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Measles Outbreak Tests Tennessee's Preparedness

On April 15th, the Shelby County Health Department was notified of a 17-month old child who was hospitalized with symptoms consistent with measles. The child had fever, rash and other classic symptoms and had not received MMR vaccination. With no history of travel or known exposure to anyone with similar symptoms, measles was not strongly suspected. However, serology was positive for measles IgM antibodies, prompting confirmatory testing by CDC. Before confirmatory test results for the child were

available, SCHD learned of a second hospitalized patient, an adult male with a febrile rash, measles IgM-positive lab results, an unclear vaccination history, no recent travel and no contact with anyone with similar illness.

Confirmation of measles for the toddler was received from CDC on April 21st; on the same day, SCHD was notified of a third patient, an infant with measles-compatible illness and no history of travel. Repeated



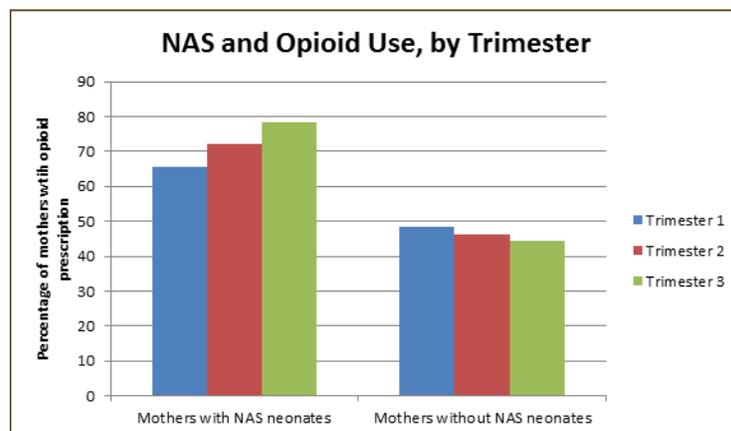
interviews of the three patients and their families revealed no common source and no epidemiologic connections.

Faced with community transmission of measles, SCHD and TDH mus-

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Neonatal Abstinence Syndrome and Opioid Use Patterns

Neonatal abstinence syndrome (NAS) is a disorder in infants that occurs when there is an abrupt discontinuation of addictive substances, most commonly opioids, used by the mother during pregnancy. NAS is characterized by withdrawal symptoms in the infant that can be severe enough to warrant use of morphine to aid in weaning the infant



from the substances. Over the last decade the incidence of NAS in Tennessee has increased 15-fold, far exceeding the national rate, which has increased threefold over the same time period. NAS became a reportable disease in Tennessee in 2013, and surveillance efforts have tracked over 1,000 cases in each of the last three years. With the goal of under-

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Measles Outbreak

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tered extensive resources to launch a rapid public health response. Over the next six weeks, four more cases of measles were identified, each linked to one of the first three cases.

Measles virus is highly contagious and can remain airborne for up to two hours after an ill person was present. Hence, nearly 1,000 potential contacts were identified: 92 of these were determined to be close contacts and 235 were health care workers. Exposures occurred in six hospitals, twelve outpatient clinics and seven public places. Susceptible (i.e. non-immune) contacts were placed in quarantine and monitored daily throughout their potential incubation period; other contacts were

told to notify the health department immediately of any illness within 21 days of their last exposure to one of the measles patients. Ultimately, the public health response contained the outbreak, which was declared over on June 20.

MMR vaccine is safe and highly effective. One dose of MMR vaccine is approximately 93 percent effective at preventing measles, while two doses are approximately 97 percent effective. Six of the patients in this outbreak were unvaccinated; however, three were not old enough to receive MMR vaccine.

Sustained measles transmission in the United States was interrupted more than a decade ago, due to high vaccination coverage. However, measles is still com-

mon in some countries in Europe, Africa, Asia and the Pacific. Measles is characterized by a prodrome of high fever, cough and runny nose, followed in one to four days by conjunctivitis and a red rash that spreads from the head to the extremities. White spots on the buccal mucosa, known as Koplik's spots, also occur. Measles can lead to serious complications in up to 30 percent of cases, including pneumonia, encephalitis, seizures and death. Infected individuals can transmit the virus as early as four days before rash onset until four days after rash onset, and up to 90 percent of susceptible persons, if exposed, will develop measles. Susceptible contacts may become ill up to 21 days after exposure.

If measles is suspected in a patient with a febrile rash illness, particularly with a history of recent international travel, the patient should be immediately isolated using airborne precautions (or placed in a private room with the door closed). Contact the local health department for assistance with assessment and possible testing. Prompt recognition and follow-up of contacts, including vaccination of susceptible contacts within 72 hours of exposure, are essential to controlling an outbreak.

Robb Garman, MPH and David Sweat, MPH

| MMR Vaccine Recommendations | |
|---|---|
| Two doses: | |
| ➤ | All children* at age 12–15 months; booster 4-6 years of age |
| ➤ | Adults in high-risk groups (e.g., health care personnel, international travelers, or students at post-high school educational institutions) |
| At least one dose: | |
| ➤ | All other adults born since 1956 who have no evidence of immunity to measles |
| <small>*Infants 6-11 months should receive one dose prior to international travel, dose 2 at 12-13 months of age (at least 28 days after dose 1) and dose 3 at 4-6 years.</small> | |

mon in some countries in Europe, Africa, Asia and the Pacific.

Measles is characterized by a prodrome of high fever, cough and runny nose, followed in one to four days by conjunctivitis and a red rash that

Highlighting Preparedness

September is National Preparedness Month, and, throughout the month, health departments across Tennessee carried out activities to help residents and organizations prepare for emergencies. More than 40 separate events took place across the state. The largest of these was the Sixth Annual Family Safety and Preparedness Fair at World's Fair Park in Knoxville, a joint effort between East Tennessee Regional Health Office and the Knox County Health Department. Dozens of agencies, community organizations and businesses were present to answer questions and teach classes on how citizens can best prepare their homes, families, pets and workplaces in case of an emergency or disaster. While disasters often catch people by surprise, communities that prepare for the unexpected can quick-

ly bounce back.

Eighty vendors and 14 display vehicles were on hand at the Fair. Highlights included the Fire Safety House, fire extinguisher education, Knoxville Police Department's drunk driving simulator, an electricity awareness demo and police demos. Participating organizations included East Tennessee Medical Reserve Corps, Knoxville Emergency Management Agency, the Church of Jesus Christ of Latter-day Saints, and many other agencies and preparedness-related businesses.



In light of the recent tragedies in cities such as Orlando, San Bernadino and Charleston, the Knoxville Police Department presented a class to educate the public how to respond to an active shooter situation. In addition, they taught attendees how to build a family disaster kit. Children had a

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Highlighting Preparedness

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chance to view and tour emergency vehicles, the Knoxville Utilities Board addressed home safety during storms, and the University of Tennessee College Of Veterinary Medicine taught attendees how to keep pets safe during disasters.

All individuals and families should have a plan and an emergency kit in

their home. A lack of preparedness results in extra time and resources being spent on relief and recovery. The Family Safety and Preparedness Fair emphasized being prepared and ready, with vendors and activities providing an opportunity for everyone to become more informed and self-reli-

ant. Adults and children alike left the fair with potentially life-saving tips.

For information on how to prepare yourself and your family for an emergency, visit CDC's [Emergency Preparedness and Response](#) webpage.

Katrina Tyler

Turtle-Associated Salmonellosis

Turtles and other reptiles are popular as pets, but contact with reptiles is a common source of *Salmonella* infections in people. Reptiles can carry *Salmonella* despite appearing healthy and clean. The bacteria are shed in feces and can easily contaminate the animals' bodies and anything in their environment, including aquarium water. People may become infected by contact with a reptile, its habitat or some other object the animal had contact with.

Since early 2015, CDC has collaborated with multiple states (including Tennessee) and several other federal agencies to investigate four multistate outbreaks of human salmonellosis that were linked by epidemiologic and laboratory findings to contact with small turtles or their environments, such as water from a turtle habitat. In the four outbreaks,

a total of 133 people infected with the outbreak strains of *Salmonella* were reported from 26 states between January 16, 2015 and April 8, 2016. Thirty-eight people were hospitalized; 41 percent



of the cases were children five years of age or younger. Because most cases of salmonellosis do not get reported to public health, the true number of infected people is likely many times higher.

Due to the high risk to young children, the FDA bans interstate sale and distribution of turtles with a shell length of less than four inches as pets. After the FDA instituted its ban in 1975, Tennessee banned the sale or transfer of any turtle, regardless of size, as a pet. This rule was recently amended to allow sale of turtles with a carapace length of four inches or greater, while requiring educational information to be made available to consumers regarding the risk of *Salmonella* infection.

CDC advises that small turtles should not be purchased as pets or given as gifts and offers [simple steps](#) for families to enjoy pet reptiles safely. More information is available on CDC's [Healthy Pets Healthy People](#) website.

Heather Henderson, DVM, MPH

Predicting Norovirus Outbreaks

Acute gastroenteritis (AGE) is significant cause of morbidity across all age groups. Viruses are responsible for a large percentage of sporadic cases as well as outbreaks of AGE. Viral gastroenteritis is usually a self-limited illness characterized by watery diarrhea, nausea, vomiting and sometimes fever; however, it can result in severe dehydration leading to hospitalization or even death. Infants, older adults and people with compromised immune systems are at greater risk of severe outcomes.

Norovirus is the most common AGE outbreak etiology identified among vul-

nerable long-term care facility populations. Timely risk communication and prevention efforts could mitigate norovirus outbreaks. TDH epidemiologists collaborated with Vanderbilt Children's Hospital to analyze data from a sporadic AGE surveillance system. The sporadic disease data, along with outbreak data reported to the Norovirus Sentinel Testing and Tracking Network, were used to assess the ability of sporadic norovirus case surveillance to predict norovirus outbreaks in middle Tennessee.

Sporadic norovirus cases were identified among children who were enrolled through AGE surveillance from Decem-

ber 2012-July 2015 by Vanderbilt Children's Hospital. Investigators analyzed the association between the weekly number and percent of cases testing positive for norovirus and the occurrence of outbreaks in middle Tennessee, attempting to identify a threshold of sporadic norovirus infections that might signal increased risk of an outbreak occurring.

During this time period, 490 (14 percent) of the 3,431 children enrolled with AGE tested positive for norovirus. During the same time, 32 norovirus outbreaks were reported in middle Tennessee, with more than half occurring in long-term care facilities. During winter

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NAS and Opioid Use

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standing more about the underlying causes of NAS in Tennessee, investigators linked data from the Controlled Substances Monitoring Program, birth records and NAS reporting database. The data identified 25,482 infants born to mothers prescribed opioids during their pregnancy. Of those, 659 infants were diagnosed with NAS. Among mothers whose infants had NAS, 78 percent had an opioid prescription during their third trimester. By comparison, 44 percent of mothers whose infants did not have NAS had been prescribed an opioid during

their third trimester. Additionally, mothers whose infants had NAS were prescribed a daily average of 435 milligram morphine equivalents (MME) over the entire pregnancy period, compared to 100 MME for mothers with infants without NAS.

These findings represent a foundation for future efforts in predictive modeling and policy implementation surrounding NAS. For more information on NAS and summaries of other NAS research projects in Tennessee, see the [TDH NAS web page](#).

Liz Thomas, MPH

Predicting Norovirus Outbreaks

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months, increases in sporadic norovirus cases preceded an increased frequency in reported outbreaks. The factors most correlated with the occurrence of an outbreak were the number and percentage of norovirus cases in the preceding two-week period. An outbreak could be predicted when three or more cases, or 15 percent of specimens from patients with AGE, tested positive for norovirus. When this threshold was exceeded, the risk of an outbreak occurring within the next two-week period rose three-fold.

Acute gastroenteritis and sporadic norovirus illness among children in clinical

settings may serve as an early warning system for norovirus outbreaks in communities to trigger risk communication and implementation of risk-reducing measures in long-term care facilities. These findings provide insights into norovirus transmission dynamics and opportunities for targeted interventions. They also highlight the importance of laboratory testing of AGE by providers and the potential for sharing data between public health and clinical institutions.

Ashley Coatsworth, MPH

Selected Reportable Conditions

| CONDITION | 2012 | 2013 | 2014 | 2015 | 2016 Year to date |
|---|--------|--------|--------|--------|----------------------|
| Campylobacteriosis | 445 | 418 | 375 | 734 | 491 |
| Chlamydia | 31,834 | 29,635 | 30,449 | 30,734 | 21,613 |
| Enterobacteriaceae, Carbapenem-reducing (CRE) | 280 | 249 | 224 | 427 | 499 |
| Gonorrhea | 8,922 | 7,202 | 7,125 | 8,202 | 6,618 |
| Hemolytic Uremic Syndrome (HUS) | 19 | 21 | 12 | 14 | 6 |
| Hepatitis A, acute | 22 | 21 | 13 | 14 | 5 |
| Hepatitis B, acute | 264 | 283 | 272 | 264 | 221 |
| Hepatitis C, acute | 150 | 138 | 181 | 197 | 172 |
| Lyme Disease | 30 | 25 | 17 | 25 | 18 |
| Meningococcal Disease | 7 | 8 | 7 | 3 | 8 |
| Pertussis | 314 | 239 | 306 | 155 | 93 |
| Salmonellosis | 1,106 | 863 | 955 | 867 | 672 |
| Shiga toxin-producing E. coli (STEC) | 130 | 71 | 142 | 158 | 133 |
| Shigellosis | 205 | 705 | 789 | 202 | 122 |
| Spotted Fever Rickettsiosis | 696 | 548 | 546 | 602 | 460 |
| Syphilis | 948 | 875 | 904 | 1,082 | 750 |
| Tuberculosis | 169 | 143 | 147 | 132 | 64 |

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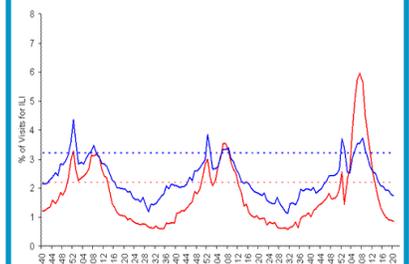


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