to GCMS members and posted in the GCMS monthly bulletin. In addition, surveys were distributed to members at GCMS meetings. Completed responses were entered into Qualtrics software and exported into MS Excel and SPSS statistical software for analysis.

Results. In total, 95 healthcare personnel responded. Of those surveyed, 79.5% have been in practice for more than 10 years and 55% identified as practicing in family, internal or emergency medicine. Despite the well-publicized LD outbreak in GC, 45% of respondents did not believe or were unsure if LD was a current public health issue, and 65% have either not received, have received but are not interested, or have received but not read the LD clinical guidelines. Despite this, 47% and 61% of respondents were able to correctly identify the symptoms and risk factors for LD, respectively. In addition, 34% of participants believe that drinking tap water is a risk factor for contracting LD.

Conclusion. This survey underscores the continuing need for comprehensive physician education to improve the clinical recognition and evaluation of patients with LD.

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677. Using a Multisectoral One Health Approach to Prioritize Zoonotic Diseases in the United States

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Background. Emerging and endemic zoonoses continue to have adverse global impacts. One Health approaches promoting multisectoral, transdisciplinary collaboration are important methods to address zoonoses threats through disease surveillance, prevention, control, and response. We conducted a One Health Zoonotic Disease Prioritization (OHZDP) workshop in the United States (US) to identify zoonotic diseases of greatest national concern that should be jointly addressed by the Centers for Disease Control (CDC), US Department of Agriculture (USDA), Department of the Interior, and partners.

Methods. We used CDC's OHZDP tool to prioritize zoonoses. Workshop participants selected criteria for prioritization, and developed questions and weights for each criterion. Questions were answered using available literature and expert opinion with subsequent scoring resulting in a ranked zoonotic disease list. After agreeing on a final prioritized disease list, participants used components of the One Health Systems Mapping and Analysis Resource Toolkit, developed by USDA and University of Minnesota, to review multidisciplinary coordination processes for the prioritized zoonotic diseases.

Results. Participants selected epidemic or pandemic potential, disease severity, economic impact, introduction or increased transmission potential, and national security as criteria to prioritize 56 zoonoses. The eight prioritized zoonotic diseases for the US were zoonotic influenzas, salmonellosis, West Nile virus, plague, emerging coronaviruses (e.g., SARS, MERS), rabies, brucellosis, and Lyme disease. Agencies then discussed recommendations to enhance One Health approaches to surveillance, response, prevention, and control of the prioritized zoonoses. Key themes and next steps for further implementation of One Health approaches were identified.

Conclusion. This OHZDP workshop represents the first use of a One Health approach to zoonotic disease prioritization in the United States. It is a critical step forward in US government agency collaboration using One Health approaches. Further, the workshop created a foundation for future US government One Health systems strengthening for the prioritized zoonoses.

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678. Outbreak of Shiga Toxin-Producing *Escherichia coli* Infections at Marine Corps Recruit Depot (MCRD), San Diego and Camp Pendleton, California: October–November, 2017

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Background. Shiga toxin-producing *Escherichia coli* (STEC) infections are a major cause of foodborne illness and the principal cause of hemolytic-uremic syndrome (HUS). In November 2017, CDC and the US Navy responded to an outbreak of STEC illnesses in military recruits at the Marine Corps Recruit Depot in San Diego (MCRD). We investigated to determine the source of this outbreak and identify prevention and mitigation measures.

Methods. In October 2017, medical staff identified a high number of gastrointestinal (GI) illnesses at MCRD. Recruits with diarrhea submitted stool specimens for culture and/or culture-independent diagnostic testing (CIDT) for GI pathogens. We performed pulsed-field gel electrophoresis (PFGE) on culture isolates. Case-patients were defined as confirmed (PFGE-confirmed STEC infection matching outbreak strains), probable (diagnosis of HUS and/or CIDT evidence of STEC), or suspected (bloody diarrhea). We conducted environmental evaluations of dining facilities, training areas, and barracks. A case-control study was performed using PFGE-confirmed case-patients and platoon-matched controls. We performed product traceback for foods identified as exposure risks by interview or case-control study.

Results. We identified 64 confirmed, 105 probable, and 91 suspected case-patients. Thirty case-patients required hospitalization and 15 had HUS. Ages ranged from 17 to 28 years (median: 18 years). Poor hygiene practices among recruits and inconsistent cooking temperatures within dining facilities were noted. Forty-three case-patients and 135 controls were interviewed about food, hygiene, and environmental exposures. Consumption of undercooked beef was significantly associated with illness (mOR 2.40, CI 1.04–5.72, $P = 0.04$). We identified a single ground beef supplier for MCRD, but dining facility records did not document the dates on which specific lots of ground beef were used.

Conclusion. Case-control analysis and environmental observations suggested undercooked ground beef as a potential source for this outbreak. We recommended the Navy and Marine Corps retain lot information, address food handling concerns, and improve hygiene among recruits.

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679. Mass-Scale Post-Hurricane Sheltering of Evacuees From Hurricane Harvey: Infectious Disease Surveillance and Prevention: Dallas County, Texas, 2017

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Background. The record rainfall following Hurricane Harvey's landfall along the Texas coast on August 25, 2017 caused prolonged, widespread flooding, which devastated Houston and areas along the southern Gulf Coast. With shelters in Houston at capacity, residents from adjacent affected regions were evacuated elsewhere, and Dallas received over 3,800 evacuees at a single convention center shelter. Approaches to infectious disease surveillance and prevention in this mega-shelter setting were assessed and refined during the response.

Methods. Teams of epidemiologists and medical students reviewed all clinical records daily from the on-site, 24/7 walk-in medical clinic, which was staffed by local volunteer physicians. Demographic data, chief complaints, and diagnosis for each patient visit were reviewed, and daily aggregate summaries of visits for potential communicable disease symptoms were compiled. An additional infection control team consisting of health department staff and volunteer hospital infection preventionists implemented aggressive infection prevention measures in the shelter and clinic.

Results. Of the evacuees registered at this mass-scale shelter, 92% were from counties outside of Houston and 36% were 18 years of age or younger. During the shelter's 23 days of operation, the shelter medical clinic received a cumulative volume of 2,654 clinic visits from 1,560 evacuees. The most common reasons for clinic visits included: need for medication refills (27.2%); respiratory symptoms (18.8%); and skin-related complaints (8.6%). Isolated cases of scabies, lice, norovirus, and influenza were confirmed, with no outbreak transmission of communicable diseases reported in the shelter.

Conclusion. The need for acute-care medical services and resources at a central shelter location was highlighted by the high proportion (40%) of evacuees seeking care

at least once at the shelter medical clinic. The 24/7 accessibility of this on-site medical clinic to evacuees additionally provided a reliable mechanism for daily syndromic surveillance for potential outbreaks of infectious disease in a large shelter. Given the challenges of mass-sheltering and provision of clinical care in non-residential structures, dedicated staffing with infection control expertise was critical in this shelter setting.

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680. "There's More to This Than Meets the Eye": Opportunities for Infection Prevention in Optometry Clinics

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Background. Los Angeles County Department of Public Health (LAC-DPH) investigated an outbreak of epidemic keratoconjunctivitis secondary to adenovirus between June and July 2017, and all cases were linked to a single optometry clinic. The LAC-DPH aimed to determine whether sub-optimal infection prevention practices used in the implicated clinic were commonplace within other local optometry clinics. The objective of this study was to understand infection prevention practices in optometry clinics within Los Angeles County.

Methods. LAC-DPH conducted a survey consisting of 17 questions related to infection prevention practices among a sample of optometry providers in the county. The survey was administered online (SurveyMonkey) via emails sent to a local optometric society's listserve and in-person at a local continuing education event for optometrists. The results were analyzed and are represented as percentages.

Results. There were 42 responses, 20 via the online survey (response rate 15%) and 22 via the in-person survey (response rate 22%). The majority worked in an optometry clinic: 77.5% ($n = 31$). More than half had no written hand-hygiene policy (58.5%, $n = 24$), 46.2% ($n = 18$) did not wear gloves while examining patients with eye drainage and about half (48.7%, $n = 18$) did not use droplet precautions for patients with respiratory symptoms. The vast majority used multi-dose eye-drop vials (92.5%, $n = 37$) but more than 40% ($n = 21$) did not discard the vial if the tip came into contact with conjunctiva. The majority (68.4%, $n = 26$) used alcohol wipes with 70% isopropyl alcohol to disinfect tonometers, while 47.4% ($n = 18$) used noncontact tonometers and 23.6% ($n = 9$) used disposable tips (options for this question were not mutually exclusive).

Conclusion. Infection prevention practices in optometry clinics are sub-optimal and must be improved. All optometry clinics must have a hand-hygiene policy and discard multi-dose vials which come into contact with conjunctivae. While the evidence on the best disinfectant for tonometers is limited, commonly used disinfectants like 70% alcohol wipes or 3% hydrogen peroxide have been associated with adenovirus outbreaks. Current evidence suggests that infectious spread via tonometers can be prevented by using disposable covers or by disinfection with 1:10 diluted bleach.

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681. Epidemiology and Outcomes of Patients with Carbapenem-Resistant Bloodstream Infection in United States Hospitals, 2010–2015

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Background. Carbapenem resistance (CR) in patients with Gram-negative (GN) bloodstream infections (BSI) presents a mounting therapeutic challenge. To gain a better understanding of CR among patients in US hospitals, we explored their characteristics and outcomes.

Methods. We performed a retrospective cohort analysis of consecutive adult patients (age ≥ 18 years) with a positive blood culture for GN pathogens (11 most prevalent pathogens reported in ~53,811 study patient samples), hospitalized in one of 181 institutions contributing microbiology data to the Premier Healthcare Database (October 2010–September 2015). We compared patients with CR vs. carbapenem-susceptible (CS) BSIs based on their characteristics and outcomes. Primary outcome was mortality, and secondary outcomes included post-index culture hospital and ICU lengths of stay (LOS), and likelihood of being discharged home.

Results. Of the ~53,811 study patient samples, 46,381 patients had a GN BSI, with the prevalence of CR occurring at 3.5% ($n = 1,602$). Compared with patients with CS, those with CR were younger (mean/SD 60.4/17.1 vs. 67.4/16.4 years, $P < 0.01$), more likely to be male (52.8% vs. 45.9%, $P < 0.01$), black (22.7% vs. 17.7%, $P < 0.01$), and had Medicaid as a payor (18.1% vs. 10.9%, $P < 0.01$). The mean/SD Charlson Comorbidity Index was higher in CR than CS group (2.9/2.5 vs. 2.3/2.5, $P < 0.01$). Crude mortality was also higher (20.6% vs. 9.7%, $P < 0.01$) in the setting of CR than CS, as were unadjusted median (IQR) post-index culture hospital (9 [6, 15] vs. 7 [5, 10] days, $P < 0.01$), and ICU (5 [2, 11] vs. 3 [2, 6] days, $P < 0.01$) LOS. Patients with CR BSI were less likely to be discharged home than those with CS (32.7% vs. 53.8%, $P < 0.001$).

Conclusion. Patients with CR BSIs have lower likelihood of surviving hospitalization or being discharged home, and longer post-index culture hospital and ICU LOS,