years, in 2010 (n = 262), 2011 (n = 100), 2012 (n = 161), 2013 (n = 86), and 2014 (n = 15); and in 2017 (n = 48), after a 2-year period with no cases diagnosed. Since 2010, a total of 81 (CF=17%) fatalities occurred among WNND cases, with a median age of 80 (49-95) years. Cases were recorded, in both urban and rural areas, in half (37/74) of the Regional Units (NUT-3 level), in all 13 Regions. In 2011, the virus disseminated from the affected regions to partially non-affected Regions throughout the country. It was recorded both in previously affected and in new areas, enhanced surveillance throughout Greece is critical to timely implement targeted control and prevention measures (i.e., communication campaigns, vector control, and blood safety measures).

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444. Zika Testing in a Large Academic Center During a Continental US Outbreak

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**Background.** Zika virus (ZIKV) is a flavivirus that is associated with spontaneous abortion, microcephaly, and severe neurological complications. The first continental outbreak of ZIKV in the United States was declared in Miami in 2016. This study reports reasons for performing ZIKV testing and the characteristics of nonpregnant individuals tested for ZIKV during the ZIKV outbreak in the largest academic center in Miami. The medical center is in close proximity to ongoing transmission areas and an emergency response system was rapidly initiated in response to the outbreak.

**Methods.** This study is a retrospective review of medical records from nonpregnant individuals who were tested for ZIKV at the largest academic center in Miami from January 1, 2016 to February 17, 2017. Demographic data and results for testing for ZIKV were collected from the electronic medical record and compared between individuals who tested positive for ZIKV vs. those who tested negative.

**Results.** Forty nonpregnant individuals were tested for ZIKV and 14 tested positive for ZIKV. Individuals tested positive for ZIKV were more likely to reside in Miami with active ZIKV transmission (39% vs. 4%, P = 0.012). Thirty-four (92%) of tests were performed in the hospital setting (inpatient setting and emergency room) compared with outpatient setting. Individuals who tested positive for ZIKV were more likely to have been tested in the ER than in other settings. The most common symptoms prompting testing for ZIKV were fever, myalgia, arthralgia and headache however the presence of these symptoms was not significantly different in individuals who tested positive for ZIKV than in those who tested negative. Skin rash was more common in individuals who tested positive for ZIKV than in those who tested negative for ZIKV (93% vs. 27% P < 0.01). More individuals who tested positive for ZIKV personally requested testing (36% vs. 0%, P = 0.003).

**Conclusion.** In our study, clinical symptoms alone are not reliable for differentiating between individuals with positive ZIKV test results vs. those with negative test results. Patient request, rash, and exposure to transmission areas are important factors for healthcare providers to consider when identifying ZIKV infection. Similar approaches should be utilized in response to future emerging infectious threats.

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445. Cross-Reactivity Between Zika and Dengue Virus: A Cross-Sectional Analysis in Rio Grande do Norte, Brazil

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**Background.** Preexisting DENV antibodies may have a cross-reactivity against ZIKV. A recent primate study suggested that prior DENV infection does not adversely impact subsequent ZIKV disease and might be protective. This study aimed to evaluate the relation between ZIKV and DENV infection in Brazil.

**Methods.** ZIKV and DENV sero-diagnostic percentage was conducted using data obtained through the RN Department of Health from January 2015 to April 2017. We analyzed the epidemiological behavior of DF and Zika Virus Disease in RN (last three summers).

**Results.** From January to March in 2015, 2016, and 2017, there were 6,902, 34,643, and 33,125 cases, respectively. In 2015, 2016, and 2017 were 523, 7,599, and 204, respectively. Regarding ZIKV infection, the number of suspected cases between January to April during 2016 and 2017 were 3,486 and 86, respectively. The number of confirmed ZIKV infection in 2016 and 2017 were 97 and 0, respectively. Adding up the total cases of ZIKV infection which occurred during 2015 and 2016, we obtain a total of 14,584 (8,743 + 5,841). This number represents less than 0.5% of the RN population (3,409 million).

**Conclusion.** This epidemiological evidence support our hypothesis that the DF outbreak in 2016 has contributed to the decrease of 97.53% (863,486) in the prevalence of ZIKV infection (suspected cases) in 2017. It may be explained by preexisting DENV antibodies that could protect against ZIKV infection. However, our data do not support the results found on the recent primate study. In addition, our findings contradict the theory (based on in vitro experiments only) that previous immunity to DENV causes an enhancement of the immunological response in individuals exposed to ZIKV. Given the lack of evidence for a cross-reactivity in our study, we can't state that there are fewer Zika cases in 2017 because the population has been previously immunized. These data are highly relevant from a public health standpoint given that regions which experienced ZIKV outbreak in Brazil are endemic for DF and that suggests that DENV. Enhance might also offer some protection against ZIKV infection.

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446. Leveraging Partnerships to Care for Babies Born to Mothers After Maternal Zika Infection—US Virgin Islands (USVI)

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**Background.** Since February 2016, the US Virgin Islands Department of Health (VIDOHR) has been monitoring the Zika outbreak and its effects on maternal and child health. As of March 19, 2018, the territory reported 291 women with confirmed laboratory evidence of Zika virus during pregnancy. Residents had limited access to the coordinated specialty care services related to Zika virus disease. VIDOHR requested technical assistance from Centers for Disease Control and Prevention, Health Resources and Services Administration, Family Voices, and American Academy of Pediatrics to provide these services in the USVI in March 2018. VIDOHR staff called 291 mothers, connected with 148, and scheduled 114 appointments. The clinic set-up included: two intake, four neurology, threeephalology, one audiology, one developmental, child life team, and two exit stations. Infants received comprehensive neurology, developmental, ophthalmology, and audiology examinations and interventions.

**Results.** The visiting specialists evaluated 88 infants; 65 (73.9%) in St. Thomas and 23 (26.1%) in St. Croix. Eight (6.9%) for speech therapy, three(5.2%) for neuroimaging, three(5.2%) for occupational therapy, and one audiology, one developmental, child life team, and two exit stations. Infants received comprehensive neurology, developmental, ophthalmology, and audiology examinations and interventions.

**Conclusion.** This is the first time following the Zika epidemic in the US Virgin Islands that a multidisciplinary team visited the islands to support clinical care for infants born to mothers infected with Zika virus. This study is the first to document the clinical care provided to infants born to mothers infected with Zika virus in the USVI in 2018. Further evaluation on these infants has been recommended based on clinical guidance for infants exposed to Zika virus infection. This can help to identify the types of hearing loss associated with Zika infection in utero.

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447. Infant Microcephaly During the Zika Virus Epidemic in Dominican Republic, 2016–2017

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**Background.** Zika Virus infection (ZIKV) during pregnancy has been linked with fetal microcephaly. As of August 2018, this study was the chief finding in many of the infants screened. Further evaluation on these infants has been recommended based on clinical guidance for infants exposed to Zika virus infection. This can help to identify the types of hearing loss associated with Zika infection in utero.

**Disclosure.** All authors: No reported disclosures.
symptoms were rash (67%), fever (42%), and arthritis/arthritisrragia (24%). In two cases, ZIKV was reported in the father. Mean gestational age at birth was 37.8 weeks (±1.95 weeks), and 13% were born ≤36 weeks. The mean HC was 28.1 cm (SD ±2.1 cm). Severe microcephaly was detected in 67 (84%) cases, and 41% had an HC on the zero percentage for gestational age. Having insurance was associated with higher mean HC (P = 0.01) while preterm birth was associated with lower mean HC (P = 0.004). None of the variables were found to be significant predictors of HC z-score or severe microcephaly.

**Conclusion.** There was substantial infant morbidity during the 2016–2017 epidemic. Most infants were born to asymptomatic women or women not reported to the Ministry during acute illness. More cases of microcephaly have been reported beyond the observation period which highlights the need for continued surveillance.

**Disclosures.** All authors: No reported disclosures.

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448. Can Electronic Clinical Notes Identify Travelers with Zika? Kelly Peterson, MS1; Daniel Denhalter, MSPh1; Olga V. Patterson, PhD2; and Makoto Jones, MD, MS1,2. Epidemiology, University of Utah, Salt Lake City, Utah, VA Salt Lake City Health Care System, Salt Lake City, Utah, 1University of Utah, Salt Lake City, Utah

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**Background.** Travel history can help differentiate a public health emergency from a travel-related infection by providing information on exposure but such information is often available only in unstructured clinical documents. We explored the feasibility extracting these mentions from the electronic health record in an automated fashion.

**Methods.** As a collaboration with the National Biosurveillance Integration Center (NBIC), clinical notes were extracted from patient encounters with Zika, dengue and chikungunya virus testing in the Department of Veterans Affairs (VA; a large healthcare system providing care in its facilities from Puerto Rico to the Philippines) between January 1, 2015 and February 28, 2016. From a corpus of 250,133 notes, we gathered a collection of 4,584 unique snippets by an automated bootstrapping process to identify documents containing potentially relevant information using phrases and travel locations. After establishing a guideline, snippets were manually annotated for travel affirmation and locations visited (see Figure 1). Using machine learning including a neural language model, snippets were used to train a Conditional Random Field (CRF) model to extract affirmed travel locations outside of the continental United States. We did not extract the time of travel.

**Results.** Of annotated snippets, 2,659 (58%) contained an affirmed mention of travel history whereas 347 (7.6%) were negated. An inter-rater reliability (IRR) analysis showed that the model achieved F1 = 0.91 with acceptable accuracy. Our approach was able to extract novel places that would otherwise not be found in a curated list (e.g., Mexican Riviera). Further research is needed to improve performance metrics for prospective use.

**Conclusion.** Targeted travel history extraction is feasible in a large medical system with acceptable accuracy. Our approach was able to extract novel places that would not necessarily be found in a curated list (e.g., Mexican Riviera). Further research could improve accuracy and could incorporate this into models improving the early detection of autochthonous transmission.

**Example snippets**

| Negated? |
|----------|
| No       |
| No       |
| Yes      |

**Figure 1:** Synthetic examples similar to annotated candidate snippets. Example location annotation test spans are underlined. Besides identifying travel locations, status of negation was also captured.

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449. Post-Hurricane Maria Surveillance for Infectious Diseases in the Veterans Affairs San Juan Medical Center, Puerto Rico Gina Oda, MS1; Almea Matanock, MD2; Jennifer C. Hunter, MPH, DrPH3; Anita Patel, PharmD4; Satish Pillai, MD, MPH5; Timothy Styles, MD6; Misonia Martinez, CIC7; Teleferco Jones, MD8; Carter Mecher, MD9; Russell Martinez, PharmD10; and Mark Holodny, MD, PIDNA, FSHEA11. Public Health Surveillance and Research, Department of Veterans Affairs, Palo Alto, California, 1Waterborne Disease Prevention Branch, Centers for Disease Control and Prevention, Atlanta, Georgia, 2Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, Division of Foodborne, Waterborne, and Environmental Diseases, Atlanta, Georgia, 3National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia, 4Centers for Disease Control and Prevention, Atlanta, Georgia, 5Centers for Disease Control and Prevention, Atlanta, Georgia, 6VA Caribbean Healthcare System, San Juan, PR, 7Internal Medicine, VA Salt Lake City Health Care System, Salt Lake City, Utah, 8Patient Care Services, Department of Veterans Affairs, Washington, DC

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**Background.** On September 20, 2017, Category 4 Hurricane Maria made landfall in Puerto Rico (PR), causing widespread flooding, power outages, and lack of water service. Given the potential for infectious disease outbreaks, the Department of Veterans Affairs (VA) and Centers for Disease Control and Prevention established enhanced surveillance to actively monitor priority infections at VA facilities.

**Methods.** We queried VA data sources from August 27, 2017 to February 3, 2018 (pre-storm dates included to establish baselines). Trends in infectious disease ICD-10 syndrome groupings (respiratory illness/pneumonia, Influenza-like illness (ILI), gastrointestinal illness, conjunctivitis, rash-like illness, jaundice) as a percent of total emergency department (ED) visits were tracked. The total number of laboratory tests performed, and percent positive per week, for influenza, hepatitis A, dengue (DENV), zika (ZIKV), leptospirosis, and chikungunya (CHIKV) were calculated.

**Results.** ILI increased from 9.3% to 12.6% during the surveillance period (peak epi week 52: 15.7%) (Figure 1), while other ICD-10–based syndromes remained relatively stable. Weekly influenza testing increased shortly after landfall averaging 105 rapid influenza tests per week (epi weeks 41–4) (Figure 2). Influenza positivity increased in epi weeks 41 and 42 (%), dropping the following weeks, and peaked at 15% in epi week 2 (Figure 3). Four acute infections were detected: 2 + leptospirosis DNA, 1 + CHIKV RNA, and 1 + Hepatitis A IgM. The remaining 34 positive tests were ZIKV, DENV IgM positive, or CHIKV, or CHIKV, or CHIKV. Surveillance for Zika virus and Chikungunya virus was established as part of ongoing surveillance.

**Conclusion.** We quickly established a simple surveillance system to monitor trends in priority infectious diseases. Increases in ILI weekly influenza testing volume, and percent positive of influenza tests coincided with onset of influenza season. Diseases of public health importance were identified through laboratory-based surveillance. The impact of Maria on VA healthcare operations, including clinic closures, power outages, and disrupted care seeking patterns limited this system. However, the timeliness and flexibility of this surveillance system provides a model for disease monitoring following future natural disasters.

**Figure 1:**