Infectious Diseases in New Mexico 2017 Annual Report

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Drug-resistant *Salmonella* serotype Typhi

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The IDEB wish to thank the contribution of former employees Joan Baumbach, MD, MPH, MS Deputy State Epidemiologist (retired) and David Selvage, MHS, PA-C Infectious Disease Epidemiology Bureau Chief – January 2017 to October 2017.

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Introduction

The New Mexico Department of Health (NMDOH) tracks outbreaks and conducts investigations to protect the health of New Mexicans and for reporting to the Centers for Disease Control and Prevention (CDC). In addition to outbreaks of notifiable diseases, suspected foodborne or waterborne illness, acute illness of any type involving a more than expected number of people in the same geographical area, and illnesses of public health significance are investigated under the authority of the New Mexico Administrative Code (NMAC) 7.4.3.13.

This report highlights some of the infectious diseases occurring in New Mexico. These chapters cover a range of topics including an outbreak of group A streptococcal infections in a long-term care facility, an outbreak of varicella (chicken pox) in a detention center, an outbreak of gastroenteritis due to *Shigella* infection, and an outbreak of antibiotic resistant infection in a long-term care facility. Appendix A provides a summary of notifiable disease rates in New Mexico during 2017. Appendices B through D provide additional information including acronym definitions, methods, and notifiable diseases or conditions in New Mexico for 2017.

This report has been prepared by NMDOH staff and CDC staff assigned to NMDOH. Significant contributions from within NMDOH were provided by Epidemiology and Response Division, Public Health Division and Scientific Laboratory Division staff.

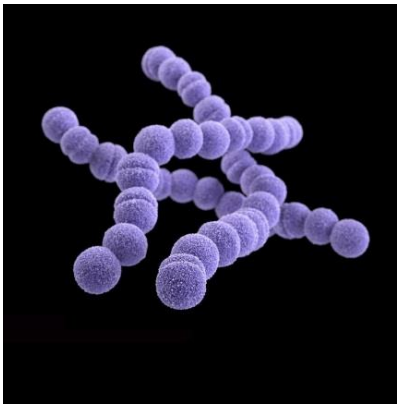
Gratitude goes to the public health nurses, laboratorians, and regional epidemiologists whose efforts are critical to ongoing surveillance and investigation of infectious diseases in New Mexico. The cooperation and active assistance from other organizations (e.g., healthcare providers, educational institutions) and individuals (e.g., infection preventionists) statewide have been vitally important in conducting investigations, and monitoring, preventing and controlling infectious diseases throughout the state.

Investigation of a Group A Streptococcus Outbreak in a Long-Term Care Facility (LTCF)

Sarah Shrum Davis, MPH and Chad Smelser, MD

Highlights

- Invasive group A streptococcus is a potentially deadly disease.
- Residents of long-term care facilities are especially at risk for invasive group A streptococcus infections.
- This investigation utilized Whole Genome Sequencing to identify linked cases that may otherwise have been missed.



Group-A Streptococcus (GAS)/CDC

Background

Invasive group A streptococcus (GAS) is a serious and potentially deadly disease. Particularly at risk are the elderly and populations with underlying medical conditions.[1] Living in crowded or dense spaces has also proven to be a risk factor for GAS infections.[2] GAS infections are transmitted through person-to-person contact or respiratory droplets and may be harbored in the environment. Residents of long-term care facilities (LTCF) could frequently encounter this kind of contact through interactions with visitors, other residents, and staff. Research has shown residents of LTCF have higher morbidity and mortality due to GAS infections.[3] Long-term care facilities account for most clusters of GAS cases investigated in New Mexico.

New Mexico Department of Health (NMDOH), working with the Centers for Disease Control and Prevention's (CDC) Active Bacterial Core (ABCs) surveillance program, identified a cluster of cases of invasive group A streptococcus using Whole Genome Sequencing Methodology (WGS). Most cases were from a 366-bed multi-purpose care facility that accepts insured and uninsured patients. The facility provides long-term care, skilled nursing, transitional care and memory unit care. It has 6 units, two secured memory units, an on-site cafeteria, and a gym.

The objectives of the investigation were:

1. To determine the extent of the outbreak and identify any additional cases
2. Identify risk factors for transmission
3. Identify infection control practices which may contribute to ongoing transmission
4. Implement disease control and prevention measures

Methods

In New Mexico, invasive GAS infections are required to be reported to the NMDOH. As part of ABCs surveillance, all invasive GAS isolates from a sterile body site are sent to the CDC laboratory for further testing. CDC performed Whole Genome Sequencing (WGS) testing on isolates to confirm the relatedness of GAS isolates to each other.

Cases were defined as: patients with closely related by WGS emm type 89 Group A streptococcus isolated from a normally sterile site with culture date between Jan 1, 2015, and September 1, 2017 (Figure 1). To ascertain whether there were additional cases, the Active Bacterial Core (ABCs) surveillance database was queried, which resulted in one additional case identified as coming from the LTCF. In addition, the facility reviewed their own records, which did not result in any additional cases.

NMDOH reviewed medical records using a standardized data abstraction tool to collect case demographics, risk factors, and determine previous healthcare facility residency.

Room assignments were mapped for all patients during the outbreak period. Electronic and hard copy medical records were reviewed to determine healthcare staff contact with cases (both timing of and types of contact) during the outbreak. Staffing lists dating back to Jan 1, 2015 were obtained, but the exact assignment of nurses to floors and patient rooms were unavailable.

Results

There were 18 cases identified by CDC as being closely related by whole genome sequencing methodology. Of these, 10 were residents at the same LTCF, and 6 cases resided on the same unit. An epidemiological curve (Figure 2) demonstrates ongoing transmission at the LTCF.

The most notable finding was that 100% of cases had some form of wound or cellulitis. All 10 cases at the LTCF received wound care from one of two wound care nurses. We also determined that one of the wound care nurses also worked weekends at a major hospital and cared for an additional case that was not a resident of the LTCF (however, the culture date preceded her recorded interactions with the patient). Nasal pharyngeal swabs were collected from both nurses and cultured at our The New Mexico Scientific Laboratory Division, but neither grew Group A streptococcus.

Figure 1. Unrooted dendrogram of emm type 89 GAS cases showing New Mexico cases clustered inside circle

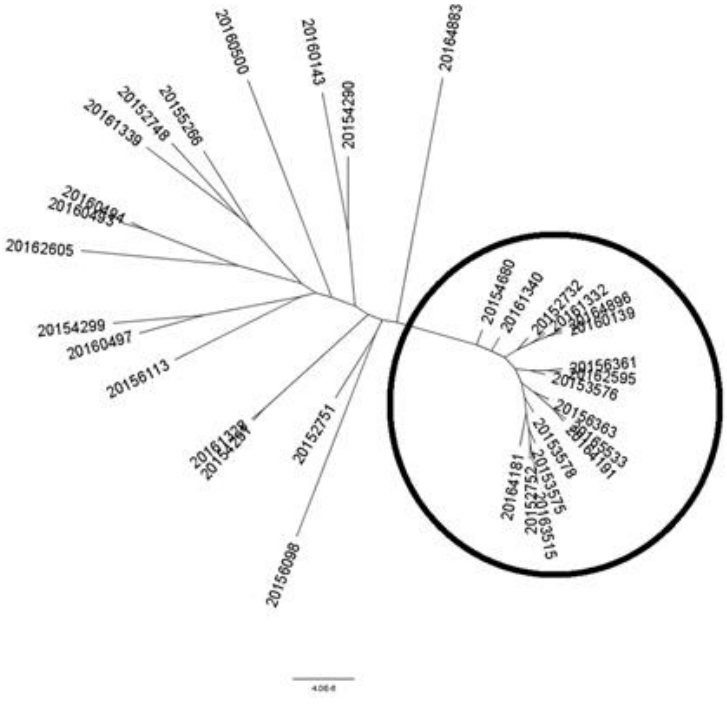
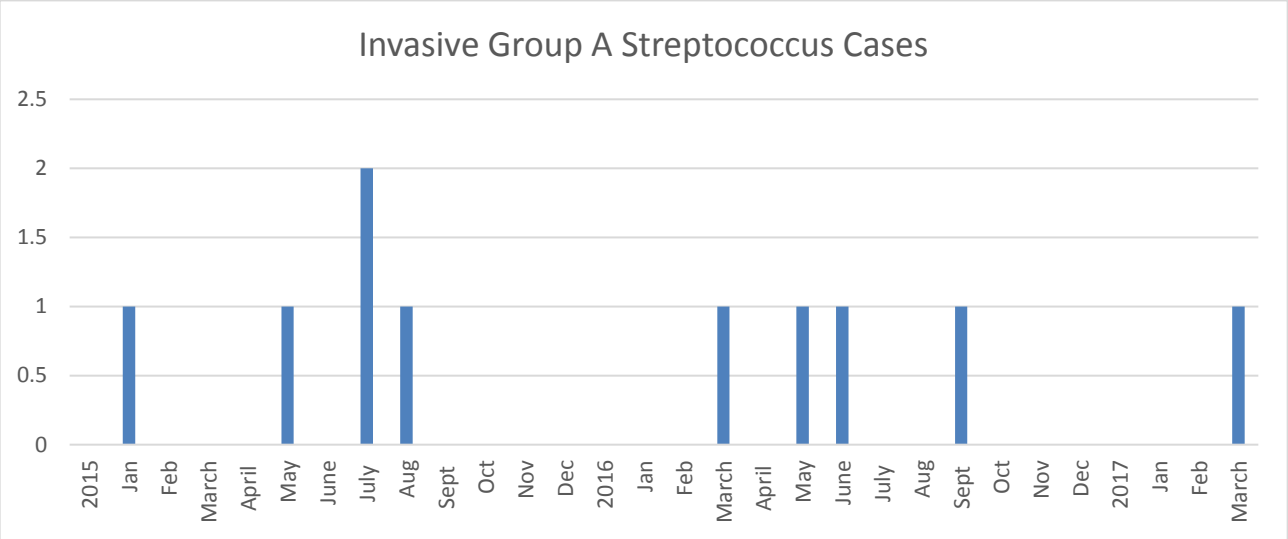


Figure 2. Epidemiological Curve of GAS Outbreak at a Large LTCF



Discussion

This was an investigation of a prolonged cluster of group A streptococcus infections, which were determined by Whole Genome Sequencing to be closely genetically related. Of 18 cases, 10 resided at the same LTCF. NMDOH investigated the outbreak at the LTCF as it was the only commonality between cases. The goals of the investigation were to identify and interrupt transmission of Group A Streptococcus. There have been no identified cases since March of 2017.

Having a wound was a common condition among cases. We were not able to make a definite determination as to whether having the wound, receiving wound care from a member of staff, or receiving certain wound care practices was the most significant risk factor. Notably, among residents of the LTCF, cases were somewhat clustered around 5 rooms on one floor. This floor, however, houses residents with greater nursing needs, and so the cluster may again be due to the type of care received rather than environmental conditions.

The outbreak may have begun due to introduction of GAS to the facility's population from either new residents or employees who were either infected or colonized with GAS, but limited infection control capability coupled with the presence of a susceptible population with multiple underlying risk factors likely led to this prolonged outbreak. The facility has already committed to hiring additional infection control staff.

This outbreak has demonstrated that whole genome sequencing methodologies can be useful in identifying outbreaks. However, there are some questions that remain with this new technology: How closely must isolates be related before they are considered part of the same cluster? What is the expected baseline rate of certain emm types? These questions require further study and underline the need for communication between laboratories and epidemiologists.

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Investigation of an Extended Spectrum Beta-lactamase (ESBL) Producing *Escherichia coli* Outbreak at a Long-term Care Facility, 2017

Lourdes Irizarry, MD and William Hudspeth, PhD, MPH

Highlights

- The production of extended spectrum beta lactamases (ESBL) may be found in 4-6% of *E. coli* in many communities.
- A cluster of 5 cultures within a short period of time was identified at a 66-bed New Mexico long-term care facility, representing an incidence rate higher than expected.
- Opportunities to improve infection prevention practices were identified. Changes in infection prevention practices will likely decrease the potential for transmission.

Background

In April 2017, a report was received that 3 different residents of a nursing home were transferred to the emergency department of an acute care hospital for the assessment of possible infections. All 3 were found to have Extended Spectrum Beta-lactamase (ESBL) producing *Escherichia coli* (*E. coli)* in their urine. Phenotypically, 2 of the organisms were identical and one had a minimum inhibitory concentration (MIC) dilution difference for one antibiotic.

The residents presented to the acute care hospital within hours to days of each other. Concerns for possible mislabeling or cross contamination of samples were hypothesized. On May 1, 2017, we received reports of an additional nursing home resident presenting to the acute care hospital with an ESBL producing *E coli* in the urine. Phenotypically, the organisms were identical to two of the previously reported isolates.

The nursing home is a 66-bed facility with an occupancy rate ranging between 86% - 88%. The facility provides long-term care, skilled nursing, transitional care and memory unit care. It has a cafeteria, gym and laundry facility onsite. Licensed staff to resident ratio is 1:3.55.

Laboratory testing for the nursing home residents is routinely done at the acute care hospital where the residents receive most of their medical services, including emergency care and hospital admissions. The hospital does not have a high prevalence of ESBL *E. coli*.

Methods

Initial investigation activities included reviewing laboratory results with the reporting entity. Collection methods for specimens that were obtained and processed within a short period of each other at the emergency department were reviewed with the hospital infection preventionist and the laboratory. Testing was repeated for one isolate that was still available. Once it was determined that the likelihood of cross contamination or laboratory error was low, investigation of the cases ensued.

Infection prevention measures and clinical presentations of each case were reviewed with the nurse executive at the nursing home. Reviews were conducted on site.

The Centers for Disease Control and Prevention (CDC) Healthcare-associated Infections branch was consulted. Both the hospital laboratory and nursing home were visited. A tour of the nursing home was conducted, and observations of staff during resident care were done. Methods used by staff for

cleaning and disinfecting non-critical, reusable equipment, in common areas such as the gymnasium were observed and discussed. Protocols for resident care such as bathing, and toileting were reviewed.

Isolates of ESBL producing *E. coli* from nursing home residents, available at the laboratory, were sent to the New Mexico Department of Health (NMDOH) Scientific Laboratory Division (SLD) for confirmation of ESBL production and to perform pulsed-field gel electrophoresis (PFGE).

Investigation

The facility appeared clean and organized. The staff were attentive. Alcohol-based hand sanitizer was readily available.

Per the nurse executive, staffing is fluid with high turnover rates, particularly kitchen staff. Staff in the units work with all residents. No isolation or cohorting is typically done, except for residents known to have significant infections with highly contagious or highly consequential organisms, such as *C. difficile*. Communication with acute care hospitals is not always optimal. Nursing home staff are not always aware or notified of highly resistant organisms. They were not aware of residents with ESBL producing *E coli*.

The residents are typically able to ambulate *ad lib*, they can attend group activities, the gymnasium and social events without restrictions. Most of the rooms are semi-private and are shared by two residents. Residents are bathed at a minimum of 3 times per week. Washcloths are not assigned to individual residents. They are laundered after each use onsite by the facility staff. Food is also prepared in the facility.

Policies for bathing, food handling and preparation and laundry standard operating procedures were discussed during the visit and subsequently sent to us. Gloving and gowning for bathing residents is not routinely done. The temperatures of laundry water and dryer are not specified or tested to meet industry standards. We did not receive copies of their food preparation policies.

Gymnasium equipment is wiped with disinfectant towelettes. Incontinent patients wear diapers. Chairs are cleaned with wipes if spillage is noticed.

None of the residents with ESBL producing *E. coli* had devices. Most were in the dementia/secured unit and one of them was in the general ward. The majority had bowel incontinence and required assistance with activities of daily living including bathing. None of them had a history of urological or pelvic procedures recorded in their nursing home record.

Given the set-up of the facility, multiple opportunities for transmission exist. Most amenities, including bathrooms are shared. Personnel are not specifically assigned to specific residents. Isolation and/or cohorting is challenging, although part of the hall may be designated for known ESBL infected or colonized residents. Per the nurse executive, they are not staffed in a way that enables cohorting. Cleaning, disinfection, hand hygiene, food preparation and laundry policies should assign specific roles and delineation of duties. Opportunities for improvement may exist in all the above.

Culture results were discussed with the hospital microbiology staff. Laboratory observed percentage of ESBL producing *E coli* in the last couple of years ranges between 4-6%.

The hospital has plans to grant temporary medical record access to the nursing home for nursing home residents who are transferred to the hospital for an acute illness. We advised the hospital to flag the record if a patient/resident is found to have a resistant organism and add which precautions should be taken.

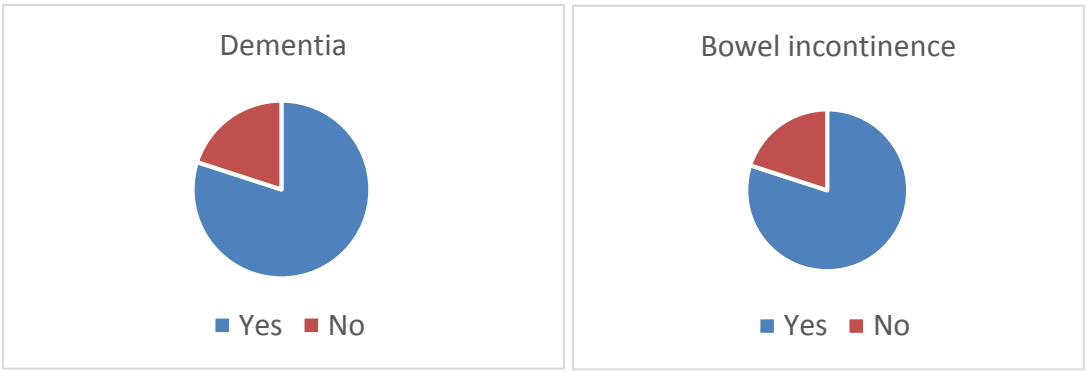
Teleconferences with CDC were held. Two isolates were sent to CDC for further testing, both were confirmed to be ESBL producers. Susceptibility patterns matched the local laboratory susceptibility. Type of ESBL was not tested but does not appear to be a unique or novel strain.

The nursing home nurse executive and corporate executive officer accepted our offer for a full Infection Control Assessment and Response (ICAR) review.

Results

In total, 5 residents were found to have bacterial infections that were phenotypically similar ESBL producing *E. coli*. The cases were discussed and reviewed with the nursing home nurse executive. The age of residents found to have ESBL producing *E. coli* ranged between 67 to 91 years of age. Most had multiple medical problems Four out of 5 residents with ESBL producing E. coli had a history of dementia and were in the secured unit. (Figure 1) Two of them had lived for a brief period in the regular unit, where one of the residents with ESBL producing *E. coli* who had no history of dementia was located. None of them had devices or had undergone invasive procedures in the recent past. Four out of five cases had some degree of bowel incontinence (Figure 1) Three residents had received broad spectrum antibiotics and had regular contact in the acute clinical care settings. All five of them grew the *E. coli* organism in urine.

Figure 1



Susceptibilty patterns for cultures obtained at nursing home and cultures from the hosptial originating from non-nursing home residents demonstrated that the *E.coli* from nursing home isolates exhibited similar susceptibility patterns while the antibiotic susceptibility patterns for non-nursing home isolates were different.

PFGE was completed at SLD for five *E. coli* isolates from the nursing home. All five were cultured from urine specimens from nursing home residents. For comparison purposes, eight isolates from the acute care hospital with no connection with the nursing home were included in the PFGE analysis. All the nursing home isolates were found to be identical (Table I). None of the hospital isolates were found to be similar to those of the nursing home cluster.

Table I - Nursing Home PFGE

	Specimen Source	Serotype	Enzyme	Match	Comments
Patient 1	Urine	ESLB	XbaI	Yes	Matches cluster 1706 ESBL by XbaI
Patient 2	Urine	ESLB	XbaI	Yes	Matches cluster 1706 ESBL by XbaI
Patient 3	Urine	ESLB	XbaI	Yes	Matches cluster 1706 ESBL by XbaI
Patient 4	Urine	ESLB	XbaI	Yes	Matches cluster 1706 ESBL by XbaI
Patient 5	Urine	ESLB	XbaI	Yes	Matches cluster 1706 ESBL by XbaI

Discussion

Given the organisms are phenotypically and genotypically similar, it is likely that some form of transmission took place at the LTCF. The nursing home's dementia ward appears to be the most common site where the highest concentration of residents found to have the organism reside, making it a likely location for transmission. Residents go to the hospital relatively frequently, but we did not find evidence that the organism was acquired through healthcare contact outside the nursing home. PFGE was performed for other community isolates, none of them were a match to the organisms isolated from nursing home residents.

Residents interact with one another often. Many of the residents in this group had some degree of bowel incontinence. *E. coli* is a typical gastrointestinal tract organism and part of the human microbiome. A potential mechanism for acquisition and transmission is through oral acquisition by touching contaminated surfaces in the environment and/or inadvertently contaminating food or utensils. Once the organism becomes part of the gastrointestinal flora auto-inoculation to other areas can occur. The organism may also migrate into the urinary tract. Potential transfer of the organisms from the hands of healthcare workers to residents cannot be ruled out. Exposure through food or environmental contamination, including linen and towels may also occurred.

Considering that 4 of 66 individuals presented to the hospital with what were clinically deemed to be infections, the incidence rate appears higher than expected, reflecting a small outbreak. An additional resident was found to have bacteriuria with the same organism. While the exact prevalence of ESBL producing *E. coli* is not known, the hospital laboratory antibiogram indicates that 4-5% of the cultures obtained in their community that yield *E. coli* are found to be ESBL producers. This appears to be similar to other US communities. Screening for colonization was not conducted in the residents. Therefore, it is not known how many residents may be colonized with this organism.

Conclusion

A cluster of five urine cultures that grew ESBL producing *E. coli* was identified within a short period of time at a nursing home. The organisms had similar phenotypic and genotypic patterns. Of the five cultures, four were deemed to be cases by hospital staff, and one was deemed to represent colonization by the outpatient treating provider. Transmission in the nursing home likely occurred. Although a definite source and mechanism for transmission was not fully identified, opportunities to improve infection prevention practices exist. Strengthening infection prevention practices will likely decrease the risks for future transmission.

Recommendations

1. Continue efforts towards improved communication between the acute care hospital and the nursing home.
    a. Recommend that the hospital flag the record of patients with highly consequential organisms that will be transferred or returned to the nursing home and add recommendations for contact precautions when and if needed.
2. Recommend cohorting residents known to have infection or colonization with multidrug resistant organisms, whenever possible.
3. If possible, cohorting staff that take care of patients with highly consequential organisms is also advised.
4. Strengthening written policies detailing how to conduct terminal cleaning, establishing protocols, clear roles and responsibilities and mechanisms to document cleaning and disinfection activities.
5. Staff should gown and glove when anticipating potential exposure to body fluids.
6. Staff should gown and glove for bathing residents.
7. Laundry policies should include minimum temperatures for washer and dryer.
8. Establish a solid antibiotic stewardship program
9. Have personal protective equipment (PPE) readily accessible for staff use.
10. Assure staff competencies in exercising hand hygiene opportunities as well as donning and duffing.
11. Monitor hand hygiene.
12. Educate staff on a frequent basis about infection prevention practices.
13. Should more cases be identified, active surveillance may be considered.

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Clusters of *Salmonella* Infection - New Mexico 2017

Kelly A. Fitzpatrick-Cuoco MPH and Sandra Melman, MS

Highlights

- More than one million *Salmonella* infections occur in the U.S. every year.
- *Salmonella* is responsible for at least 450 deaths in the U.S. each year.
- People can get *Salmonella* from contaminated foods, surfaces, infected people, and animals.

Background

Salmonellosis is an infection caused by bacteria from the genus *Salmonella*. The organism is transmitted by ingestion of bacteria excreted in the feces of infected humans or animals. Symptoms include diarrhea, fever, and abdominal cramps that typically develop between 12 and 72 hours after exposure to *Salmonella*. Illness usually lasts 4 to 7 days and most people recover without treatment. However, some infections can be more severe and require the patient to be hospitalized. Elderly, infants, and individuals with weakened immune systems are more likely to experience severe illness.

Transmission of *Salmonella* occurs via ingestion of contaminated food, person-to person spread (e.g., day care settings), through contact with infected animals, or through contact with contaminated items. Raw eggs, raw milk, and raw meats may be contaminated with *Salmonella* when it is purchased. Produce can become contaminated during growing and handling procedures. However, cross-contamination from uncooked meats to hands, cutting boards, counters, knives, and other utensils in the home can also spread *Salmonella*.

More than one million *Salmonella* infections occur in the U.S. every year. The Healthy People 2020 target is 11.4 *Salmonella* infections for every 100,000 people. Nationally, the rate was slightly higher than the target, however rates were consistent from 2013 to 2015. According to the CDC, there were 14.5 *Salmonella* infections per 100,000 people in 2013 and 14.9 per 100,000 in 2015. Rates in New Mexico were elevated compared to U.S. rates and increased from 2013 to 2015. There were 16.9 infections per 100,000 in 2013 and 18.9 per 100,000 in 2015.

The percent of New Mexican's with *Salmonella* decreased to 16.8 per 100,000 people in 2017. There were 350 infections and 80 hospitalizations reported due to *Salmonella*. Of the interviewed patients, 74.4% reported preparing raw beef, chicken, or fish in their homes during the 7 days before illness onset (Figure 1).

Methods

Pulsed-field Gel Electrophoresis (PFGE) is a genetic fingerprinting technique that matches or clusters patients by the DNA of infectious organisms. There are more than 1,000 different subspecies of *Salmonella* that are defined by unique PFGE patterns. Patients with *Salmonella* infections that closely match by PFGE pattern testing (called PFGE clusters) likely have a common exposure to an infectious organism.

Investigation and Results

In 2017, New Mexico identified 37 unique *Salmonella* PFGE clusters. Of these clusters, 74% of cases reported that raw meat was handled in the home (Figure 1) and 30% of the clusters were linked to raw meats (Figure 2). Three of the clusters contained uncooked chicken samples that matched the clinical samples by PFGE and 1 cluster contained ground beef samples that matched the clinical samples by PFGE. IDEB suspects beef for 2 clusters due to high proportion of beef consumption and chicken for 1 cluster due to high proportion of consumption compared to other foods. There were an additional 4 clusters where patients reported high consumption proportions for 2 different meats, however which meat was the source could not be determined. The infections that resulted from these clusters were likely caused by cross-contamination or undercooking meats. Two additional clusters were linked to shopping at Latin/Hispanic Markets, although a specific food item could not be identified.

Figure 1:

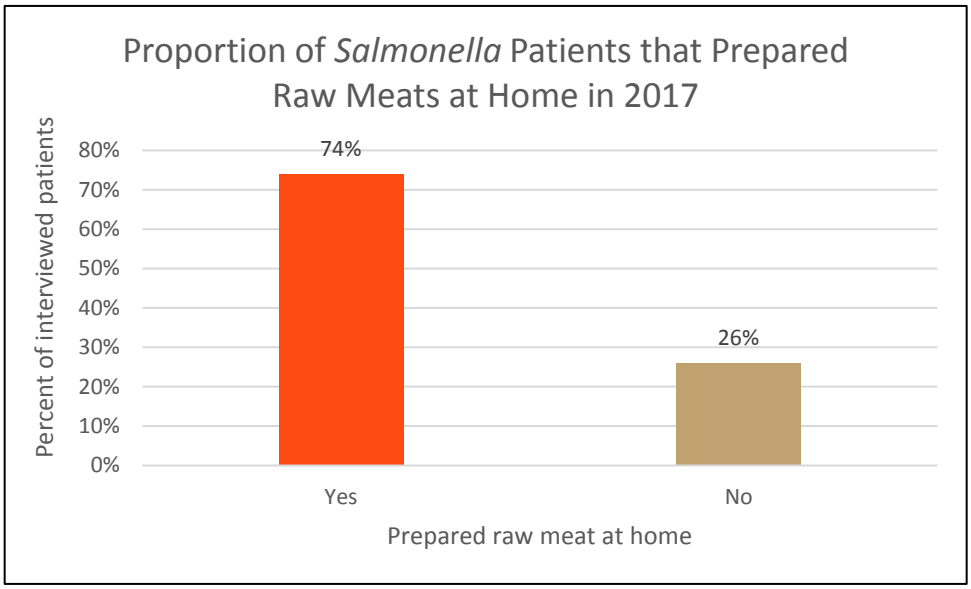
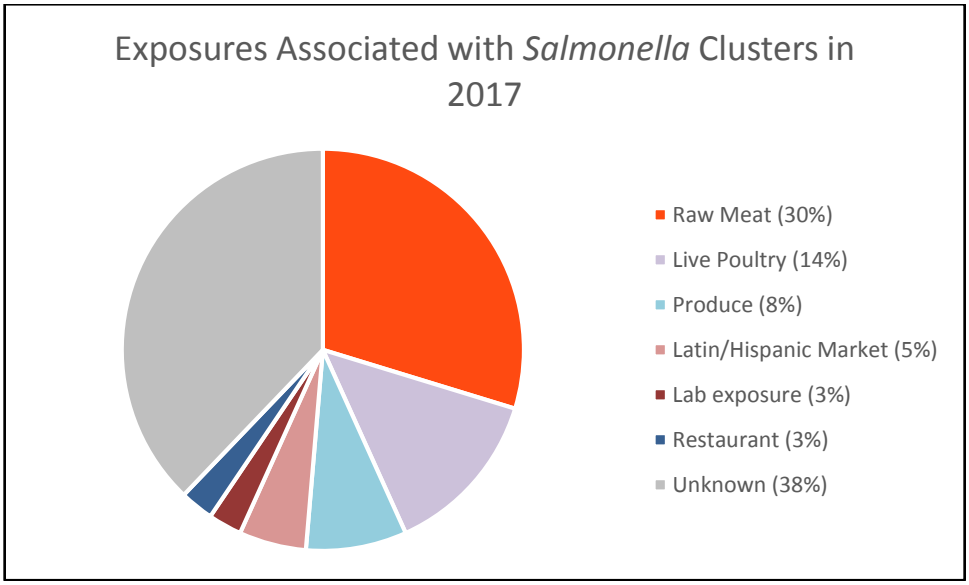


Figure 2:



One of the meat clusters was associated with meat that was prepared in Mexico. Although the cases did not visit the same states in Mexico, all of the interviewed cases reported consuming uncooked seafood a known risk factor for developing gastrointestinal illness. This serves as a reminder that people should avoid eating uncooked and undercooked meats while traveling.

Season and severity of illness were important factors for the raw meat clusters. The majority (56%) of infections occurred during the summer, and all the clusters began in June, July, or August. Of the people in the clusters, 29% required hospitalization. There were not any other notable characteristics associated with the meat clusters. Patients in the clusters evenly spanned age groups and sex.

Discussion

In 2017 IDEB identified 13 *Salmonella* clusters linked to raw meats were identified. Cluster cases were likely infected through cross-contamination of raw meats or undercooking meats. These clusters prompted IDEB to develop new action plans to prevent *Salmonella* infections. Increasing public awareness and education may be key to reducing infection rates. When a defined threshold is reached, NMDOH will issue a press release to increase public education and awareness on the dangers associated with improper handling and cooking of raw meats. IDEB is also working on developing community outreach and education programs for *Salmonella* and other foodborne illness prevention, one program is specifically marketed toward middle school students. The middle school foodborne illness prevention program will be designed to help young people adopt preventative behaviors that then become routine practice throughout their lifetimes.

Recommendations

Cross-contamination and transmission of *Salmonella* is preventable. The New Mexico Department of Health educates all identified patients to prevent future infections with the following recommendations.

- People should not eat raw or undercooked eggs, poultry, or beef because foods that originate from animals may be contaminated with *Salmonella*
- Poultry, beef (including hamburgers), and fish should be cooked thoroughly, and meat should not be pink in the middle
- Uncooked meats should be kept separate from produce and ready-to-eat foods
- Wash hands, cutting boards, counters, knives, and other utensils thoroughly after touching uncooked meats
- Produce should be thoroughly washed because it may have touched contaminated foods or items during growing, harvest, or sales
- Hands should also be washed before handling food and between handling different food items

Shigellosis Outbreak in Southeastern New Mexico, May 10, 2016-September 22, 2017

Holly Simpson, MSPH, CIC

Highlights

- *Shigella* is a highly contagious bacterial infection that causes approximately 500,000 infections a year in the United States.
- This outbreak was the largest outbreak of *Shigella* in New Mexico's history.
- The New Mexico Department of Health (NMDOH) worked in partnership with the Center for Disease Control and Prevention (CDC) to develop new guidance documents and educational materials in order to stop this outbreak.

Background

On May 10, 2016, NMDOH was notified via electronic laboratory reporting (ELR) of a positive *Shigella* culture in a pregnant 17-year-old female. A phone interview was conducted that same day, and it was determined that her siblings as well as the foster children living at her residence were also symptomatic. The children did attend daycare while they were symptomatic. The daycare was contacted, and recommendations were given to them, including exclusion of symptomatic children. IDEB worked with the daycare to review diaper logs and to conduct active surveillance for symptomatic children, it was determined that four other children were symptomatic with similar illness. The symptomatic children were taken to their primary care providers and were diagnosed with shigellosis. During the time the daycare in question was excluding symptomatic children, those children were taken to other daycares in the area or stayed at home, resulting in the spread of the disease to multiple daycares and the community at large. In addition, the foster children that were ill were transferred to different homes spreading the disease to their new foster families. This outbreak quickly became associated with multiple daycares, schools, and families across several southeastern counties (primarily occurring in Lea, Eddy, and Chaves counties). After over 17 months, there were 268 confirmed and probable cases of shigellosis.

Methods

Cases were identified and classified based on the Council of State and Territorial Epidemiologists (CSTE) classification:

CSTE Case Classifications:

- Probable – A case that meets the supportive laboratory criteria for diagnosis or a clinically compatible case that is epidemiologically linked to a case that meets the supportive or confirmatory criteria for diagnosis
- Confirmed – A case that meets the confirmed laboratory criteria for diagnosis

Clinical Criteria:

- An illness of variable severity commonly manifested by diarrhea, fever, nausea, cramps, and tenesmus.

Laboratory Criteria for Diagnosis:

- Supportive - Detection of *Shigella* spp. or *Shigella*/enteroinvasive *E. coli* (EIEC) in a clinical specimen using a culture-independent diagnostic testing (CIDT).
- Confirmatory – Isolation of *Shigella* spp. from a clinical specimen

Epidemiologic Linkage:

- Clinically compatible case that is epidemiologically linked to a case that meets the supportive or confirmatory laboratory criteria for diagnosis.

Confirmed and probable cases were originally identified via electronic laboratory records (ELR) that came in through NMDOH core surveillance. Attempts were made to contact all cases by either the local public health nurse or lead epidemiologist and interviewed. All symptomatic contacts were interviewed as well and were encouraged to see their primary care providers for testing and treatment. In the event someone did not have insurance or was unable to pay for a healthcare visit, the local public health nurses worked to ensure they received proper medication.

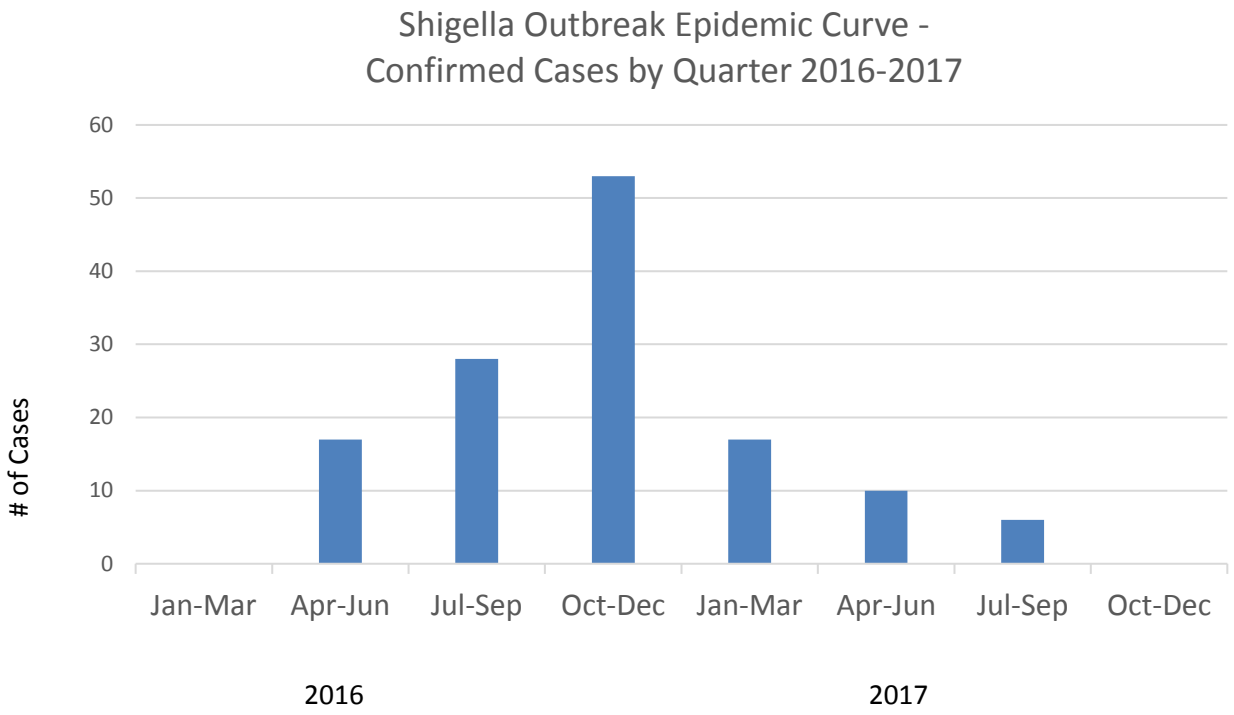
NMDOH partnered with Child Youth and Families Department (CYFD) early during the outbreak. CYFD licenses all daycare facilities in New Mexico and is responsible for the care of foster children in New Mexico. CYFD was a valuable partner during this outbreak. They were able to quickly reach out to all the daycares in the affected counties and provide educational materials that were developed by NMDOH, often in partnership with the CDC. In addition, they were able to ensure, and if needed, enforce all daycare recommendations to those daycares associated with this outbreak.

The lead epidemiologist and regional public health nurse spent extensive time educating the providers and the public about this outbreak. Conference calls with the CDC, in person meetings, and one-on-one meetings were conducted with local providers throughout this outbreak. Educational materials were distributed to both daycares, schools, and providers' offices. The regional public health nurse and lead epidemiologist also attended local events and educated the public on how *Shigella* is spread.

Results

Shigella sonnei 1603ML16-1 was the primary PFGE associated with this outbreak. This strain of *Shigella* was linked with a multi-state outbreak and had not been seen in New Mexico previously. Determining the baseline for this outbreak became complicated when the hospitals in that region switched from culture testing to culture independent testing (CIDT) in July 2016. Initially it was unclear if NMDOH was seeing more cases of *Shigella* because of the outbreak or because of the more frequent use of CIDT.

From May 10, 2016 to September 22, 2017, there were 268 confirmed and probable cases of *Shigella.* Of those, 152 (56.71%) were confirmed and 116 (43.28%) were probable cases. 146 (54.47%) of the cases were female and 122 (45.52%) were male. The average age for this outbreak was 13.86 years old and the median age was seven years old. Below is the epidemiologic curve of *Shigellosis* by onset date.



NMDOH was unable to contact or conduct interviews on 12 of 268 cases. Of those interviewed, 251 (93.66%) had diarrhea, 85 (31.71%) had bloody diarrhea, and 193 (72.01%) had fever.

Discussion

Shigellosis is a gram-negative bacillus in the family *Enterobacteriaceae* that causes an acute bacterial illness characterized by loose stools accompanied by fever, nausea, and sometimes toxemia, vomiting, cramps, and tenesmus. Stools often contain blood and mucus. The incubation period varies from 1 to 7 days (usually 1-3 days). Possible complications from Shigellosis include post-infectious arthritis, blood stream infections (although rare), seizures, and hemolytic-uremic syndrome (a severe kidney disease).

To help stop the spread of this outbreak, robust prevention measures and action were put in place; including five press releases, eight letters to daycares and schools, four Health Alert Network (HAN) messages, developing educational materials, conducting weekly conference calls, meeting in-person with local providers in partnership the CDC, conducting conference calls with all pediatricians in the affected counties in partnership with the CDC, and development of new protocols for middle and high school children. This outbreak continued to spread despite these efforts. Over the course of 17 months, there were four peaks that occurred. Transmission during the first peak occurred mostly with daycares, the moving of foster children between families, and spreading disease within households. Transmission during the second peak occurred mostly from transferring symptomatic foster children to various foster homes, daycares, transmission between household family members, and water activities (such as pools and splash pads). Transmission during the third peak occurred mostly in daycares, schools (elementary, middle, and high schools), sport activities, as well as transmission between household contacts. Transmission during the fourth peak occurred primarily between daycares and household family members.

This outbreak was further complicated by the socio-economic status of the region. The majority of adults were unable to take time off of work to stay at home with their symptomatic children. This resulted in symptomatic children continuing to attend daycare and school or staying with friends and family members, thereby transmitting the illness to new households. Some providers refused to conduct testing and/or provide antibiotics to symptomatic children and wrote notes to patients to return to work/school/daycare while still symptomatic, resulting in further spread of the outbreak.

Recommendations for daycares:

1. Daycares should be aware that outbreaks of shigellosis in child care centers occur and can be difficult to control, particularly among groups of young children who are not yet toilet trained.
2. Management of isolated cases
    a. All symptomatic persons who have *Shigella* isolated or detected from their stool should be given antimicrobial therapy to prevent further transmission. They also should be excluded until the diarrhea has resolved, and there are two consecutive negative fecal samples or rectal swabs taken at least 24 hours apart, and at least 48 hours after completion of antibiotic therapy.
    b. When a case of shigellosis occurs among a child care center attendee or staff member, stool specimens from other symptomatic attendees and staff members should be cultured. Stool specimens from household contacts who have diarrhea should also be cultured.
    c. Daycares should notify parents or guardians in writing of a case of *Shigella* in the facility (Subsection D of 8.16.2.20 NMAC).
3. The child care center should review its infection control protocols with staff, and emphasize the following:
    a. Standard and enteric precautions should be followed to include strict hand washing routines for staff and children, and routines for handling fecal contaminated materials.
        ✓ Wash hands with soap and warm water. Waterless hand sanitizers are acceptable if hands are not visibly soiled.
    b. Frequently mouthed objects should be cleaned and sanitized daily.
        ✓ Items should be washed with dishwashing detergent and water, then rinsed in freshly prepared (daily) household bleach solution (dilute 1 cup bleach in 9 cups of water).
    c. Food handling and diaper changing areas should be physically separated and cleaned daily.
    d. Diaper changing surfaces should be nonporous and cleaned with a freshly prepared (daily) household bleach solution.
        ✓ Cleaning of diaper changing surfaces after each use is required;
        ✓ Soiled diapers should be disposed of properly.
        ✓ Gloves should be worn when changing diapers.
        ✓ Child care facilities should maintain a system of stool monitoring (i.e., diaper logs) for all infants and children who are not toilet trained.
    e. Access to shared water play areas should be temporarily suspended during an outbreak.
    f. Animals in the child care center with diarrhea should be isolated from children and taken to a veterinarian for diagnosis and treatment.

Recommendations for school-age children:

1. Exclude laboratory confirmed or symptomatic cases (staff or student). Cases may not return to school for 48 hours after symptoms resolve.
   a. Laboratory confirmation includes PCR and culture testing.
   b. Symptoms for *Shigella* include diarrhea, fever, nausea, and sometimes vomiting, cramps, and toxemia (blood poisoning from toxins produced by the bacteria). Stools often contain blood and mucus. Incubation period varies from 1 to 7 days but is typically 1-3 days.
2. Symptomatic or confirmed cases should also be excluded from afterschool programs. Cases may not return to afterschool programs for 48 hours after symptoms resolve.
3. Identify symptomatic (potential source or secondary) cases in the school.
4. Reinforce and improve hand washing.
   a. Students and staff must wash their hands after each visit to the restroom and before eating.
   b. If the laboratory-identified case is in a younger grade, hand washing should be supervised.
   c. High-touch games (such as face painting and Play-Doh®) should be discontinued until there are no new cases for at least one week.
5. Increase cleaning of high contact surfaces in the affected rooms using EPA-registered disinfectant.
6. Meet with school staff to ensure knowledge of means of transmission and prevention/control measures for shigellosis.
   a. Ensure that the school has adequate stock of hand washing supplies and appropriate environmental cleaning products.
   b. Bathrooms should be monitored for cleanliness and cleaning should be increased.

Recommendations for persons with *Shigella* infections:

1. Wash your hands frequently, especially after using the bathroom, changing a diaper, or before preparing and/or eating food.
2. Promptly clean possible contaminated surfaces with household chlorine bleach-based cleaners.
3. Wash soiled clothing and linens.
4. Avoid food or water from sources that may be contaminated.
5. Do not send sick children to school, daycare, or local pool and splash pads if they have persistent diarrhea.

References

1. Scallan E, Hoekstra RM, Angulo FJ, Tauxe RV, Widdowson MA, Roy SL, Jones JL, Griffin PM. Foodborne illness acquired in the United States--major pathogens. Emerg Infect Dis. 2011;17(1):7-15.
2. American Academy of Pediatrics. Red Book: Report of the Committee on Infectious Diseases. 2015. 706-709.

Appendix A: Summary of Select Notifiable Disease, New Mexico, 2017

	Number	Rate* (per 100,000 pop.)
Foodborne Diseases		
Botulism, foodborne	0	0.0
Botulism, infant	0	0.0
Botulism, wound	1	0.0
Campylobacteriosis	788	37.5
Cholera	0	0.0
Cryptosporidiosis	122	5.8
Cyclosporiasis	4	0.2
Giardiasis	80	3.8
Hepatitis A, acute	4	0.2
Listeriosis	2	0.1
Salmonellosis	353	16.8
Shiga toxin-producing *Escherichia coli* (STEC)	42	2.0
Shigellosis	131	6.2
Typhoid fever (*Salmonella typhi*)	1	0.0
Vibrio parahaemolyticus	0	0.0
Vibrio species, non-toxigenic	3	0.1
Yersiniosis	10	0.5
Vaccine Preventable Diseases		
Measles (Rubeola)	0	0.0
Mumps	1	0.0
Pertussis	197	9.4
Tetanus	0	0.0
Varicella (Chickenpox)	71	3.3
Bacterial Invasive Diseases		
Group A *Streptococcus*, invasive	318	15.1
Group B *Streptococcus*, invasive	255	12.1

Haemophilus influenzae, invasive	48	2.3
Necrotizing fasciitis	5	0.2
Neisseria meningitides (meningococcal disease)	2	0.1
Streptococcus pneumoniae, invasive	317	15.1
Zoonotic Diseases		
Brucellosis	0	0.0
Dengue virus infection	0	0.0
Lyme disease	3	0.1
Hantavirus pulmonary syndrome	5	0.2
Malaria	1	0.0
Plague	4	0.2
Tularemia, human	5	0.2
Rabies, animal	13	0.6
West Nile virus neuroinvasive disease	20	1.0
West Nile virus non-neuroinvasive disease	13	0.6
Bloodborne Diseases		
Hepatitis B virus infection, chronic	39	1.9
Hepatitis B virus infection, acute	1	0.0
Hepatitis C virus infection, chronic or resolved	Data unavailable	n/a
Hepatitis C virus infection, acute	32	1.5
Respiratory Diseases		
Coccidioidomycosis	23	1.1
Legionellosis	13	0.6

*****All rates rounded to the tenths.

Appendix B: Acronyms

ABCs	Active Bacterial Core surveillance
CDC	Centers for Disease Control and Prevention
CIDT	Culture-independent Diagnostic Testing
CSTE	Council of State and Territorial Epidemiologists
CYFD	Child Youth and Families Department
ELR	Electronic Laboratory Reporting
ESBL	Extended Spectrum Beta-lactamase
GAS	Group A *Streptococcus*
HAN	Health Alert Network
ICAR	Infection Control Assessment and Response
IDEB	Infectious Disease Epidemiology Bureau
LTCF	Long-term Care Facility
MIC	Minimum Inhibitory Concentration
NMAC	New Mexico Administrative Code
NMDOH	New Mexico Department of Health
NMEDSS	New Mexico Electronic Disease Surveillance System
NM IBIS	New Mexico Indicator-Based Information System
PFGE	Pulsed-field Gel Electrophoresis
SLD	Scientific Laboratory Division
STEC	Shiga-toxin producing *Escherichia coli*
UTIs	Urinary Tract Infections
WGS	Whole Genome Sequencing

Appendix C: Methods

Standard Council of State and Territorial Epidemiologists (CSTE) case definitions are used by NMDOH to classify the infectious diseases in this report.

Rates were calculated for January 1, 2017 through December 31, 2017 and displayed as numbers of cases per 100,000 population. The numerators represent the number of reported cases that were confirmed or, for some diseases, the number of confirmed and probable cases. The data source used to obtain the numerators was the New Mexico Electronic Disease Surveillance System (NMEDSS). Denominator data are based on 2016 population estimates available in the New Mexico Indicator-based Information System (NM-IBIS).

Appendix D: New Mexico Notifiable Diseases

NOTIFIABLE DISEASES OR CONDITIONS IN NEW MEXICO
7.4.3.13 NEW MEXICO ADMINISTRATIVE CODE

ALL REPORTS INCLUDING ELECTRONIC LABORATORY REPORTS OF NOTIFIABLE CONDITIONS MUST INCLUDE:

1. The disease or condition being reported;
2. Patient's name, date of birth/age, gender, race/ethnicity, address, patient's telephone numbers, and occupation;
3. Physician or licensed healthcare professional name and telephone number; and
4. Healthcare facility or laboratory name and telephone number, if applicable.

Laboratory or clinical samples for conditions marked with [*] are required to be sent to the Scientific Laboratory Division.

EMERGENCY REPORTING OF DISEASES OR CONDITIONS

The following diseases, confirmed or suspected, require **immediate reporting** by telephone to Epidemiology and Response Division at 505-827-0006.

Infectious Diseases

- Anthrax*
- Avian or novel influenza*
- Bordetella species (including pertussis)*
- Botulism (any type)*
- Cholera*
- Diphtheria*
- *Haemophilus influenzae* invasive infections*
- Measles
- Meningococcal Infections, invasive*
- Middle East Respiratory Syndrome
- Plague*
- Poliomyelitis, paralytic and non-paralytic
- Rabies
- Rubella (including congenital)
- Severe Acute Respiratory Syndrome (SARS)*
- Smallpox*
- Tularemia*
- Typhoid fever*
- Viral hemorrhagic fever
- Yellow fever

Other Conditions

- Acute illnesses or conditions of any type involving large numbers of persons in the same geographic area
- Illnesses or conditions suspected to be caused by the intentional or accidental release of biologic or chemical agents*
- Severe smallpox vaccine reaction
- Suspected foodborne illness in two or more unrelated persons*
- Suspected waterborne illness or conditions in two or more unrelated persons*
- Other illnesses or conditions of public health significance

Infectious Diseases in Animals

- Anthrax
- Plague
- Rabies
- Tularemia

ROUTINE REPORTING OF DISEASES OR CONDITIONS

Infectious Diseases (Report case within 24 hours to Epidemiology and Response Division by fax at 505-827-0013 or by phone at 505-827-0006; or contact the local health office)

- Arboviral disease
- Brucellosis
- *Campylobacter* infections*
- Chikungunya virus disease
- *Clostridium difficile**
- Coccidioidomycosis
- Colorado tick fever
- Cryptosporidiosis
- Cysticercosis
- Cyclosporiasis
- Dengue
- *E. coli* 0157:H7 infections*
- *E. coli* , shiga-toxin producing (STEC) infections*
- Encephalitis, other
- Giardiasis
- Group A streptococcal invasive infections *
- Group B streptococcal invasive infections*
- Hansen's Disease/Leprosy
- Hantavirus pulmonary syndrome
- Hemolytic uremic syndrome
- Hepatitis A, acute
- Hepatitis B, acute or chronic
- Hepatitis C, acute or chronic
- Hepatitis E, acute
- Influenza-associated pediatric death
- Influenza, laboratory confirmed hospitalization only
- Legionnaires' disease
- Leptospirosis
- Listeriosis*
- Lyme disease
- Malaria
- Mumps
- Necrotizing fasciitis*
- Psittacosis
- Q fever
- Relapsing fever
- Rocky Mountain spotted fever
- Salmonellosis*
- Shigellosis*
- St. Louis encephalitis infections
- *Streptococcus pneumonia* invasive infections*
- Tetanus
- Trichinellosis
- Toxic shock syndrome
- Varicella
- *Vibrio* infections*
- West Nile Virus infections
- Western equine encephalitis infections
- *Yersinia* infections*

Infectious Diseases in Animals (Report case within 24 hours to Epidemiology and Response Division at 505-827-0006; or contact the local health office).

- Arboviral, other
- Brucellosis
- Psittacosis
- West Nile Virus infections

Tuberculosis*.

Report suspect or confirmed cases to NM department of health tuberculosis program by fax at 505-827-0163 or by phone at 505-827-2471 or 505-827-2473: active disease within 24 hours; infection within 72 hours.

Sexually Transmitted Diseases

Report to Infectious Disease Bureau - STD Program, NM Department of Health, P.O. Box 26110, Santa Fe, NM 87502-6110, Fax 505-476-3638; or call 505-476-3636.

- Chancroid
- *Chlamydia trachomatis* infections
- Gonorrhea
- Syphilis

HIV (Human Immunodeficiency Virus) and AIDS (Acquired Immunodeficiency Syndrome)
Report to HIV and Hepatitis Epidemiology Program, 1190 St. Francis Dr., N1350, Santa Fe, NM 87502, fax 505-476-3544 or call 505-476-3515.

All CD4 lymphocyte tests (count and percent)
All confirmed positive HIV antibody tests (screening test plus confirmatory test)
All HIV genotype tests
All positive HIV cultures
All tests for HIV RNA or HIV cDNA (viral load tests)
All tests to detect HIV proteins
Opportunistic infections, cancers, and any other test or condition indicative of HIV or AIDS

Occupational Illness and Injury
Report to Epidemiology and Response Division, NM Department of Health, P.O. Box 26110, Santa Fe, NM 87502-6110; or call 505-827-0006.

Asbestosis
Coal worker's pneumoconiosis
Hypersensitivity pneumonitis
Mesothelioma
Noise induced hearing loss
Occupational asthma
Occupational burn hospitalization
Occupational injury death
Occupational pesticide poisoning
Occupational traumatic amputation
Silicosis

Other illnesses or injuries related to occupational exposure

Health Conditions Related to Environmental Exposures and Certain Injuries
Report to Epidemiology and Response Division, NM Department of Health, P.O. Box 26110, Santa Fe, NM 87502-6110; or call 505-827-0006.

Environmental Exposures
All pesticide poisoning
Arsenic in urine greater than 50 micrograms/liter
Carbon monoxide poisoning
Infant methemoglobinemia
Lead (all blood levels)
Mercury in urine greater than 3 micrograms/liter or
Mercury in blood greater than 5 micrograms/liter
Uranium in urine greater than 0.2 micrograms/liter or 0.2 micrograms/gram creatinine

Other suspected environmentally-induced health conditions

Injuries
Drug overdose
Traumatic brain injuries
Firearm injuries
Fracture due to fall among older adults

Adverse Vaccine Reactions
Report to Vaccine Adverse Events Reporting System, http://www.vaers.hhs.org. Send copy of report to Immunization Program Vaccine Manager, NM Department of Health, P.0. Box 26110, Santa Fe, NM 87502-6110; fax 505-827-1741.

Healthcare-associated infections
Acute care hospitals only report through NHSN and confer rights to NM department of health.
Central line-associated bloodstream infections (CLABSI) events
Clostridium difficile infections

Report all infections, including non-healthcare-associated, within 24 hours to epidemiology and response division by fax at 505-827-0013 or by phone at 505-827-0006.
carbapenem-resistant enterobacteriaceae*;
carbapenem-resistant pseudomonas aeruginosa*.

Cancer
Report to NM DOH designee: New Mexico Tumor Registry, University of New Mexico School of Medicine, Albuquerque, NM 87131. Report all malignant and in situ neoplasms and all intracranial neoplasms, regardless of the tissue of origin.

Human Papillomavirus (HPV)
Report to NM DOH designee: Laboratories report the following tests to the New Mexico HPV Pap Registry, 1816 Sigma Chi Rd NE, Albuquerque, NM 87106, phone 505-272-5785 or 505-277-0266.

Papanicolaou test results (all results)
Cervical, vulvar and vaginal pathology results (all results)
HPV test results (all results)

Birth Defects
Report to Epidemiology and Response Division, NM Department of Health, P.O. Box 26110, Santa Fe, NM 87502-6110; or call 505-827-0006.

All birth defects diagnosed by age 4 years, including:
Defects diagnosed during pregnancy
Defects diagnosed on fetal deaths
Defects found in chromosome testing on amniotic fluid, chorionic villus sampling and products of conception for Trisomy 13, Trisomy 18 and Trisomy 21

Genetic and Congenital Hearing Screening
Report to Children's Medical Services, 2040 S. Pacheco, Santa Fe, NM 87505; or call 505-476-8868.

Neonatal screening for congenital hearing loss (all results)
Suspected or confirmed congenital hearing loss in one or both ears
All conditions identified through statewide newborn genetic screening

newborn critical congenital heart defects screenings (all results)

For details online of 7.4.3 NMAC see: http://www.nmcpr.state.nm.us/nmac/parts/title07/07.004.0003.htm

List of Notifiable Diseases/Conditions in New Mexico revised June 15, 2016