

Section 4

Notable Outbreaks and Case Investigations

Notable Outbreaks and Case Investigations

In Florida, any disease outbreak in a community, hospital or institution, as well as any grouping or clustering of patients having similar disease, symptoms, syndromes or etiological agents that may indicate the presence of an outbreak is reportable as per Florida Administrative Code Chapter 64D-3. Selected outbreaks or case investigations of public health importance that occurred in 2014 are briefly summarized in this section.

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Bacterial Diseases

***Brucella suis*: Pediatric Brucellosis (Polk County)**

Background: *Brucella suis* is endemic in feral swine in Florida. Transmission of *B. suis* from pigs to other animals including cattle, dogs, and horses has also been reported in Florida. The bacteria can be transmitted by entering the body via skin wounds or mucous membranes through contact with infected animals. The infection often localizes in the reproductive tract of animals, making infertility, fetal loss, and unhealthy newborns common. Infections in people and animals frequently involve bone and joints. On December 11, 2013, the Florida Department of Health in Polk County (DOH-Polk) received notification from a local hospital of a suspect *Brucella* blood culture collected December 10 from a 21-month-old girl. The investigation continued into 2014 when testing of animals on the property was conducted.

Methods: A DOH-Polk epidemiologist requested medical records from the physician and conducted numerous interviews with the girl's parents to determine if the infection met the surveillance case definition criteria for brucellosis and to identify the most likely exposure. Because *B. suis* in livestock is a reportable condition for the Florida Department of Agriculture and Consumer Services, a livestock investigation, including testing of domestic cattle and swine, was conducted concurrently. Testing of the family members was conducted by the Bureau of Public Health Laboratories in Tampa (BPHL-Tampa) and the Centers for Disease Control and Prevention (CDC). Samples from pet dogs were collected by the owner's veterinarian and the Polk County Animal Control veterinarian and submitted to a commercial laboratory and CDC.

Results: The girl had a recent history of upper respiratory illness with fever that resolved approximately December 3, followed by the onset of a limp and pain in her right leg on December 5. She was seen at an emergency department on December 7 and again on December 10 when her fever returned. Blood culture isolates submitted by the hospital laboratory were positive for *Brucella* species by polymerase chain reaction on December 13 at BPHL-Tampa. No laboratory exposures were reported. On December 16, the isolate was reported presumptive positive for *B. suis* and was sent to CDC where the species was confirmed. The girl was admitted for treatment following a diagnosis of brucellosis. The family lived on a farm where they had at least three cows, two domestic pigs, two chickens, and five dogs. Wild swine also had access to the property. In the few months preceding her illness, one of the domestic pigs had piglets. In addition, one of the hunting dogs had a litter of puppies, all of whom died soon after birth. The parents regularly hunted wild swine with two of their dogs but denied dressing the swine or eating hog meat. The child's mother reported that the girl had no recent travel, did not consume raw milk or undercooked meat products, and did not have any contact with swine, but reported occasional contact with the dogs. The parents reported no symptoms of brucellosis, and both tested negative by *Brucella* microagglutination testing conducted at CDC. One sow and three of five dogs, including the hunting dog that had recently lost its pups, had positive blood titers for *Brucella* antibodies, indicating past exposure. Four dogs were euthanized, including all the animals that tested positive. Post-mortem oral (4), vaginal (2), and testicle (1) biopsies were negative for *Brucella*.

Conclusions and Recommendations: The girl's parents were provided with brucellosis prevention information for hunters. Brucellosis is endemic in feral swine in Florida and can spread to humans and domestic animals in close contact with them. The risk for transmission from infected pets to people is not well characterized; however, most confirmed infections of *B. suis* in Florida report direct contact with feral swine.

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***Clostridium difficile*: Outbreak in a Rehabilitation Facility/Nursing Home (Okaloosa County)**

Background: *Clostridium difficile* is a spore-forming, Gram-positive anaerobic bacillus that produces two exotoxins: toxin A and toxin B. It is a common cause of antibiotic-associated diarrhea. *C. difficile* infections (CDI) are among the most serious health care complications that impact the nursing home population. These infections can result in malnutrition, increased frailty, and in some cases, hospitalizations and death. On April 8, 2014, the Florida Department of Health in Okaloosa County (DOH-Okaloosa) was contacted by the Director of Nursing at a local rehabilitation center/nursing home to report that 5 of 102 female residents (5%) had severe diarrhea, three of whom also had fever. Illness onsets ranged from February 7 through April 4. The five residents were all bedridden and three of the five were in private, adjacent rooms before symptom onset. The remaining two residents were immediately moved to private rooms after testing positive for *C. difficile* toxin by enzyme immunoassay (EIA).

Methods: DOH-Okaloosa obtained pertinent past medical histories for each patient, including recent antibiotic use and past episodes of CDI. The DOH Health Care-Associated Infection Prevention Program Manager was consulted and provided CDI-specific guidance to share with the facility. DOH-Okaloosa also recommended that any newly symptomatic residents be isolated in their rooms and that a cleaning and disinfection in-service education be completed. Active surveillance was conducted for two weeks following the date of the last reported onset of symptoms.

Results: All five patient specimens tested positive for *C. difficile* A/B toxin by EIA and were negative for other enteric bacteria by stool culture. All five residents were taking various antibiotics before symptom onset. Four of the residents were treated for *C. difficile* with vancomycin and one resident refused treatment and received supportive care in isolation. Three of the four treated residents recovered, and one patient died due to causes unrelated to CDI. Through the course of the investigation, DOH-Okaloosa learned that the facility had a policy that nurses may use an alcohol-based hand sanitizer between patients and are only required to wash hands with soap and water after every third patient.

Conclusions and Recommendations: Toxigenic cultures are considered the gold standard for detection of CDI, and should be performed if there is a suspicion of a CDI outbreak in a health care facility. Using positive EIA test results can lead to the unnecessary treatment of people with nontoxigenic *C. difficile* colonization. To prevent the spread of *C. difficile* within the facility, DOH-Okaloosa emphasized that alcohol-based sanitizers are not effective against *C. difficile* spores, and the facility agreed to implement a hand-washing protocol between every patient. DOH-Okaloosa also recommended the use of a sporicidal disinfectant with appropriate contact time to eliminate *C. difficile* spores from fomites and surfaces.

***Clostridium tetani*: Probable Case in an Unvaccinated Woman (Pinellas County)**

Background: Tetanus is caused by a toxin produced by the *Clostridium tetani* bacterium. The bacteria are common in the environment in soil, dust, and manure, and enter the body through broken skin. The infection can be severe, and 10-20% of cases are fatal. Infections are rare in the U.S. due to widespread use of vaccine. On January 10, 2014, the Florida Department of Health in Pinellas County (DOH-Pinellas) was notified by a local hospital of a suspect case of tetanus in a 39-year-old woman.

Methods: A probable case of tetanus is defined as an acute illness with muscle spasms or hypertonia and a diagnosis of tetanus by a health care provider in the absence of a more likely diagnosis. There is no confirmed case definition for tetanus as there are no laboratory tests available for diagnosis. Upon notification, DOH-Pinellas initiated an investigation, immediately reviewing the woman's medical records and conducting an interview with the woman to determine exposures.

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Results: During the interview, the woman reported that near the end of December 2013, she cut her left index finger on a rusty box cutter while working as maintenance staff at a local racetrack. She washed the wound with soap and water, covered it with a bandage, and returned to work. One to two weeks later, she gradually began to experience muscle spasms in her left ankle, and then her abdomen and back. She also reported muscle stiffness in her jaw, vomiting, dysphagia, and fatigue. Her last tetanus shot was 18 years earlier. The woman was diagnosed based on clinical presentation, as culturing *C. tetani* has low sensitivity and was not performed. She was hospitalized for two days and treated with tetanus immunoglobulin (TIG) and tetanus toxoid (TTV).

Conclusions and Recommendations: During a one-month follow-up interview, the woman continued to report muscle spasms and vomiting, and it was recommended that she see an infectious disease doctor. The woman was unable to be reached for a one-year follow-up interview. Patients with any new wound and an unknown vaccine history should be evaluated by a health care provider to be evaluated for post exposure prophylaxis with TTV or TIG. This case emphasizes the importance of adults remaining up to date on their tetanus booster shots, which should be received every 10 years.

***Francisella tularensis*: Imported Case of Tularemia (Polk County)**

Background: While tularemia cases were regularly reported in rabbit hunters in Florida up until the 1960s, activity declined through the 1980s, possibly due in part to decreased popularity of rabbit hunting. Since then, sporadic cases identified in Florida are often due to infection from exposure in other locations where it is endemic (e.g., midwestern, western, and northeastern U.S. states). Transmission occurs most frequently through contact with infected animals or via tick bite, and less commonly, fly bites. Laboratory and environmental transmission are also possible. On September 30, 2014, the Florida Department of Health in Polk County (DOH-Polk) was notified that the Bureau of Public Health Laboratories in Tampa (BPHL-Tampa) had received a wound culture isolate from a Polk County clinical laboratory that tested positive for *Francisella tularensis* by polymerase chain reaction (PCR).

Methods: DOH-Polk interviewed the man to determine relevant epidemiologic information, including where exposure likely occurred. The director of the clinical laboratory that initially received the specimen was also interviewed. Confirmatory testing was performed at BPHL-Tampa.

Results: The 61-year-old infected man presented to an urgent care clinic on September 24 with an infected insect bite on the inner part of his right foot, an enlarged lymph node in the right groin, and a history of recent subjective fever. Other symptoms included headache, myalgia, conjunctival irritation, and sore throat. The physician collected a wound swab for culture and prescribed sulfamethoxazole/trimethoprim. On September 26, the man returned to the clinic with worsening pain and cellulitis, and the wound was cleaned and dressed. He was advised to return to the clinic on October 1 following receipt of the positive laboratory results for *F. tularensis* and was prescribed doxycycline for treatment of tularemia. The man's work involved travel throughout the U.S., and he believed he received the bite from an unknown insect during a brief stop for truck repairs near Colorado Springs, Colorado in mid-September. The bite was noticed at the time as it was itching. Fever began approximately 5 days later, and the wound on his foot became more painful and inflamed in the following days. He was asked about other possible exposures and travel to other states, but he denied having contact with rabbits or exposure to ticks or insects at any other time or location. Laboratory exposures were also assessed, and two laboratory technicians were identified as having worked with the specimen, although no high-risk exposure was reported. They were prescribed doxycycline as prophylaxis.

Conclusions and Recommendations: Colorado experienced increased tularemia activity in 2014. Recent travel history should always be obtained as part of the standard patient interview. Tularemia prevention recommendations include wearing gloves when handling wildlife or wild game,

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wearing insect repellent, and avoiding running over the carcasses of dead animals with lawn mowers. Although aerosol transmission can occur in laboratories, the incubation period is short (less than two weeks) and the standard recommendation is to monitor for fever (and treat with doxycycline if fever does develop) unless a high-risk exposure has occurred.

***Legionella pneumophila*: Legionellosis Outbreak at a Nursing Home (Orange County)**

Background: On July 8, 2014, the Florida Department of Health in Orange County (DOH-Orange) was notified of a single case of legionellosis with onset of illness on June 20 in a man who had been in a nursing home during the entire exposure period, indicating the exposure occurred at the nursing home. On August 12, the same nursing home notified DOH-Orange of two additional cases of legionellosis. Upon confirmation of the diagnoses, an outbreak investigation was initiated immediately.

Methods: Syndromic and reportable disease surveillance data were reviewed to identify any additional cases and active case finding was conducted at the facility to determine the scope of the outbreak. Environmental assessments were conducted to determine the potential source of the outbreak and make remediation recommendations. Environmental samples were collected by DOH-Orange and a private remediation company for testing. A case of legionellosis was defined as a resident, staff member, or visitor who was at the nursing home during the exposure period who subsequently developed clinically compatible illness (e.g., fever >100°F, myalgia, cough) and had laboratory evidence of *Legionella pneumophila* infection (e.g., culture, urine antigen, antibody titer) diagnosed between June 20 and December 1, 2014.

Results: Three cases were determined to be part of the outbreak with no new cases identified through active and passive surveillance efforts. All cases were in men aged 69, 82, and 88 years old. The cases had been admitted to the nursing home at least two months prior to onset of symptoms and had not exited the nursing home in the 10 days prior to the onset of symptoms. Symptom onsets occurred on June 20, July 13, and August 7. Two cases were hospitalized as a result of the *Legionella* infection. The nursing home building had two units, and all three men resided in Unit A during the 10 days prior to symptom onset. The men were moved into the unit on March 18, March 12, and June 2, 2014.

The environmental assessment found that residents were transferred to the recently constructed nursing home in two waves beginning in December 2013 and finishing in February/March 2014. The second wave of residents were described as those with the most severe morbidities. Unit A, where the three infected men resided, was the latter unit to be filled. Before the completion of construction of the nursing home, the contract company stated that they had flushed and chlorine shocked the plumbing; however, no documentation supporting this remediation effort were provided.

Environmental samples collected by DOH-Orange were negative for *L. pneumophila*. Samples collected by the private remediation company identified *L. pneumophila* throughout the plumbing system in the facility.

Conclusions and Recommendations: This outbreak of three cases of legionellosis was associated with exposure to the water system at a newly constructed nursing home. The common exposure identified was residence in the same living unit with showers and sinks where water can aerosolize. Water samples collected in July 2014 from the nursing home plumbing system were culture positive for *L. pneumophila*. Extensive environmental assessment data collected during the outbreak investigation indicated conditions existed that could support the growth of the microbial biofilm environments preferred by *Legionella* bacteria as well as promote the harborage and survival of *Legionella* bacteria. DOH-Orange provided written recommendations on August 22 and September 3 to the nursing home infection control and engineering staff to support previous verbal

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recommendations for preventing the harborage and growth of *Legionella* in the facility's plumbing water system and guiding environmental monitoring and *Legionella* testing during the outbreak timeframe to reduce the risk of continued disease transmission.

***Mycobacterium tuberculosis*: Large Tuberculosis Contact Investigation Involving Two Hospitals (Okaloosa County)**

Background: On June 3, 2014, the Florida Department of Health in Okaloosa County (DOH-Okaloosa) was notified by the Infection Practitioner (IP) of a local hospital (Hospital A) that four nurses who worked in the same unit had tuberculin skin test conversions from March through May of 2014. The IP identified a 62-year-old man as the suspect index tuberculosis (TB) case through a retrospective medical record review. Examination of the man's clinical notes identified that he was recently hospitalized at two different hospitals (Hospitals A and B) for a total of 2.5 months and died in April 2014. Preliminary diagnoses did not include TB; therefore, no infection control precautions were taken. Contact investigations at each hospital, in addition to a community contact investigation, were initiated to identify, evaluate, and treat hospital employees, hospital patients, and community contacts of the index case who may have been exposed to infectious TB.

Methods: An Incident Command System (ICS) structure was mobilized within DOH-Okaloosa to maintain operational control and ensure communication throughout the different facets of the investigation. The Centers for Disease Control and Prevention's *Guide for the Investigation of Contacts of Persons With Infectious Tuberculosis* was used as a resource for contact investigations. Contacts were prioritized for testing based on the frequency and duration of contact with the suspect index case, involvement in high-risk medical procedures with the case, age, and immune status. A customized data collection form was created in Epi Info™ 7 to collect demographic information, previous TB testing results, exposure information, and field notes.

Results: The investigation identified 244 exposed hospital contacts and seven exposed community contacts who required testing. Of the exposed contacts from both hospitals, 239 (98%) were tested for TB or had a documented TB test >12 weeks after exposure. Two new skin test conversions were found through the contact investigation at Hospital A, both of whom were assigned to the same floor as the original four nurses identified at Hospital A; no conversions were identified at Hospital B. Two of the seven community contacts tested positive for TB exposure; one contact was treated for latent TB infection, and the other was treated for TB disease.

Conclusions and Recommendations: Providers in areas considered as low risk for TB should remain vigilant and consider TB in their differential diagnoses in patients with cavitory lesions on chest x-ray and other symptoms of TB. When potential TB transmission is identified in multiple settings, early mobilization of an ICS structure is essential for maintaining organization and ensuring communication between various arms of a multifaceted investigation. Although not typically used by DOH for TB contact investigations, Epi Info™ 7 was a useful tool for organizing and managing the vast amounts of data collected. Most importantly, cultivating and maintaining relationships among local health office staff, local IPs, and community partners is vital to the early detection and mitigation of diseases and outbreaks.

***Neisseria meningitidis*: Imported Pediatric Meningococcal Disease (Lee County)**

Background: Meningococcal disease is caused by *Neisseria meningitidis* bacteria. The bacteria can be transmitted through the exchange of respiratory secretions and can cause severe illness. The Florida Department of Health in Lee County (DOH-Lee) was notified of a suspect meningococcal disease case on July 17, 2014, by a local children's hospital. The child was not a Lee County resident, but a traveler visiting from Ireland, who had arrived in Lee County on July 11.

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Methods: DOH-Lee initiated an investigation to confirm the case and identify potential contacts. A confirmed case was defined as a clinically compatible illness in a person with isolation of *N. meningitidis* from a sterile site. DOH-Lee conducted interviews with the child's family and hospital staff to identify travel history and close contacts for post-exposure prophylaxis (PEP). An isolate was forwarded to the Bureau of Public Health Laboratories in Jacksonville (BPHL-Jacksonville) for serogrouping and subsequently forwarded to the Centers for Disease Control and Prevention (CDC) for multilocus sequence typing (MLST).

Results: The child was brought to the emergency department on July 17 with a history of fever, vomiting, and purpuric rash. The child was intubated for several days before recovering from the illness. DOH-Lee identified 19 close contacts in the U.S. who needed PEP, including 10 family members and nine health care workers. Interviews also identified six neighbors in Ireland who were in contact with the case during the incubation period. The Bureau of Epidemiology contacted the Ireland Department of Public Health (IDPH) to notify them of the need for PEP for these people. On July 20, DOH-Lee was notified by the hospital that blood cultures were positive for *N. meningitidis*. BPHL-Jacksonville later confirmed *N. meningitidis* serogroup B. The older sibling of the case had been diagnosed with meningococcal disease 18 months prior in Ireland, and the current case had received prophylaxis at that time. In coordination with IDPH, CDC confirmed the *N. meningitidis* isolated from the case had the same MLST profile as the sibling's isolate from the previous year.

Conclusions and Recommendations: Rapid response and interviews with the family were essential to ascertaining a detailed travel history and list of close contacts. International cooperation was key to ensuring all contacts received PEP in a timely fashion. Further laboratory analysis and international coordination by CDC also determined the same strain of *N. meningitidis* was responsible for the siblings' infections, though they occurred 18 months apart. The source of the infection for the siblings is unknown due to the potential role of asymptomatic carriage and transmission from colonized persons.

Salmonella Braenderup: Outbreak Linked to a Food Truck, Lee County

Background: On July 16, 2014, the Florida Department of Health in Lee County (DOH-Lee) was notified of a salmonellosis (*Salmonella* group C) case in a man who had been hospitalized. He reported consuming food from a local food truck with a friend who was also ill but did not seek medical attention. On July 17, the Regional Environmental Epidemiologist noted the same food truck was referenced in a separate 72-hour food history complaint. On July 18, a third complaint was received from a family of five that reported similar symptoms of gastrointestinal illness with exposure to the same food truck. In response to these incidents, a foodborne illness complaint investigation was initiated.

Methods: DOH-Lee conducted interviews with all ill people, queried the reportable disease surveillance system for additional *Salmonella* group C cases, and reviewed the foodborne illness complaint log for people reporting similar exposure to the food truck. All specimens were forwarded to the Bureau of Public Health Laboratories (BPHL) for serotyping and pulsed-field gel electrophoresis (PFGE) analysis. An environmental assessment of the food truck was scheduled with the Florida Department of Business and Professional Regulation. A confirmed case was defined as any person with laboratory-confirmed *Salmonella* infection who consumed food from the mobile food truck on July 11 or July 12. A suspected case was defined as a person experiencing diarrhea within 72 hours after consuming food from the mobile food truck on July 11 or July 12.

Results: Of the 14 interviews conducted, 12 people met the case definition (six confirmed, six suspected). The incubation period ranged from 8.5 to 70 hours with a median of 24 hours. The duration of illness ranged from three to seven days with a median of six days. Ages ranged from 4 to

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46 years with a median of 29 years, and 8 cases (67%) were in men. The 12 people consumed a variety of different tacos and most consumed more than one kind of taco. This was the only common exposure identified among cases. BPHL confirmed the six *Salmonella* group C isolates as *Salmonella* serotype Braenderup with an indistinguishable PFGE pattern (JBPX01.0002). The environmental assessment found inadequate hand washing practices, insufficient cold and hot holding time and temperature practices, and an improperly functioning reach-in cooler. No ill employees were identified in the two weeks before the outbreak and no food handlers tested positive for enteric pathogens.

Conclusion and Recommendations: Based on the epidemiological data and the environmental assessment, this cluster of salmonellosis cases was associated with food from the local food truck. Some limitations to this investigation included a lack of controls, limited food exposure data, lack of recall of specific food exposures, inconsistent responses based on various interviewers' techniques, lack of implicated foods available for analysis, and a language barrier during interviews with some sick people and employees of the food truck. A strength of this investigation was DOH-Lee working with local hospitals to quickly obtain case information and rapidly submit isolates to the BPHL for serotyping and PFGE analysis.

***Staphylococcus aureus* enterotoxin: Foodborne Outbreak at a Holiday Lunch Buffet (Orange County)**

Background: On December 10, 2014, a request for multiple ambulances needed at a commercial building was broadcast via the mass casualty incident notification system. The Florida Department of Health in Orange County (DOH-Orange) was notified by their preparedness partners about the incident. The request for ambulances occurred following a catered holiday luncheon. Initial reports indicated that 25 people had been transported via ambulance to area emergency departments for symptoms of severe nausea, vomiting, and diarrhea. An outbreak investigation was immediately initiated.

Methods: Questionnaires were administered to the attendees of the luncheon in a cohort study. Environmental assessments were conducted at the caterer's commissary, home, and the complex where the holiday luncheon occurred. Clinical and food samples were collected for analysis by the Centers for Disease Control and Prevention (CDC). Additional case finding was conducted by querying syndromic data, review of routine complaints received by DOH, querying Florida Poison Information Center Network calls, and posting a notice on EpiCom (Florida's moderated outbreak communication system and moderated message board). A case was defined as a person who became ill with diarrhea or vomiting within 24 hours following consumption of food from the catered holiday lunch buffet at the office building between 11:30 a.m. and 1:00 p.m. on December 10.

Results: A total of 141 people met the case definition. People ranged in age from 20 to 64 years with a median of 41 years, and 87 cases (62%) were in women. Incubation periods ranged from 22 minutes to 23.5 hours with a median of 4.3 hours. The most frequently reported symptoms among cases were watery diarrhea (87%), abdominal cramps (77%), and nausea (77%). Among study participants, food items that were associated with a statistically significant increased risk of becoming ill with gastrointestinal illness included white turkey meat (risk ratio=2.76, 95% confidence interval [CI] [1.58-4.80]), gravy (risk ratio=1.88, 95% CI [1.24-2.84]), and devil chocolate cake (risk ratio=1.44, 95% CI [1.10-1.89]). With only 36 ill study participants reporting consumption of the devil chocolate cake, this food item by itself was not determined to have caused the outbreak. The environmental assessment found that the caterer prepared all of the foods for the event, except the salad, at the commissary from December 7 to 10 with assistance from the caterer's spouse. Storing a large amount of food in a small cooler and limited hot holding capacity likely led to temperature abuse of the implicated foods. Environmental contamination from shared workspace at the commissary was possible. Six stool specimens tested positive at CDC for *Staphylococcus aureus*, and one was culture-positive for *Bacillus cereus*. The dark turkey meat, white turkey meat, and ham were also culture-positive for *S. aureus* and *B. cereus*.

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Conclusion and Recommendations: This outbreak of gastrointestinal illness was caused by *S. aureus* toxins in the turkey prepared and served by personnel of the catering company at the holiday lunch buffet at the office building on December 10. The presence of *S. aureus* toxin in the turkey, statistically significant association of illness with consumption of turkey, and the thermal abuse of the turkey after the initial roasting process and before the end of the holiday lunch buffet supports this conclusion. Contamination with *B. cereus* of the turkey, ham, and green beans served at the holiday lunch buffet also contributed to the illnesses. However, the degree to which illnesses were caused by each identified pathogen could not be determined. Cross-contamination of food items before, during, or following the holiday lunch buffet cannot be ruled out, which may have led to multiple food items acting as an outbreak causative vehicle or distortion of the true relationship.

Undetermined: Fatal Case of Suspected Meningococcal Disease in a Child (St. Lucie County)

Background: On December 19, 2014, the Florida Department of Health in St. Lucie County (DOH-St. Lucie) was notified by the medical examiner's (ME) office of an 8-year-old boy with suspected meningococcal disease. According to the ME, meningococcal disease was suspected based on probable sepsis, findings of Waterhouse-Friderichsen syndrome (hemorrhagic adrenal glands), early signs of meningitis during the autopsy, and a history of a "blotchy" red rash. The case had no known underlying medical conditions and initially presented to a local emergency department (ED) on December 17 with fever (103 °F), vomiting, nausea, and fatigue, and was discharged with anti-nausea/vomiting medications. He returned to the local ED in the early morning of December 19 severely dehydrated, confused, and in metabolic acidosis and shock. Blood cultures were collected before administering intravenous (IV) ceftriaxone. A spinal tap was not performed. He was transferred to another local hospital, intubated, and admitted to the pediatric intensive care unit where he received IV fluids, vancomycin, and cefepime. Despite rescue efforts, he died a few hours after arrival from cardiopulmonary arrest with a disposition of probable severe sepsis and severe metabolic acidosis. Based on the clinical presentation and rapid deterioration, the ME's findings, and consultations with the Bureau of Epidemiology, an investigation was initiated for suspected meningococcal disease.

Methods: DOH-St. Lucie led a rapid investigation and comprehensive response including obtaining medical records; completing an interview with the mother of the case; identifying and notifying close contacts at risk; recommending antibiotic prophylaxis as appropriate; coordinating advanced laboratory testing with the Bureau of Public Health Laboratories (BPHL) and the Centers for Disease Control and Prevention (CDC); and communicating with family members, the ME office, health care providers, school contacts and parents.

Results: The child had no reported history of recent travel, no reported or identified risk factors, and all recommended immunizations were up to date, including influenza vaccine. Four adult household contacts and five close contacts (two adults and three children) were identified for whom prophylaxis was recommended. All received prophylaxis through their primary care providers or DOH-St. Lucie. In addition, 30 possibly exposed health care workers were identified and provided with prophylaxis through their employee health or risk management programs. Exposures occurred while providing direct patient care, during transport, or resuscitation efforts. Letters and fact sheets were provided to the child's school for notifying parents and staff. DOH-St. Lucie epidemiology staff and an on-call nurse were available after hours and throughout the weekend to answer any questions or concerns. General information on diagnosis and treatment of meningococcal disease were also distributed to local health care providers, including the treating hospitals and infection preventionists. No additional cases or symptomatic contacts were identified.

Two sets of blood cultures and urine cultures collected at the EDs showed no growth. The chest x-ray impression was suggestive of viral-like pneumonitis. Post-mortem specimens (cerebral spinal fluid [CSF], blood, and lung tissue) were tested at a local hospital but were reportedly contaminated (i.e.,

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growing multiple organisms including *Streptococcus mitis* and diphtheroids) and no pathogenic organisms were identified. Gram stain on the CSF and lung tissue showed no organisms and lung tissue culture and toxicology results were all negative. Blood and CSF specimens were sent to CDC for bacterial meningitis polymerase chain reaction (PCR) panel testing, and tissue specimens were submitted to the CDC's Infectious Disease Pathology Branch Lab (IDPB). Blood and CSF specimens were negative for *Neisseria meningitidis*, *Haemophilus influenzae*, and *Streptococcus pneumoniae* by real-time PCR. Parvovirus B19 was detected in heart tissue specimens by PCR, though IgM antibodies were negative.

Conclusion and Recommendations: According to CDC, detection of parvovirus B19 IgM antibodies is the best indicator of recent parvovirus B19 infection, as parvovirus DNA can persist in multiple tissues (including heart) for decades following the infection. The etiologic agent that caused this child's death remains unknown. Even though all laboratory tests were negative for *N. meningitidis* and the illness ultimately did not meet the meningococcal disease surveillance case definition, responding to this illness as if it were meningococcal disease was the appropriate precautionary public health response.

Parasitic Diseases

***Cryptosporidium* species: Multi-County *Cryptosporidium* Outbreak at a Water Park, (Hillsborough County)**

Background: During the summer of 2014, more than 500 confirmed cases of cryptosporidiosis were reported in Florida. Of the confirmed cases, 266 (52%) were reported in the Tampa Bay area including Hillsborough, Pinellas, and Pasco counties. Investigations conducted by the Florida Department of Health in Hillsborough County (DOH-Hillsborough) identified that many of the cases had visited a local water park in Tampa. In addition, several surrounding counties notified DOH-Hillsborough that some of their reported cryptosporidiosis cases had also visited the same water park. An investigation was initiated, including two environmental assessments of the identified water park, extensive contact with park management, active case finding, and a news release to the public.

Methods: DOH-Hillsborough investigated cryptosporidiosis cases reported by physicians, clinics, and private citizens in Hillsborough County and additional reports from surrounding local health offices. Active case finding was implemented by posting a notice to EpiCom (Florida's moderated outbreak communication system and moderated message board) and reviewing syndromic data. A confirmed cryptosporidiosis case was defined as a person who visited the identified water park in Tampa from June 1 through September 30, 2014, with a positive *Cryptosporidium* laboratory result. A probable cryptosporidiosis case was defined as a person who visited the water park who had diarrhea, but lacked laboratory evidence of infection. Environmental assessments of the water park were conducted by DOH-Hillsborough.

Results: Analysis of surveillance data identified 30 confirmed and 17 probable cases of cryptosporidiosis among water park visitors. Ages ranged from 6 months to 63 years old with a median of 14.3 years. Illness onset dates ranged from June 24 through September 23. The median incubation period for cases was 6.4 days. Results from the environmental assessment at the water park did not identify any significant violations of current Florida pool code, however a secondary disinfection system was not in place, potentially allowing *Cryptosporidium* oocysts to survive and circulate for extended periods of time. Water chemistry records were reviewed for the past two months for the pools, and all identified fecal accidents were responded to according to Centers for Disease Control and Prevention (CDC) recommendations for eliminating *Cryptosporidium*.

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Conclusion and Recommendations: A cryptosporidiosis outbreak associated with a local water park in Hillsborough County occurred during the summer of 2014. Confirmed cases were reported from six Florida counties. Several confirmed cases attended the park while infectious with cryptosporidiosis and were likely the source of at least some of the illness clusters. The facility was following CDC guidelines for pool disinfection after detection of fecal accidents. Recommendations were made to the management to exclude ill people, and consider the use of more effective disinfection methods to reduce the likelihood of transmission at their facility.

***Naegleria fowleri*: Primary Amebic Meningoencephalitis With International Exposure (Seminole County)**

Background: On July 2, 2014, the Bureau of Epidemiology received a report of a suspected case of primary amebic meningoencephalitis (PAM) in an 11-year-old boy being treated in an Orange County hospital. PAM is caused by *Naegleria fowleri*, a free-living amoeba. The treating physician requested the release of an investigational medication, miltefosine, from the Centers for Disease Control and Prevention (CDC). In response to the call, an investigation was initiated to determine the exposure source and summarize case findings. The investigation determined the ill person was a resident of Seminole County.

Methods: The Florida Department of Health in Seminole County (DOH-Seminole) obtained medical records from the treating hospital and interviewed the boy's parents and hospital staff to determine exposure details, clinical history, and treatment. Cerebral spinal fluid (CSF) was forwarded to CDC on July 2 by the hospital to confirm the presence of *N. fowleri*.

Results: Exposure history included travel to Costa Rica from June 19 to 27. The boy reported extensive swimming, zip lining, and water slide activities at a resort on June 23. The resort used a natural hot water spring as the water source for these activities. No other fresh water exposures with nasal submersion were reported during the trip. On June 27, the boy experienced headache, nausea, low-grade fever, vomiting, and stiff neck. On June 29, he was admitted to a local hospital with a diagnosis of meningitis, at which time a cerebral spinal fluid (CSF) specimen was negative for all organisms. The boy's condition continued to deteriorate, and he was placed on mechanical ventilation on July 1. Motile amoebae were identified in a second CSF specimen on July 2 and the attending physician requested miltefosine. The boy died later that morning. CDC confirmed the presence of *N. fowleri* in CSF by real-time polymerase chain reaction on July 9.

Conclusion and Recommendations: This PAM case in a Seminole County resident very likely resulted from exposure to hot springs in Costa Rica during a family vacation before illness onset on June 27. The physical activities of water sliding and zip lining into the hot springs at the resort likely resulted in water forcefully entering the nasal passages of the case. The family was aware of the risks of *N. fowleri* infections in Florida; however, they were unaware of the risk of infection outside of the U.S. *N. fowleri* thrives in warm temperatures and is commonly found around the world in warm fresh water (like lakes, rivers, and hot springs) and soil.

***Plasmodium falciparum*: Fatal Case of Malaria (Broward County)**

Background: Human malaria is caused by four species of protozoan parasites of the genus *Plasmodium*, including *P. vivax*, *P. falciparum*, *P. malariae*, and *P. ovale*. All four are transmitted via the bite and blood-feeding behavior of mosquitoes in the genus *Anopheles*. Approximately 200 million people worldwide are infected each year, and approximately 500,000 people die from malaria annually. Of the four species causing malaria, *P. falciparum* is the most likely to result in severe infections and may lead to death if not promptly treated. On December 5, 2014, the Florida

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Department of Health in Broward County (DOH-Broward) received notification from a hospital about a patient with a blood smear that was positive for malaria. In response to this report, DOH-Broward initiated an investigation.

Methods: DOH-Broward collected medical records from the hospital, interviewed the case, and had blood smears forwarded to the Bureau of Public Health Laboratories in Miami (BPHL-Miami) for confirmation.

Results: The infected person was a 57-year-old black woman who formerly resided in Jamaica. She spent a month in Nigeria working as a missionary, returning on November 22. She visited a local emergency department on December 4 with fever, chills, diarrhea, headache, abdominal pain, and sweats that began that day. A laboratory workup also identified hyperparasitemia (>20%), a low red blood cell count (3.98 million cells per microliter), and thrombocytopenia (33,000 per microliter). She initially claimed to have no recent travel outside the country, possibly due to hyperawareness and fear related to travelers coming from Ebola virus-impacted areas. Preliminary smears done in the hospital on the evening of December 4 demonstrated malaria infection. She was started on quinine and doxycycline and underwent exchange transfusion due to her high level of parasitemia. BPHL-Miami reviewed the blood smears and confirmed the parasite as *P. falciparum* on December 5. In an interview with DOH-Broward on December 5, the woman stated she did not use precautions against mosquito bites. She did not take any malaria chemoprophylaxis during her recent trip but had taken prophylaxis for her previous trips to Nigeria. She had no history of past malaria infections. Over the next few days, her anemia and thrombocytopenia worsened. She went into renal failure and respiratory failure, requiring intubation. She died on December 8 from respiratory and cardiopulmonary arrest.

Conclusions and Recommendations: Anti-malarial prophylaxis is recommended for travelers going to malaria-endemic areas to prevent this serious infection. Due to the women's inaccurate travel history, malaria treatment was not given until the day after she went to the hospital. It is important for malaria treatment to occur as soon as possible, especially in cases of severe malaria. Intravenous artesunate is also available for treatment of severe malaria in consultation with the Centers for Disease Control and Prevention. The use of a rapid diagnostic test for malaria, such as BinaxNOW®, can aid in a preliminary diagnosis. Testing by traditional means, polymerase chain reaction of whole blood or microscopic evaluation of thick and thin peripheral blood smears, is still required to confirm the diagnosis.

Viral Diseases

Enterovirus and Other Pathogens: Response to an Enterovirus D68 Case, Norovirus Outbreak, and a Fatal Meningococcal Disease Case Affecting Two Affiliated Private Schools (Polk County)

Background: On October 7, 2014, the first case of enterovirus D68 (EV-D68) in Florida was identified in a Polk County resident following a positive test result by the Centers for Disease Control and Prevention (CDC). The patient was a 10-year-old girl who attended a private middle school, and who presented to an emergency department on September 9 with a chief complaint of shortness of breath. The girl was hospitalized and released on September 15. A specimen was collected during her stay. On October 9, the Florida Department of Health in Polk County (DOH-Polk) was notified of a gastrointestinal illness outbreak involving 19 students and two staff at a high school affiliated with the middle school. On October 11, DOH-Polk was notified of meningitis in a 17-year-old male student attending the same high school who presented to an emergency department the previous evening with rash, fever, and altered mental status. Gram-negative diplococci were identified and the boy died from suspected meningococcal disease on October 12. Due to publicity surrounding the EV-D68 case, there was concern within the schools' community that the diseases were linked.

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Methods: Students and staff with GI illness were interviewed, and stool specimens were collected for testing by the Bureau of Public Health Laboratories in Tampa (BPHL-Tampa). Close contacts of the meningococcal disease case were notified to ensure they had received appropriate antibiotic prophylaxis; none was part of the GI illness outbreak; however, DOH-Polk and the Regional Epidemiologist re-contacted parents of students with GI illness to verify their current health status. A cerebrospinal fluid (CSF) specimen was submitted to CDC for *Neisseria meningitidis* polymerase chain reaction (PCR).

Results: The most common signs and symptoms among students and staff with GI illness included nausea and vomiting (18), diarrhea (12), headache (12), and abdominal cramps (10). No common exposure was identified. One stool specimen tested positive for norovirus genotype I at BPHL-Tampa on October 13. The CSF specimen from the meningitis patient tested positive for *N. meningitidis* serogroup B. All parents who had been re-contacted reported that their children had since recovered.

Conclusions and Recommendations: Close coordination between DOH-Polk, the Bureau of Epidemiology, and BPHL-Tampa allowed for the rapid identification of norovirus as the cause of the GI illness outbreak, and helped DOH-Polk quickly assure members of the schools' community that the outbreak was unrelated to either EV-D68 or meningococcal meningitis.

Chikungunya Virus: First Imported Cases From the Caribbean (Hillsborough, Broward, and Palm Beach Counties)

Background: In December 2013, the first autochthonous transmission of chikungunya virus in the Americas was reported on the island of St. Martin. Since then, local transmission has been identified in countries throughout the Caribbean and the Americas. Prior to 2014, Florida had identified five imported cases of chikungunya fever, all of whom had travel to Asia where the virus is endemic. On May 7, 2014, the Florida Department of Health in Hillsborough County (DOH-Hillsborough) was notified of a possibly imported chikungunya fever case with travel to the Dominican Republic. On May 14, the Florida Department of Health in Broward County (DOH-Broward) was notified of a possible imported chikungunya fever case with travel to Haiti. On May 19, the Florida Department of Health in Palm Beach County (DOH-Palm Beach) was notified of another imported chikungunya fever case with travel to Haiti.

Methods: DOH-Hillsborough, DOH-Broward, and DOH-Palm Beach worked with physicians to collect serum specimens that were sent to the Bureau of Public Health Laboratories in Tampa (BPHL-Tampa) and Jacksonville (BPHL-Jacksonville) for testing. DOH-Hillsborough, DOH-Broward, and DOH-Palm Beach also obtained medical records, interviewed patients, and promptly contacted their local mosquito control programs.

Results: The Hillsborough County case was in a 44-year-old woman who traveled to San Cristobal, Dominican Republic. Her first symptoms of headache and myalgia started the day of her return to Florida on May 5 and were followed by fever, rash, arthralgia, and joint effusion. She was hospitalized for seven days. Her acute serum specimen collected May 7 tested positive for chikungunya virus by reverse-transcriptase polymerase chain reaction (PCR) and culture and was equivocal for IgM and IgG antibodies at BPHL. Her convalescent specimen collected May 12 was IgM-positive and IgG-negative at BPHL indicating seroconversion.

The Broward County case was in a 29-year-old woman who traveled to Port-au-Prince, Haiti. She started experiencing fever, myalgia, and joint effusion while still in Haiti on May 5. Her acute serum specimen collected May 13 tested positive for chikungunya virus by PCR and culture, equivocal for IgM antibody and negative for IgG antibody at BPHL. Her convalescent specimen collected May 22 tested positive for IgM and IgG antibodies at BPHL, indicating seroconversion.

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The Palm Beach County case was in a 66-year-old man who traveled to Haiti. His symptoms of fever, nausea, and polyarthralgia started on May 15, a day after he returned to Florida. He was hospitalized for four days. His acute serum specimen collected May 16 tested positive for chikungunya virus by PCR and negative for IgM and IgG antibodies. All three cases were exposed while traveling to visit friends and relatives.

Conclusions and Recommendations: These were among the first imported chikungunya fever cases associated with the outbreak in the Caribbean reported in Florida and the U.S. A total of 442 chikungunya fever cases were reported in Florida residents in 2014, of which 12 were locally acquired. Most imported cases in 2014 reported traveling to visit friends and relatives, which is an important but challenging group to effectively target for preventive messaging. Given the large number of travelers between Florida and the Caribbean, it is essential that activity of diseases of public health concern be closely monitored in this region. Maintaining strong relationships between local health offices and local mosquito control is also a critical part of effective surveillance and response to chikungunya and other non-endemic arboviruses.

Chikungunya Virus: First Locally Acquired Cases (Miami-Dade and Palm Beach Counties)

Background: Since the first autochthonous transmission of chikungunya virus in the Americas was reported in 2013, Florida has seen an increase in chikungunya fever cases among travelers returning from endemic areas, particularly the Caribbean and South America. The recent spread of chikungunya virus and the presence of competent mosquito vectors provide the conditions for transmission of the virus in Florida and concern that it will become established as an endemic virus. On June 27, 2014, the Florida Department of Health in Miami-Dade County (DOH-Miami-Dade) was contacted by the Florida Poison Information Center Network about a physician who called regarding a patient with suspected chikungunya fever. On July 11, the Florida Department of Health in Palm Beach County (DOH-Palm Beach) was notified of a suspected secondary dengue infection (i.e., a person previously infected with dengue) via an electronic laboratory report.

Methods: DOH-Miami-Dade and DOH-Palm Beach worked with patients and physicians to collect appropriate specimens, which were sent to the Bureau of Public Health Laboratories in Tampa (BPHL-Tampa) and the Centers for Disease Control and Prevention (CDC) for testing. DOH Miami-Dade and DOH-Palm Beach also obtained medical records, interviewed patients, and contacted their local mosquito control programs. DOH-Palm Beach conducted a cluster investigation within a 50-meter radius of their case's residence to identify any additional cases.

Results: The first case was in a 41-year-old woman residing in Miami-Dade County. The case was initially reported to DOH Miami-Dade as imported due to a history of recent travel to an endemic area. She began having polyarthralgia on June 10, followed by fever, rash, and leukopenia on June 13. Upon interview by DOH Miami-Dade epidemiologists, she reported travel to Bali with return May 11, one month before to symptom onset, but no travel to endemic areas during the two-week incubation period. Her acute serum specimen collected June 16 tested positive for chikungunya virus by IgM antibody at BPHL-Tampa and the CDC, positive by reverse-transcriptase polymerase chain reaction (PCR) at BPHL-Tampa, positive by plaque reduction neutralization test (PRNT) at the CDC, and negative for IgG antibody. Her convalescent serum specimen collected July 10 tested positive for IgG antibody demonstrating seroconversion. Miami-Dade Mosquito Control District was notified of the suspect case within 24 hours of when DOH Miami-Dade received initial notification. The spouse of the infected woman tested negative for chikungunya virus and no additional cases were identified following media outreach soliciting additional cases.

The second case involved a 50-year-old man residing in Palm Beach County. His symptoms of fever, arthralgia, rash, leukopenia, and thrombocytopenia started on July 1. He had no international travel

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during the two weeks prior to onset of symptoms. Although his physician initially suspected dengue fever and ordered dengue virus testing, all potential dengue virus specimens are also tested for chikungunya virus at BPHL. His acute specimen collected July 4 tested positive for chikungunya virus by PCR at BPHL-Tampa and the CDC and negative for chikungunya virus IgM and IgG antibodies at BPHL-Tampa. His convalescent specimen collected July 14 was negative for IgM antibody and positive for IgG antibody at BPHL-Tampa demonstrating a seroconversion. Palm Beach Mosquito Control District was notified of the suspect case within one day of initial notification to DOH-Palm Beach. DOH-Palm Beach interviewed eight people in their cluster investigation; none had experienced a febrile illness in the past three months, and all tested PCR- and antibody-negative for chikungunya virus.

Conclusions and Recommendations: These cases represent the first documented autochthonous transmission of chikungunya virus in the continental U.S. In 2014, Florida reported a total of 12 locally acquired chikungunya fever cases with no sustained transmission. These first two cases would not have been identified as local chikungunya fever cases without detailed interviews to capture accurate travel history and comprehensive testing provided by public health reference laboratories. The Palm Beach case highlights the importance of testing for both chikungunya and dengue viruses if either is suspected. Past experiences responding to local dengue introductions facilitated readiness for response to local chikungunya cases.

Chikungunya Virus: Locally Acquired Chikungunya Fever Field Survey and Response (St. Lucie County)

Background: On July 26, 2014, the Florida Department of Health in St. Lucie County (DOH-St. Lucie) received a call from a local urgent care provider reporting a positive chikungunya virus laboratory report. The 56-year-old woman, a St. Lucie County resident, had no travel outside of Florida in the two weeks prior to symptom onset on July 11. Infection with chikungunya virus was confirmed on July 30. Response efforts led by DOH-St. Lucie with St. Lucie Mosquito Control District (MCD) and multiple other community partners were immediate and extensive.

Methods: An epidemiology investigation was initiated. St. Lucie MCD and the Bureau of Epidemiology were immediately notified of the suspect locally acquired chikungunya fever case. Information on chikungunya fever and laboratory testing information was distributed to providers. In addition, a retrospective record review of emergency department (ED) chief complaint syndromic data from April 28 to July 28 was immediately completed. A press release and mosquito-borne illness advisory were issued on July 30. A local Incident Management Team was activated using the Incident Command System and planning was initiated to conduct community outreach and a chikungunya fever field survey. The purpose of the field survey was to determine the extent of the outbreak, characterize risk factors, and gather information that could be used to prevent further transmission. Two field teams consisting of an interviewer, a phlebotomist, and a Spanish/Creole-speaking translator were assembled, trained, and deployed to complete the field survey and collect specimens for dengue virus and chikungunya virus testing starting on August 4. A second press release was issued on Aug 1, and a reverse-911 call was used to notify residents of the outreach efforts and field survey.

Results: The retrospective record review of syndromic data identified two records of interest; however, once investigated, neither was determined to meet the chikungunya fever surveillance case definition. Public education and information were provided through media outreach while conducting the field survey, and during various community outreach projects. St. Lucie MCD was provided with addresses of residential areas with potential breeding sites. Code Enforcement assisted with clearing breeding sites. All homes visited were given a door hanger package including an informational flyer on chikungunya fever, bug spray, and contact information for DOH-St. Lucie and St. Lucie MCD. On July

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28, St. Lucie MCD conducted field inspections to identify mosquito breeding sites and apply control measures. Of the 534 properties inspected, mosquito breeding was identified in 12%, and 3% had adult mosquitoes present. The field survey operations concluded on August 4. Eighteen households were visited by the field teams, of which 16 were occupied. Four households participated, and seven serum specimens were obtained with one person reporting a febrile illness in the past three months. All seven specimens were negative for dengue virus by polymerase chain reaction (PCR), negative for dengue virus IgM antibody, and negative for chikungunya virus IgM and IgG antibodies. About 1/3 of the reverse 911 call attempts connected to a land line phone.

Conclusion/Recommendations: This event and response efforts provided staff and community partners an opportunity to evaluate current response plans and capabilities. It tested local communications, planning, and public information capabilities and also provided an opportunity to collaborate with community partners during an actual event. Overall, staff demonstrated the ability to respond and work together effectively and efficiently and plans, policies, and procedures that required updating or changing were identified. Effective communication and outreach to local partners and the public were identified as critical areas for this event and for a successful response.

Dengue and Chikungunya Viruses: Imported Case of a Co-Infection (Miami-Dade County)

Background: During 2014, both chikungunya and dengue viruses were circulating among countries in the Caribbean basin. Chikungunya virus was recently introduced in the area, while dengue virus was already present. Both viruses can be transmitted by the same species of mosquitoes and have substantial overlap in clinical presentations. On September 19, 2014, the Florida Department of Health in Miami-Dade County (DOH-Miami-Dade) received a positive electronic laboratory report for dengue fever IgM antibody titer.

Methods: DOH-Miami-Dade initiated an investigation and collected medical records from the hospital. An interview was conducted with the infected woman to determine travel history and identify any additional risk factors. DOH-Miami-Dade also informed Miami-Dade Mosquito Control District of the case. The specimen was forwarded to the Bureau of Public Health Laboratories in Tampa (BPHL-Tampa) for confirmation. Due to the similar clinical presentation and shared geographic distribution of the two viruses, any specimens submitted to BPHL for chikungunya or dengue testing are routinely tested for both viruses.

Results: The 31-year-old infected woman had recently traveled to Cuba and returned to Miami on August 27. Symptoms started on September 3, and she visited a local emergency department on September 8 with fever, arthralgia, headache, myalgia, rash, and retro-orbital pain but was not hospitalized. On September 26, BPHL-Tampa reported a positive result for dengue virus type 1 by reverse-transcription polymerase chain reaction (RT-PCR). On September 29, BPHL-Tampa reported a positive result for chikungunya virus by RT-PCR, indicating co-infection with two arboviral diseases.

Conclusions and Recommendations: During 2014, several other Florida travelers had serologic evidence of recent infection with both dengue and chikungunya viruses. However, this was the first case to demonstrate evidence of a true co-infection with RT-PCR positive testing for both viruses. This co-infection would not have been identified if BPHL-Tampa had not tested for both viruses, highlighting the value of public health confirmatory testing of specimens due to similar clinical presentation for both diseases. After identification of this co-infection, four additional co-infected people were identified. Providers should consider both dengue fever and chikungunya fever when evaluating suspect cases with travel to areas where both viruses are present. Co-infections are most likely underreported due to incomplete testing, asymptomatic infections, and infected people not seeking health care.

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Dengue Virus: Household Cluster of Locally Acquired Cases (Miami-Dade County)

Background: On July 15, 2014, the Florida Department of Health in Miami-Dade County (DOH-Miami-Dade) received notification from a physician about a suspect locally acquired dengue fever case. During the interview, the woman mentioned that one of her housemates had a febrile illness 13 days before her symptom onset. In response to this report, DOH Miami-Dade initiated a larger investigation.

Methods: DOH-Miami-Dade collected medical records from the hospital, interviewed additional household members, and collected convalescent specimens from symptomatic and asymptomatic household members. DOH Miami-Dade also informed Miami-Dade County Mosquito Control District (MCD) of the suspect locally acquired dengue fever cluster. Specimens were forwarded to the Bureau of Public Health Laboratories in Tampa (BPHL-Tampa) for confirmation.

Results: The 49-year-old woman initially identified visited a local emergency department on July 2 with reported symptoms of fever, chills, myalgia, and rash that began on June 29. A laboratory workup also identified leukopenia and thrombocytopenia. Commercial laboratory results were positive for dengue IgG antibody and negative for dengue IgM antibody. On July 21, BPHL-Tampa reported a positive result for dengue virus type 3 by reverse-transcription polymerase chain reaction (RT-PCR). The symptomatic housemate identified during the initial case interview was a 64-year-old woman. She had symptoms of fever, arthralgia, myalgia, rash, and diarrhea, with onset on June 16. She sought medical care but no testing for dengue virus was ordered, and her final diagnosis was a urinary tract infection. Titer results for specimens submitted to BPHL-Tampa were positive for dengue IgM and IgG antibodies for this woman on August 6. On August 11, a third symptomatic housemate was reported to DOH-Miami-Dade and a convalescent specimen was collected that day. The 64-year-old woman had fever and chills starting on June 23 and a laboratory workup also confirmed the presence of leukopenia and thrombocytopenia. BPHL-Tampa reported positive dengue IgM and IgG antibody titers for this woman on August 13. All three women recalled being bitten by mosquitoes at their residence and were provided education on mosquito-borne disease prevention. The house was subdivided into three apartments, and the three infected women lived in two of the apartments. Two asymptomatic housemates were also tested, resulting in at least one person from each apartment being tested, but testing was negative for dengue virus. No additional infected people were identified in the house.

Conclusions and Recommendations: It is important for physicians to consider dengue fever in their differential diagnoses when evaluating febrile illnesses in areas that have had repeated dengue virus introductions. Clusters of illness are quite common with dengue fever because a single infected mosquito can bite and infect multiple people. Both DOH and MCD staff had to visit the residence numerous times during the investigation, requiring additional time and resources as new cases were identified. Asking about similar illnesses in household members and encouraging mosquito bite prevention for suspect cases can help prevent local dengue transmission.

Influenza Virus: Pneumonia Associated With an Influenza A (H3) Outbreak at a Skilled Nursing Facility (Pasco County)

Background: In December 2014, the Florida Department of Health in Pasco County (DOH-Pasco) was notified that 18 (19%) of 95 residents at a skilled nursing facility had radiographic evidence of pneumonia and were being treated with antibiotics. Two residents were hospitalized, one of whom died. DOH-Pasco conducted an investigation to ascertain all cases through active surveillance, identify the etiology, provide infection control guidance, and recommend treatment or prophylaxis.

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Methods: An outbreak-associated case was defined as the onset of fever or respiratory illness in a nursing facility resident or staff member from November 29 to December 29. Oropharyngeal swabs were collected from 13 ill residents for respiratory virus testing by polymerase chain reaction at the Bureau of Public Health Laboratories. Characteristics of the resident cohort were analyzed including age, sex, race, room location, tobacco use, pneumococcal vaccination status, underlying chronic diseases, and obesity.

Results: Fifty people, including 44 (46%) residents and six (8%) of 75 staff met the outbreak case definition. The earliest reported onset date was November 29; 34 cases (68%) occurred from December 12 to 18. Ages ranged from 31 to 98 years old (mean of 81 years). The most frequently reported signs and symptoms among all cases included congestion (72%), cough (60%), and fever (38%). Antibiotics were prescribed to 36 (72%) people. Nine (20%) ill resident cases were hospitalized. Four (9%) deaths occurred among resident cases. No hospitalizations or deaths occurred among staff. Ten specimens tested positive for influenza A (H3), and three tested positive for respiratory syncytial virus. Prophylactic oseltamivir was offered to exposed people from December 21 to 22. The facility canceled group activities, initiated droplet precautions, and stopped accepting admissions. Additional measures included implementing respiratory precautions for visitors and exclusion of ill staff from work until 24 hours after symptom resolution. No cases were identified after December 21. No characteristics analyzed were associated with illness. Among the 44 ill residents, 19 (43%) had documentation of receipt of influenza vaccination during the 2014–15 influenza season. Among 51 unaffected residents, 33 (65%) had documentation of receipt of influenza vaccination. Neither influenza testing nor prescription of antiviral medications occurred during the initial cluster, which was followed by extensive secondary transmission.

Conclusions and Recommendations: Preventing transmission of influenza viruses within long-term care facilities requires a multifaceted approach that includes yearly vaccination of all residents and health care workers, prompt testing when any resident has signs and symptoms that could be due to influenza, standard and droplet precautions for residents with suspected or confirmed influenza, empirical antiviral treatment of all residents with confirmed or suspected influenza regardless of vaccination status, and antiviral chemoprophylaxis for residents as soon as an influenza outbreak is identified.

Middle East Respiratory Syndrome Coronavirus: First Confirmed Case of MERS in Florida (Orange County)

Background: On May 9, 2014, the Florida Department of Health in Orange County received notification from an infection preventionist at a local hospital of a man under investigation for Middle East respiratory syndrome (MERS). Consultation between public health and hospital officials resulted in testing for MERS coronavirus (MERS-CoV). MERS-CoV was not detected at the Bureau of Public Health Laboratories Tampa (BPHL-Tampa) by polymerase chain reaction (PCR) on a serum specimen collected from the man. After further consultation with the Centers for Disease Control and Prevention (CDC), out of an abundance of caution, the man was kept in isolation and an induced sputum specimen was collected on May 10. On the same day, BPHL-Tampa reported that MERS-CoV was detected in the specimen. The result was confirmed by the CDC on May 11, triggering an investigation of the second reported confirmed MERS case in the U.S.

Methods: An outbreak investigation was initiated, including active and passive surveillance, case identification, contact investigation and exposure classification, isolation, quarantine, the creation of an Epi Info 7™ database to manage data for all identified contacts, clinical specimen collection, and laboratory analysis.

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Results: Investigation determined that the case potentially exposed other people to MERS in four general locations: 1) airplanes during airline travel from Saudi Arabia to Orlando, 2) household contacts and visiting friends, 3) a hospital outpatient waiting room while accompanying a relative for an unrelated medical reason, and 4) an emergency department waiting room where he presented for care and was then evaluated for potential MERS-CoV infection.

In total, 211 contacts were identified, including 32 (15%) close contacts and 179 (85%) non-close contacts. This total excludes airline contacts believed to be located outside Florida at the time of the contact investigation. BPHL-Tampa tested 206 specimens from 65 different contacts; all specimens were negative for MERS-CoV by PCR. In total, 29 clinical specimens were taken from the infected man; four (three sputum and one serum) were positive for MERS-CoV by PCR.

Conclusions and Recommendations: This investigation highlights the critical role that health care and public health practitioners play in considering and confirming MERS-CoV infections in people who develop respiratory symptoms within 14 days after travel to the Arabian Peninsula. Sputum specimens were the most sensitive for detection of MERS-CoV by PCR. The lack of secondary infections in this investigation is significant for future contact investigations. In combination with findings from previous case investigations, refinement of the risk definition for contacts may reduce the burden on public health responders regarding contact identification, follow-up, and laboratory testing.

Norovirus: An Outbreak Among University Fraternity Chapter (Alachua County)

Background: On March 13, 2014, the Florida Department of Health in Alachua County (DOH-Alachua) was notified by a university student health nurse about a cluster of gastrointestinal illnesses among men all belonging to the same fraternity. An outbreak investigation was immediately initiated.

Methods: DOH-Alachua obtained a line list of ill fraternity members and conducted interviews using a standardized questionnaire. A request to submit stool specimens for analysis by the Bureau of Public Health Laboratories (BPHL) was made to the ill people. An outbreak case was defined as any fraternity member reporting diarrhea or vomiting from March 7 to March 20. DOH-Alachua conducted an environmental assessment of the fraternity's food services.

Results: A total of 19 people met the outbreak case definition out of a total of 160 active fraternity members (12% attack rate). Ages ranged from 19 to 21 years old, with a median age of 19 years. All cases were in men. The duration of illness ranged from 8 to 44 hours with a median of 24 hours. Predominant symptoms included diarrhea, nausea, and vomiting. One man sought medical attention. Interviews identified that the index case had returned from his weeklong spring break the day before his illness onset. He reported that a travel companion was ill with similar symptoms during the trip. The two cases with onsets on March 10 were household contacts of the index case. Fraternity activities where person-to-person transmission likely occurred included daily lunch and dinner served at the house, a chapter meeting the evening of March 10, and an evening social event with a sorority March 11. Active case finding at the sorority did not result in identifying additional ill people. Two stool specimens submitted to BPHL were positive for norovirus genotype I. The food service inspection at the fraternity house did not identify any violations.

Conclusions and Recommendations: This outbreak was caused by norovirus genotype I and was likely transmitted person-to-person through close contact. Because healthy fraternity members were not interviewed, the transmission route could not be determined definitively. Rapidly interviewing ill fraternity members (within 24 hours of notification of the outbreak) facilitated high case participation and implementation of gastrointestinal control measure guidelines that minimized further transmission through the fraternity chapter. DOH-Alachua obtained two clinical specimens for pathogen testing and was able to determine the etiological agent of this outbreak. DOH-Alachua inspected kitchen and dining areas and provided education and outreach on hand washing and sanitation to prevent future disease transmission.

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Rabies Virus Possible Exposure: Rabid Bat Found in an Elementary School (St. Lucie County)

Background: On October 7, 2014, the Florida Department of Health in St. Lucie County (DOH-St. Lucie) was notified by a school health nurse regarding a bat found in a student's backpack. The student's teacher noticed several students hovering around the child's backpack prompting her to investigate and discover the bat. The bat was submitted to Bureau of Public Health Laboratories in Jacksonville (BPHL-Jacksonville) for rabies testing. On October 8, BPHL-Jacksonville notified DOH-St. Lucie that the bat tested positive for rabies.

Methods: DOH-St. Lucie worked closely with the school health program and school principal to identify anyone who may have had contact with the bat. School surveillance video was used to confirm exposures from the time that students got off the bus to the time that the teacher found the bat in the student's backpack. Exposed students were defined as any child who may have had potential contact with the bat while unsupervised by an adult, or an adult who handled the bat without personal protective equipment. A line list was compiled of people who may have had contact with the rabid bat, including people on the bus, at school, and at home, as well as animal control staff and Humane Society staff.

Results: In total, 24 people (seven adults and 17 children) were identified, interviewed, and evaluated for possible exposure to rabies. Rabies post-exposure prophylaxes (PEP) was recommended for one adult and 15 children. Everyone for whom PEP was recommended completed the rabies PEP series, except for one child whose parent refused after multiple education attempts by DOH-St. Lucie.

Conclusions and Recommendations: Rabies is an acute encephalomyelitis that almost always progresses to coma or death within two to three weeks after the first signs of illness. Rapid incident reporting and testing of this animal ensured rabies PEP could be made promptly available to all those potentially exposed. Use of video footage facilitated identification of potentially exposed children.

St. Louis Encephalitis (SLE) Virus: First Human SLE Cases Identified Since 2003 (Duval County)

Background: Prior to the introduction of West Nile virus (WNV), St. Louis encephalitis (SLE) was the most common mosquito-borne disease reported in people in the U.S. Historically, periodic large outbreaks involving more than 100 people have been reported in Florida, particularly in the Tampa Bay area. Since the introduction of WNV in 2001, SLE outbreaks have not been identified in Florida. Due to the significant cross-reactivity seen among flaviviruses on serological tests, all specimens submitted to the Bureau of Public Health Laboratories (BPHL) for SLE virus (SLEV) testing or WNV testing are tested for both. On September 4, the Florida Department of Health in Duval County (DOH-Duval) received notification from a hospital laboratorian of a serum specimen that tested positive for WNV IgM antibody. In addition, on September 10, DOH-Duval received a commercial laboratory report of a serum specimen that was positive for SLEV IgM antibody by immunofluorescent assay for a second person. DOH-Duval initiated investigations in response to these reports.

Methods: DOH-Duval collected medical records from the hospital, interviewed cases, and facilitated collection of convalescent specimens. DOH-Duval also informed Duval County Mosquito Control District of the suspect locally acquired cases. Specimens were forwarded to the Bureau of Public Health Laboratories in Jacksonville (BPHL-Jacksonville) and Tampa (BPHL-Tampa) for confirmation.

Results: Both cases were classified as neuroinvasive disease. The initially identified WNV IgM antibody result was for a 50-year-old woman who developed fever, headache, paralysis, and stiff neck on August 25. A laboratory workup also identified cerebral spinal fluid (CSF) pleocytosis. Commercial laboratory results for a serum specimen were positive for WNV IgM antibody and negative for WNV

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IgG antibody. Both the serum sample and CSF specimens were forwarded to BPHL for confirmation and on September 8, BPHL-Jacksonville reported a positive enzyme-linked immunosorbent assay (ELISA) laboratory result for both WNV and SLEV IgM antibody. Serum neutralization (SN) testing conducted on a convalescent serum specimen sample at BPHL-Tampa confirmed SLEV infection on October 20.

The subsequently identified SLEV IgM antibody result was for a 58-year-old woman who had onset of fever, headache, vomiting, and decreased consciousness on August 27. Further testing at BPHL on both acute and convalescent specimens were positive for WNV and SLEV IgM by ELISA on September 24. SN testing on both specimens confirmed SLEV infection on October 13.

Conclusions and Recommendations: These two SLE cases were the first identified in Florida since 2003. As demonstrated by the first case, WNV and SLEV antibodies can cross-react on serologic assays and more specialized tests such as SN may be needed to identify the infecting virus. Research suggests that antibodies for WNV may temporarily protect against SLEV infection in birds. However, since 2011, there have been increases in the number of sentinel chickens testing positive for antibodies to SLEV, suggesting the potential for possible resurgence. Few SLE cases were identified in Duval County previously. Similar to previous cases identified in north Florida, these two cases occurred earlier than the historical September transmission peak seen in central Florida. Testing capacity for SLEV antibody at commercial laboratories has been limited since 2014. However, SLEV testing is still available at BPHL, highlighting the importance of public health laboratory testing capacity and the value of environmental surveillance.

Non-Infectious Agents

Carbon Monoxide Poisoning: A Cluster of Work-Related Carbon Monoxide Poisoning (Duval County)

Background: Carbon monoxide (CO) is an odorless, colorless, and poisonous gas that can cause sudden illness and death if present in sufficient concentration in ambient air. On September 2, 2014, the Florida Department of Health in Duval County (DOH-Duval) identified three people who went to an emergency department (ED) with chief complaints of CO poisoning by reviewing syndromic ED chief complaint data, all of whom were working at the same location at the time of their exposure.

Methods: DOH-Duval initiated an investigation that included reviewing medical records, assessing the work environment, interviewing workers, and coordinating with the Fire and Rescue Department, that measured CO levels.

Results: Three cases of CO poisoning were confirmed in men exposed while at work. Two of the men were electricians installing a new breaker box at a restaurant. The third man exposed at this location was the restaurant corporate maintenance supervisor. Work on the project began at approximately 7:30 p.m. on August 29. Power was shut off at the location, a generator was placed outside the front door, and large lights were placed in the work area. An extension cord was run from the outside generator to the lights and electrical equipment inside, allowing the door to be opened slightly. On August 30, the men developed headaches at approximately 2:30 a.m. and were “very tired”, but they attributed it to having worked a full day and being on call before arriving on the worksite. Later in the morning, the spouse of one electrician called and recognized that his speech was slurred. The spouse came to the worksite and raised awareness about the men’s symptoms and possible CO poisoning. The electrician was taken to the ED the morning of August 30 and was admitted to the hospital with altered mental status, weakness, dizziness, nausea, and confusion. The man’s carboxyhemoglobin (COHb) level was 35%, a critical level. He was placed on a nonrebreather

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15-liter oxygen mask and later transferred to a hospital for treatment in a hyperbaric chamber. He received the hyperbaric oxygen treatment, was discharged home, and returned to work on September 2. The headache and fatigue continued and the electrician returned to the ED on September 5. His COHb level at the follow-up visit was 0%, and his blood gasses were approaching normal levels. The other electrician went to the ED on August 30 and the restaurant maintenance supervisor went to the ED on September 3, each with complaints of fatigue and headache. Their COHb levels were 14.3% and 17.3%, respectively. They received oxygen via nonrebreather masks, were observed, and discharged from the hospital. The Fire and Rescue Department measured the CO levels at the worksite at 215 parts per million (ppm), well above the recommended level of 50 ppm. Managers of the electricians and restaurant were called and education was provided to prevent CO poisoning. There were no other reports of CO exposure from the worksite.

Conclusion and Recommendations: Managers of the electricians and restaurant were called and precautions were taken to prevent additional exposures. There were no other reports of CO exposure from the worksite. To prevent CO poisoning from generators, it is important to follow manufacturer's instructions on safe use of a generator and always use generators outside, more than 20 feet away from home, doors, and windows.

Lead Poisoning: A Household Cluster of Lead Poisoning Cases Due to Take-Home Lead Exposure (Hillsborough County)

Background: Lead poisoning in children can lead to adverse effects that are permanent and irreversible. Lead can settle on skin, hair, and clothes. "Take-home lead" is lead dust carried home on clothes, shoes, or skin of people whose occupations or hobbies involve lead. Take-home lead can cause lead poisoning in household members not directly exposed to occupations or hobbies involving lead. On June 6, 2014, the Florida Department of Health in Hillsborough County (DOH-Hillsborough) was notified of a confirmed lead poisoning case via an electronic laboratory report for a 7-month-old infant with a very high blood lead level (BLL) of 38 micrograms per deciliter ($\mu\text{g}/\text{dL}$).

Methods: A home visit was conducted by DOH-Hillsborough to investigate the infant's environment. Household members were interviewed during the home visit for information on potential exposures.

Results: The family household included the father, mother, the infant, and two older siblings who were <6 years old. The father worked at a battery recycling plant and was responsible for packaging refined lead after recycling. He indicated that the work area contained a large amount of lead dust that contaminates his clothes and shoes. The home visit identified detectable dust on the father's work clothes and shoes, as well as in the family's car and on car seats. No lead-containing paint was detected in the home, which was built in 1983. The father was tested regularly as a part of his job and his most recent BLL at the time of the investigation was 16.6 $\mu\text{g}/\text{dL}$. The two older siblings were tested for lead poisoning, one of whom had a BLL of 16 $\mu\text{g}/\text{dL}$, which meets the surveillance case definition for lead poisoning. DOH-Hillsborough recommended follow-up blood testing within four weeks for the infant and within 12 weeks for the sibling. The infant's BLL began to decrease, but in August, increased to 41 $\mu\text{g}/\text{dL}$. DOH-Hillsborough visited the pediatrician's office to discuss chelation therapy to reduce the infant's BLL and continued to actively follow-up with the family. The infant's BLL continued to decline over the next three months.

Conclusions and Recommendations: Unlike living in sub-standard housing, take-home lead exposures are preventable. DOH-Hillsborough provided health education on dietary needs and measures to prevent further exposure to take-home lead. Recommendations included safe work practices, correct hygiene practices such as washing and drying of work clothes separately from the children's clothes, and thoroughly vacuuming and wet cleaning of the car's interior.

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Lysergic Acid Diethylamid (LSD): Exposure Associated With Food (Hillsborough County)

Background: On March 4, 2014, the Florida Department of Health (DOH) Chemical Disease Surveillance Program was sent hospital records for a family that had potential exposure to lysergic acid diethylamid (LSD) from the Florida Department of Health in Hillsborough County (DOH-Hillsborough). The family claimed their illnesses were associated with consumption of a skirt steak purchased from a local grocery store. Information was shared with the DOH Food and Waterborne Disease Program (FWDP) and an investigation was initiated immediately, which included notification of the Florida Department of Agriculture and Consumer Services (FDACS).

Methods: FWDP reviewed all medical records of the family members, and DOH-Hillsborough attempted to interview the family to collect demographic, illness, and exposure information. Information about the suspected product was shared with FDACS to ensure a contaminated product was not in commerce. As this was a meat product, the U.S. Department of Agriculture (USDA) became involved in the investigation (including the USDA Food Safety and Inspection Service [FSIS]). Local law enforcement (LE) went to the family's house to collect food samples. Active case finding continued throughout the investigation. DOH-Hillsborough worked with the local medical examiner's (ME) office to conduct analysis on food samples to confirm the presence of LSD.

Results: A family of five was involved in this outbreak. Each of the five family members was hospitalized for two days and diagnosed with atropine-like nerve agent exposure. The family refused to provide additional details regarding their illness to DOH-Hillsborough. Gas chromatography mass spectrometry (GCMS) conducted by the ME detected LSD in the skirt steak; however, clinical specimens were negative. A second incident possibly associated with a ground beef product was reported on Thursday, March 6; however, laboratory results and an autopsy ruled out the ground beef as the cause of death. No other similar illness reports were received in Florida.

Conclusions and Recommendations: This appears to be a foodborne outbreak associated with the consumption of LSD in skirt steak. LE and DOH could not determine how or who put the illicit drug in the food and analysis of other samples of skirt steak from the same lot were negative for the illicit drug. Therefore, it is hypothesized that this was an isolated incident. The father mentioned other drug use in the past and an incidental contamination could have occurred. A coordinated effort between local, regional, state, and federal entities successfully investigated this incident.

Paladin® (Dimethyl Disulfide): Investigation of Health Effects Potentially Related to Applications (Hillsborough County)

Background: Paladin® is a newly approved soil fumigant that contains dimethyl disulfide (DMDS) as the active ingredient and has a sulfurous odor. Since the odor threshold (7 parts per billion [ppb]) for DMDS is much lower than levels potentially affecting human health (55 ppb), unpleasant odors may occur in and around areas of application. All treated areas must be covered with a plastic tarp for 12 to 21 days to retain the fumigant in the soil to improve efficacy and mitigate odor concerns. In August and September 2014, the Florida Department of Health (DOH) received several complaints of health effects following a strong chemical odor in Hillsborough County. The odor was later confirmed to be from Paladin®. Acute pesticide-related illness and injury is listed as a reportable disease in Florida. DOH in Hillsborough County (DOH-Hillsborough) initiated an investigation to understand better the health effects potentially related to the application of Paladin®.

Methods: Public health investigations included surveillance, interviews, medical record reviews, review of supporting documentation (e.g., partner agency investigation reports), and determination of pesticide-related illness and injury case status according to the Florida surveillance case definition. Locations of the application sites and residential addresses for all interviewed people who indicated home exposure were mapped using Google Earth®.

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Results: Among the 33 households contacted in this investigation, DOH-Hillsborough interviewed 66 people complaining of health effects related to the Paladin® application. Of the 66 people interviewed, 43 (65%) met the surveillance case definition criteria for a suspect case of pesticide-related illness and injury, though none met the confirmed or probable criteria. Severity of illness was classified as low for 38 cases and moderate for five cases. The most common symptoms reported by cases included eye pain, throat irritation, nausea, dizziness, headache, and fatigue. The average distance from an application site was 0.74 miles among people who had illnesses classified as suspect and 2.84 miles among people whose illnesses did not meet the surveillance case definition, which was a statistically significant difference ($p=0.001$).

Conclusions and Recommendations: To our knowledge, this is the first report of an investigation of health effects potentially associated with application of Paladin®. Findings from this investigation will help inform activities and preparations taken by DOH for future applications of Paladin®. DOH continues to work with partners to exchange information and prepare for anticipated public concerns and potentially related health effects of Paladin®. DOH-Hillsborough has performed outreach activities to local health care providers to educate them on past issues associated with the application of Paladin®, identification of people with health effects that may be related to Paladin®, and reporting to DOH-Hillsborough for public health investigation. DOH will target public health surveillance activities during Paladin® applications in Hillsborough and other counties.

