

Foreword

In medical school in the mid 1970's, I began clinical rotations with two assumptions: first, that since people seemed to be having smaller families, there wouldn't be enough children in the future to make pediatrics a viable career; and second, that given vaccines and all the marvelous antibiotics we'd just studied, infectious disease, although interesting, was going to be a quaint and dying discipline.

Fortunately I was wrong about pediatrics; caring for infants and children has been a very interesting and rewarding career, clinically and in public health. Texas actually needs many more pediatricians and other primary care providers, not fewer.

Unfortunately, I was wrong about infectious disease. Although immunization has made incredible inroads against vaccine preventable diseases, those illnesses still crop up, sometimes with fatal results. Even at lower numbers, "normal" childhood illnesses such as measles and pertussis are not benign, a lesson that current generations have forgotten or have not experienced. Foodborne illnesses still affect thousands of Texans. Influenza remains a leading killer, especially when novel strains develop and spread. Emerging infectious diseases, far from being "already all discovered", continue to present major challenges. Possibly the most devastating of the new pathogens, Human Immunodeficiency Virus (HIV), has taken a heartbreaking toll across the globe. We have also made well-known organisms more dangerous with our marvelous antibiotics. Multiple drug resistant organisms chip away at the arsenal of effective medications; and, unfortunately, there is the potential for use of some infectious agents as weapons.

Infectious disease did not go away.

Disease reporting is a major tool in following the burden of pathogens over time, identifying targets for prevention efforts, and evaluating the success of those interventions. *Epidemiology in Texas 2007* documents surveillance of infectious diseases in 2007, other than tuberculosis, HIV, and sexually transmitted disease (STD). It includes links to reports on the latter conditions as well as links to epidemiological information on non-infectious reportable conditions. This document also includes reports of specific outbreaks and other events of interest at the local and state level.

The document's content represents the efforts of hundreds of public health workers and clinical providers across Texas, at local and state levels. These include epidemiologists and technicians; public health clinicians; food safety, facility safety, and sanitation workers; laboratorians, private and public; providers, also both private and public, who identify and report diseases to public health; providers and entities that participate in ongoing disease surveillance, and the support and auxiliary staff who help keep them all going. It also represents the contributions of members of the public whose cooperation, information, and insight into events make it possible for disease investigations to be successful.

The teamwork and contributions of these individuals and entities is invaluable and much appreciated, and we look forward to continued collaboration. We hope that you will find these data useful.

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Reports



Botulism Outbreak Associated with a Commercially Canned Product, the Texas Perspective, 2007

Botulism is a bacterial disease caused by *Clostridium botulinum*, a spore-forming organism. The spores themselves are harmless. However, under anaerobic conditions and in the absence of other microorganisms, botulism spores can germinate and begin producing and releasing botulinum toxin. Foodborne botulism occurs after a person ingests preformed toxin in a food item. The incubation period for botulism ranges from 6 hours to 10 days, usually 12-36 hours. The toxin paralyzes muscles, and the initial symptoms commonly are blurred and/or double vision, slurred speech, and drooping eyelids. Flaccid paralysis is symmetric and descends rapidly beginning at the shoulders followed by upper arms, lower arms, thighs, then calves. Later symptoms often include paralysis of the respiratory muscles, as well as most of the skeletal muscles. An antitoxin, produced in horses, prevents further progression of the condition but cannot reverse the symptoms. Recovery is usually complete or nearly so, but takes several months.

Foodborne Outbreak

On a Saturday evening in early July of 2007, a hospital clinician in a mid-sized West Texas city called the physician-on-call at the Texas Department of State Health Services about two suspected cases of botulism. The patients were pre-teen and teenaged siblings. Both had onset of neurological symptoms during the previous week. The pre-teen patient had been admitted to this hospital a few days earlier, with progressing symptoms that necessitated mechanical ventilation. The teen patient had been admitted to a smaller hospital near the family's home, but none of the staff in either hospital was aware that there were two siblings with similar symptoms. The teen patient was transferred to the larger hospital because his condition had worsened, and he was also placed on a ventilator. When the physicians saw the similarities between the siblings' symptoms, they determined that botulism was a more likely diagnosis for both than any of the multiple degenerative neurological conditions they were considering.

The lead DSHS foodborne disease epidemiologist immediately called the DSHS regional office, DSHS food regulatory partners, DSHS laboratory, hospital physicians, and CDC. The regional epidemiologist went to the hospital and interviewed the two patients and their mother, who also had mild symptoms of botulism. Serum and stool specimens were collected for all three family members, and detailed food histories were taken.

The only suspicious food item that the three family members had consumed was a commercially canned hot dog chili sauce, eaten on buns with hot dogs. These had been eaten 9 days earlier, 1-2 days before the onset of symptoms. No leftover chili was available for testing, but an unopened can purchased at the same time was collected. Botulinum antitoxin was released by the CDC, sent to the hospital, and administered to the two siblings. Clinical specimens obtained from the three family members were negative for botulism, as was the chili in the unused can.

A week later, in Indiana, a married couple was hospitalized with suspected botulism. They had some leftover chili sauce in their refrigerator, and an empty can in their recycling bin. The can of chili was of the same brand and type that the Texas family had reported eating. Clinical specimens from both patients demonstrated botulinum toxin activity. The leftover chili also grew out *Clostridium botulinum*, and demonstrated *botulinum* toxin type A activity, but the empty can was negative for botulism.

The FDA issued a recall for the hot dog chili sauce, and also determined that the can purchased by the Indiana couple had been produced just 5 hours after the can purchased by the Texas family. Eventually, the recall was expanded to include 91 types of canned foods produced at the same plant. The company had reserved 17 cans of the hot dog chili sauce produced on the same day as the cans associated with illnesses in Texas and Indiana. These were held because of concerns that there had been production deficiencies on those dates that could have allowed botulism spores to germinate in the cans and produce toxin. After the recall, these cans were tested and 16 demonstrated *botulinum* toxin A activity. The company closed to conduct an investigation and recall products from 8,500 retail stores.

The three Texas case-patients in the 2007 outbreak made near-complete recoveries after several months of hospitalization and rehabilitation. Besides the two Indiana cases, only one additional case in California has been linked to the chili hot dog sauce.

Of interest, DSHS learned that the pre-teen Texas patient, who was the most seriously ill of the three, had consumed 6 chili hot dogs. Her brother, who was

not quite as ill, ate 3 chili hot dogs. Their mother, who had only mild symptoms, consumed just one chili hot dog. These findings show a clear dose-response, with severity of symptoms being correlated with the amount of contaminated food eaten.

Foodborne botulism cases in the US are usually associated with home-canned foods. The commercial canning process used today was, in fact, developed and implemented as a means of preventing botulism cases. This effort has been very effective, and the last botulism outbreak associated with a commercially canned product occurred more than 45 years ago. A single suspected case of foodborne botulism triggers an immediate investigation, as the public health implications are huge.

Botulism Surveillance

There are at least three other kinds of botulism, but none of these are public health threats even though they are just as serious for the patients as foodborne botulism. *Infant botulism* occurs in children < 1 year of age. Infants take at least several months to acquire the beneficial bacteria that normally colonize the human colon. These organisms easily overgrow and inhibit the germination of any botulism spores that might be ingested. Affected babies present with a "floppy baby" syndrome, and often

require ventilatory support. The antitoxin for babies is produced in humans, usually laboratorians who commonly work with the organism. *Wound botulism* occurs in persons who have a puncture or other closed wound which results in low oxygen conditions locally. Botulism spores germinate in the wound and produce toxin that circulates around the body. Over the past decade or so, wound botulism cases have been detected in injection drug users, who commonly use nonsterile needles that can cause abscesses. Other botulism types include a form of colon colonization that can occur in adults who have a procedure or take antibiotics that clear the normal microbes from the colon, enabling botulism spores to germinate and produce toxin in the body. The case definitions and numbers of cases of the different kinds of botulism are given in Figure 1 on page 11 and Table 1 below.

Reference:

CDC. Botulism Associated with Commercially Canned Chili Sauce --- Texas and Indiana, July 2007. MMWR. 2007;56 (Dispatch):1-3.

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(512) 458-7111, extension 6358

Table 1. Number of reported cases of botulism in Texas, 2000-2009

Year	Type of Botulism				Total
	Foodborne	Infant	Wound	Other	
2000	0	8	0	0	8
2001	16	4	0	0	20
2002	1	1	1	1	4
2003	0	1	1	2	4
2004	0	3	1	0	4
2005	0	1	0	1	2
2006	0	5	1	0	6
2007	3	4	0	0	7
2008	0	8	1	1	10
2009	0	4	0	0	4
Average	2.0	3.9	0.5	0.5	6.9

Figure 1.

Botulism types with case definitions

Type of botulism	Laboratory confirmation criteria	Case classification
Foodborne	Detection of botulinum toxin in serum, stool, or patient's food; or Isolation of <i>Clostridium botulinum</i> from stool	Confirmed: a clinically compatible case that is laboratory confirmed or that occurs among persons who ate the same food as persons who have laboratory-confirmed botulism Probable: a clinically compatible case with a history of ingestion of a food item known to carry a risk for the botulism toxin
Infant	Detection of botulinum toxin in stool or serum; or Isolation of <i>Clostridium botulinum</i> from stool	Confirmed: a clinically compatible case that is laboratory-confirmed, occurring in a child aged less than 1 year
Wound	Detection of botulinum toxin in serum; or Isolation of <i>Clostridium botulinum</i> from wound	Confirmed: a clinically compatible case that is laboratory confirmed in a patient who has no suspected exposure to contaminated food and who has a history of a fresh, contaminated wound during the 2 weeks before onset of symptoms
Other	Detection of botulinum toxin in clinical specimen; or Isolation of <i>Clostridium botulinum</i> from clinical specimen	Confirmed: a clinically compatible case that is laboratory confirmed in a patient aged greater than or equal to 1 year who has no history of ingestion of suspect food and has no wounds

Leishmaniasis – Emergence of Endemic Cutaneous Infections in Collin and Denton Counties, Texas, 2005-2007

Leishmaniasis is a parasitic vector-borne disease which is occasionally found in the most southern regions of Texas, but unusual in North Texas. Prior to 2005, endemic *Leishmania mexicana* cases reported in Texas were identified primarily among residents of Central and South Texas, or persons with travel history to South Texas. The only indigenous leishmaniasis infections that have been documented north of San Antonio are two cases in Brown County (1988 and 1992) and one in Shackelford County (1994) (1,2). Findings from two investigations provide additional documentation of the transmission of *L. mexicana* in North Texas and document the presence of *Lutzomyia anthropora*, a sand fly and likely vector of *L. mexicana* in one of the counties of residence.

Life Cycle and Reservoir

Leishmania is an obligate intracellular parasite. The flagellate form exists in the macrophages of a vertebrate host. In the Americas, flies in the *Lutzomyia* family ingest the parasites during blood meals, and the parasite may be transmitted via the proboscis during subsequent blood meals.

The majority of cases of human leishmaniasis in the Americas are found from Southern Mexico through Argentina. Although three complexes (*L. mexicana*, *L. braziliensis* and *L. peruviana*) are responsible for the cases of cutaneous leishmaniasis that occur in North and South America, only *L. mexicana* has been identified in the United States (3). The distribution of *L. mexicana* extends from Brazil through Central America, Mexico and southern Texas. *L. mexicana* is characterized by cutaneous lesions that are usually found on the face or extremities. *L. mexicana* may spread to the lymph nodes, although this is rare. Symptoms begin as itchy erythematous lesions, which develop into papules and then into painless ulcers. While lesions generally resolve on their own within weeks or months, they may persist more than a year, and can cause significant scarring. The disease process may be altered in persons with weakened immune systems, such as those living with HIV/AIDS or persons undergoing immune-suppressing therapies. Incubation varies from one week to several months.

The reservoir for *L. mexicana* in South and West Texas is most likely *Neotoma micropus*, also known as the Southern Plains Woodrat, and it is transmitted from animal to animal via various species of sand fly.

This species of woodrat prefers to construct its home out of sticks in thickets of cacti, mesquite, or other thorny brush. Humans are incidental hosts in the leishmaniasis life cycle, and living in close proximity to *N. micropus* habitat has been identified as a risk factor. In 1990, *L. mexicana* was isolated from *N. micropus* in Zavala County (4), and during 1998-2000 *L. mexicana* was isolated from multiple *N. micropus* specimens in Bexar County (5).

Denton and Collin Counties have been thought to be outside the range of *N. micropus*, although it is possible that range has extended. However, these counties are within range of the Eastern Woodrat, *Neotoma floridana*. McHugh et al (6) isolated *L. mexicana* from an Eastern Woodrat collected in Grimes County. The Eastern Woodrat lives in borrows at the base of oak and other trees or around fallen logs. Given the ecology of Denton and Collin Counties, the Eastern Woodrat may be the reservoir for *L. mexicana* in North Central Texas. Further research is needed to confirm this.

The most likely vector for leishmaniasis in Texas is *Lu. anthropora*. While a number of *Lutzomyia* species exist in Texas, to our knowledge *L. mexicana* has only been isolated from *Lu. anthropora* which is a nest associate of *Neotoma* species. Similar to mosquitoes, female sand flies typically feed at dawn and dusk and are susceptible to DEET. Transmission to humans is most likely to occur in settings in which humans encroach on enzootic areas. This encroachment results in ecological changes, disrupting the disease cycle and modifying the epidemiology of the disease.

Surveillance Summary

From 2005 through 2007, the Texas Department of State Health Services Region 2/3 became aware of 13 cases of cutaneous leishmaniasis in the North Central Texas area (Table 1). Ages ranged from 8 to 82 years and 7 of the 13 were female. The cases all resided in counties on the periphery of the Dallas-Fort Worth Metroplex. This distribution is consistent with previous epidemiological reports of leishmaniasis in Texas, which found residences to be located in either rural or suburban areas (1).

In 2008, Wright et al reported a cluster of 9 cases in the Dallas Fort Worth (DFW) Metroplex and surrounding counties (7). Eight of these cases are included in Table 1.

During 2007, the first year leishmaniasis was reportable in Texas, 9 cases were reported statewide in the following counties: Collin-1, Denton-1, Ellis-2, Grayson-1, Hill-1, Tarrant-2, Travis-1.

Table 1. Reported cutaneous leishmaniasis infections, Health Service Region 2/3, 2005-2007 Case Reports

Year	County	Gender	Location of lesion
2005	Collin	Female	Face, Arm
2005	Ellis	Male	Arm
2005	Fannin	Male	Wrist
2006	Collin	Female	Forehead
2006	Collin	Female	Nose
2006	Grayson	Female	Eyelid
2006	Wise	Male	Abdomen
2007	Denton	Female	Cheek
2007	Ellis	Female	Chest
2007	Ellis	Male	Back
2007	Grayson	Female	Wrist
2007	Tarrant	Female	Face
2007	Tarrant	Male	Leg

Case 1

In December 2005, a young female resident of Collin County presented with three lesions, two on her face and one on her upper arm. Medical care had included topical and oral antibiotics, topical antifungals, and topical steroids, none of which induced healing. Biopsy in April 2006 yielded a diagnosis of *Leishmania* parasitosis. *L. mexicana* was ultimately identified by culture at the U.S. Centers for Disease Control and Prevention (CDC) and by polymerase chain reaction (PCR) testing at the University of the Incarnate Word in San Antonio.

Case 2

In May 2007, the Denton County Health Department learned of a case of cutaneous leishmaniasis in an elderly woman with symptom onset in March 2007. The patient had one facial lesion. CDC confirmed *L. mexicana* via biopsy, culture, and PCR testing. The patient reported having resided in a rural area of Ellis County until November 2006, raising the possibility the disease was contracted there.

Both cases lived in areas of recent housing development. The Collin County resident lived near an area of hardwood forest. A site visit revealed evidence of recently inhabited woodrat nests in an area in which she often played. The Denton County resident’s home was

within one block of pasture area, although she reported little outdoor activity. Neither person remembered a bite. In both counties, CDC light traps were used to attempt to collect sandflies. None were caught in Denton County. In Collin County, *Lu. anthrophora* and *Lu. vexator*, both of which can be vectors for leishmaniasis, were collected at the child’s residence. Unfortunately not enough sand flies were collected to perform testing for *Leishmania*.

Suburbanization and Leishmaniasis

Collin and Denton Counties are located on the rural-urban interface of the Dallas-Fort Worth metropolitan area. Both counties experienced significant population growth and encroachment of new home building into areas that are potential vector and reservoir habitat during this time frame, which may explain the emergence of leishmaniasis in these counties. As population expands into formerly uninhabited area, habitats are disturbed, exposing humans to new pathogens. Suburbanization in particular has been shown to be a significant risk factor for leishmaniasis. New construction in previously undeveloped areas allows for new contact between humans and pathogens. The construction of sub- and ex-urban neighborhoods is generally associated with significant habitat destruction as areas are bulldozed for building.

Our investigations document the expansion of the range of *L. mexicana* into North-central Texas, the presence of the sandfly vector in North-central Texas, and the likely interaction of the vector with additional species of reservoir, the Eastern Woodrat. Surveillance for changes in leishmaniasis epidemiology should further define the geographic distribution of the disease in Texas. Previous studies have identified the parasite in both the vector and the reservoir in South Texas, but further research is needed in North-central Texas to delineate the natural epidemiology of transmission between vector and reservoir.

Reporting and Prevention

In 2007, leishmaniasis was made a notifiable condition in Texas. Clinicians should maintain vigilance in the identification of new cases. Confirmatory tests should include biopsy and PCR testing. Persons moving into new housing areas should be aware of the risk of disease and are encouraged to protect themselves from sand fly bites by using recommended mosquito repellants such as DEET, avoiding exposure at night when sand flies bite, and wearing long sleeves and pants when out of doors in wooded areas.

References

1. McHugh CP, Melby PC, LaFon SG. Leishmaniasis in Texas: Epidemiological and clinical aspects of human cases. *Am J Trop Med Hyg.* 1996;55(5):547-555.
2. McHugh CP. Cutaneous leishmaniasis in Texas. *J Am Acad of Dermatol.* 2010;62(3):508-510.
3. Acha PN, Szyfres B. Zoonoses and communicable diseases common to man and animals. 3rd ed. Washington DC: Pan American Health Organization; 2001.
4. McHugh CP, Grogl M, Kerr S. Isolation of *Leishmania mexicana* from *Neotoma micropus* collected in Texas. *J Parasitol.* 1990;76(5):741-742.
5. Raymond RW, McHugh CP, Witt LR, Kerr SF. Temporal and spatial distribution of *Leishmania mexicana* infections in a population of *Neotoma micropus*. *Mem Inst Oswaldo Cruz.* 2003;98(2):171-180.
6. McHugh CP, Thies ML, Melby PC, Yantis LD, Raymond RW, Lillegas MD, Kerr SF. A disseminated infection of *Leishmania mexicana* in an Eastern Woodrat, *Neotoma floridana*, collected in Texas. *Am J Trop Med Hyg.* 2003;69(5):470-472.
7. Wright NA, Davis LE, Aftergut KS, Parrish CA, and Cockerell C. Cutaneous leishmaniasis in Texas: A northern spread of endemic areas. *J Am Acad of Dermatol.* 2008;58(4):650-652.

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Oak Tree - Goose Island State Park, © Texas Parks & Wildlife Department

Measles Cluster in Texas Associated with an International Youth Sporting Event, 2007

Measles is a highly infectious acute viral illness characterized by fever, rash, cough, coryza, conjunctivitis and Koplik's spots. Measles is spread by droplet or airborne transmission. The incubation period from exposure to rash onset ranges from 7 to 18 days and the communicable period extends from 5 days before rash onset through 4 days after rash onset. In the 10 years prior to vaccine introduction, annual measles incidence peaked at 85,862 in 1958 in Texas. Since the introduction of vaccine, cases have decreased by 99.9% in Texas. Due to high coverage rates with 2 doses of measles, mumps, and rubella (MMR) vaccine, endemic measles transmission in the US was declared interrupted by a panel of experts in 2000 (1). Genotyping of the viral isolates from US measles patients identified in 1994-2000 confirmed that US strains were related to multiple strains circulating in other countries. In comparison, from 1989-1992, the D3 genotype was the only virus known to be circulating in the US. Nearly all cases and outbreaks of measles in the US and Texas since 2000 have occurred among persons exposed to imported cases from countries where measles is still endemic.

Outbreak control measures can include post-exposure MMR vaccination, post exposure immunoglobulin, isolation of ill individuals and quarantine of susceptible contacts.

On August 16, 2007, measles was diagnosed by the Pennsylvania Department of Health in a Japanese participant at a 10-day international youth sporting event held annually in Pennsylvania. The sporting event included 8 US and 8 international teams; coaches, staff, and 200 boys aged 12-13 years stayed in a residential compound. Access to the residential compound was restricted to team members, event staff, and corporate representatives. The estimated attendance for the outdoor sporting events was 265,000.

There were a total of 6 secondary cases that occurred from the index case, 3 of which were from Texas. Of the 7 cases associated with this outbreak, viral genotyping was successful in 6 of the cases (including all 3 Texas patients) and was identified as measles genotype D5 with identical sequences. This indicates a single chain of transmission. Measles viruses with the same sequence circulated in Japan during 2007.

One of the nine corporate representatives exposed to the index patient at the sporting event subsequently developed measles. He was a US-born man, age 40

years, who had greeted the index patient on August 14. After returning to Texas, he was contacted by public health authorities, informed of his exposure, and advised to see his physician because he had no documentation or recollection of prior measles illness or having received vaccination against measles. He developed a dry cough on August 26th. He visited 3 Houston-area colleges on August 28, the day of his rash onset. At his physician's office on August 29, his temperature was 105.7° F. He was admitted to the hospital on August 29th after experiencing a febrile seizure. He was hospitalized for 4 days with pneumonia and recovered. Specimens collected on August 31 confirmed measles through detection of serum IgM antibodies.

Two male college students aged 20 and 21 years became ill and sought services at the on-campus clinic. The physician contacted the local health department who was aware of the campus being visited by the corporate representative. These students recalled being in close proximity to the corporate representative when he was coughing during an August 28 college visit. The students were US-born, roommates, and from the same town. Each had documentation of 2 appropriately timed routine childhood doses of MMR vaccine from different health facilities. They experienced fever, chills, and myalgias on September 9 and 10. Maculopapular rash appeared 2 days after fever onset, was generalized in one student and limited to the trunk in the other student. Both were laboratory-confirmed. Both had assisted with a youth baseball camp during their potential infectious period, and 189 persons were notified of the possible measles exposure. No additional cases were identified.

The number of cases in this cluster was relatively small compared to the large number of potentially exposed persons. Effective surveillance, prompt public health response by state and local health authorities, and high MMR vaccination coverage levels likely prevented additional cases. The risk of imported measles highlights the importance of maintaining high coverage with MMR vaccine. Obtaining clinical specimens to confirm the diagnosis and identify the genotype is also crucial to understanding the epidemiology of measles in Texas and to determine the original source of infection.

References

1. IDSA. Progress Toward Measles Elimination — Absence of Measles as an Endemic Disease in the US. *JID* 2004;189 (Suppl 1).

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(512) 458-7111, extension 2632

Norovirus Outbreak Associated with an Ill Food Server in a Men's Prison South Texas, November–December 2007

Noroviruses (family *Caliciviridae*) are infamous for causing acute gastroenteritis on cruise ships, in nursing homes and schools, and in other settings where many people are in close contact for extended periods. Symptoms are usually self-limiting and include nausea, vomiting and/or diarrhea, abdominal cramps, and, less frequently, headaches and fever. Incubation is 24–48 hours and infected persons can transmit the virus from illness onset for up to 2 weeks afterward. Transmission is fecal-oral, usually by person-to-person contact but also by ingestion of contaminated food. Spread can be amplified by close quarters, improperly cleaned environmental surfaces, and poor personal hygiene. Some estimates associate ill food-service workers as the source for half of all norovirus outbreaks (1).

Outbreak Investigation

On November 29, 2007, the Texas Department of State Health Services (DSHS), Health Services Region (HSR) 11, was notified of an outbreak of acute gastrointestinal illness among 108 inmates in a men's maximum-security state prison. HSR 11 initiated an investigation to identify the source, and agent of infection and to determine the scope of illness among inmates and prison workers.

The affected prison houses up to 2,818 male inmates and has three categories of housing: 1) an administrative segregation building containing 504 solitary cells in which inmates are isolated from each other for 23 hours daily; 2) two barracks-style dormitories with a total of 668 beds; and 3) four housing-pod buildings, each containing 432 beds (a total of 1,728 beds) divided among three pods each that are grouped around shared living spaces and recreation areas. All meals at the prison are prepared at the main kitchen and dining facility. The prison is staffed by 708 workers, including 530 guards.

Initial investigation indicated the index patient was an inmate aged 45 years who worked as a food server. He reported to the medical unit on November 27 with vomiting, diarrhea, and headache and was the only inmate to report illness that day. The patient lived in a dormitory, but his job assignment was to deliver food trays to inmates in the administrative segregation building. The ill inmate served food November 27, but did not work November 28. Several hours after the evening meal on November 28, inmates began reporting to the medical unit with diarrhea and/or vomiting. Of the 73 inmates reporting illness that evening, 66 (90.4%) were from the administrative segregation building. The number of ill

inmates and occurrence of illness so soon after mealtime led prison officials to initially suspect a foodborne cause. On November 29, an additional 55 inmates from other types of housing, including dormitories and housing pods, were ill with similar symptoms, and HSR 11 was notified.

On November 30, an environmental inspector and an epidemiologist from HSR 11 went to the prison to inspect the kitchen, interview staff, collect menus and a list of ill inmates, and obtain food samples. Seven stool specimens from ill inmates were sent to the state health department laboratory for testing for norovirus RNA by reverse transcription–polymerase chain reaction (RT-PCR) and for bacterial pathogens. Food samples were obtained and held pending lab results on the stool specimens. The environmental inspection revealed no major violations of public health regulations related to food preparation, storage, or handling.

Over the next few days, the number of ill inmates increased to include those from all of the housing units. On December 2, the warden suspended weekend visitation and cancelled all nonessential activities. HSR 11 staff recommended disinfecting cells and bathrooms of all ill inmates with a 10 percent chlorine bleach solution.

On December 3, the DSHS laboratory reported that all seven stool specimens were positive for norovirus. Strain typing is not done at the state health department laboratory, however, nor does the laboratory routinely test food or other environmental specimens for the presence of norovirus.

On December 5, the HSR 11 epidemiology team returned to the prison to interview ill inmates and provide guidance on prevention and control of gastrointestinal illnesses. Prison officials had initiated disinfection using a quaternary ammonium compound-based cleaner. Cleaning duties are routinely assigned to inmates, but prison officials consider bleach a controlled substance and would not allow inmates to use it unsupervised. Prison officials said staff was insufficient to supervise cleaning of all cells with bleach, but agreed at this time to supervise cleaning of common areas and dining facilities. Since noroviruses are non-enveloped virus particles, most quaternary ammonium compounds (which act by disrupting viral envelopes) are not as effective for infection control as chlorine bleach (2). The epidemiology team emphasized the importance

of using a 10% bleach solution to disinfect all shared surfaces. Additionally, some inmates reported lack of soap in bathrooms and being returned to food service assignments while still symptomatic.

As a result of these findings, prison officials implemented the following control measures: 1) exclude symptomatic kitchen staff from food handling until 30 days after symptoms have resolved, per prison policy, a period longer than the 48 hours recommended by DSHS; 2) ensure inmates have access to hand soap; 3) disinfect prison contact areas with 10% bleach solution; 4) curtail unit activities except for essential functions; 5) suspend inmate transfers between housing units; 6) suspend public visitation; and 7) segregate dormitories and housing areas during dining and disinfect tables and serving areas after each group has dined.

Illness rates began to decline, gradually decreasing to fewer than 10 per day by December 15. The final case of inmate illness was reported to the medical unit December 28.

Descriptive study

For the descriptive study, a case was defined as an inmate treated at the medical unit for diarrhea and/or vomiting during November 27–December 28. The baseline rate of inmates treated for gastrointestinal illness was 0–2 per month. During this month-long outbreak, 480 of 2,818 inmates (17%) reported to the medical unit with diarrhea and/or vomiting. Illness duration ranged from 2–4 days. Information about symptoms was obtained for 223 (46.5%) inmates from among those who became ill (Table 1).

Table 1. Signs and symptoms reported by prison inmates (n = 223) with illness during a norovirus outbreak, Texas, November–December 2007

Signs and Symptoms	No.	%
Diarrhea	193	86.5
Vomiting	160	71.7
Nausea	55	24.7
Dehydration (requiring intravenous solution)	19	8.5
Fever	2	0.9
Hospitalization	1	0.4
Total	223	

The most common symptom was diarrhea, affecting 193 inmates (86.5%), followed by vomiting, reported by 160 inmates (71.7%). Nausea was reported by 55 inmates (24.7%) and headache by 17 inmates (7.6%). Nineteen inmates (8.5%) required intravenous rehydration. One inmate who had insulin-dependent diabetes was hospitalized overnight. No deaths were reported.

The index patient lived in Building 19, one of two dormitories with barracks-style beds and a shared bathroom. Although all housing units were affected during the outbreak, Building 19 had the highest attack rate of 33.6%, as 111 of 330 inmates became ill (Table 2).

Table 2. Attack rate among prison inmates (n = 469) with illness during a norovirus outbreak, by category of prison housing and housing unit, Texas, November–December 2007

Prison housing category: housing unit	No. ill	Prison population ¹	Attack rate %
Pod housing:	159	1,608	9.9
<i>Bldg. 3</i>	31	419	7.4
<i>Bldg. 4</i>	47	420	11.2
<i>Bldg. 7</i>	45	374	12.0
<i>Bldg. 8</i>	36	395	9.1
Dormitories:	174	663	26.2
<i>Bldg. 18</i>	63	333	18.9
<i>Bldg. 19²</i>	111	330	33.6
Administrative segregation:	136	500	27.2
<i>Bldg. 12³</i>	136	500	27.2
Total/Average	469	2,771	16.9

The index patient delivered food trays to the administrative segregation building. Of 500 inmates in that building, 136 (27.2%) became ill; of those, 103 reported illness within the first 3 days. The outbreak ended more rapidly in the administrative segregation building than in other housing (likely due to the inmates' isolation) declining to less than five per day by the fifth day. In contrast, the transmission rate in Building 19 was slower and more persistent (Figure 1 see next page).

The findings in this report are subject to at least three limitations. First, the extent of the outbreak might have been under-reported because all inmates with illness might not have reported to the medical unit. Second, the broad case definition and subjective reporting of symptoms might have allowed some uninfected inmates to be misclassified as ill. Third, illness magnitude or duration among employees could not be determined because detailed information was not available regarding illness in that subgroup. Approximately 80–85 prison

employees reported gastrointestinal illness during the outbreak; precise numbers and information about job assignments of ill employees were not available because prison officials did not maintain records of ill employees.

Conclusions

In the outbreak at the Texas prison, the first person known to become ill was an inmate who worked in the kitchen. He had onset of vomiting and diarrhea on a day when he served food to other inmates. How the inmate contracted the virus is unknown, but he probably introduced the virus to other inmates and staff by contaminating the food, and the virus then spread by person-to-person transmission. Lack of effective disinfection likely contributed to rapid spread of illness prisonwide. Not all inmates had access to hand soap and a tour of the kitchen revealed soap missing from at least one sink. Prison employees conducted initial disinfection using a quaternary ammonium-based product, which might be ineffective against norovirus. Food-handling duties are coveted assignments in the hierarchy of prison jobs so inmates might have continued to work while symptomatic rather than be assigned to other duties. Also, some inmates might have returned to work in the kitchen before they were symptom-free, which could have further spread the virus. The virus was most quickly contained in the administrative segregation building, where inmates

are in enforced isolation. This finding emphasizes the importance that person-to-person transmission plays in institutional outbreaks.

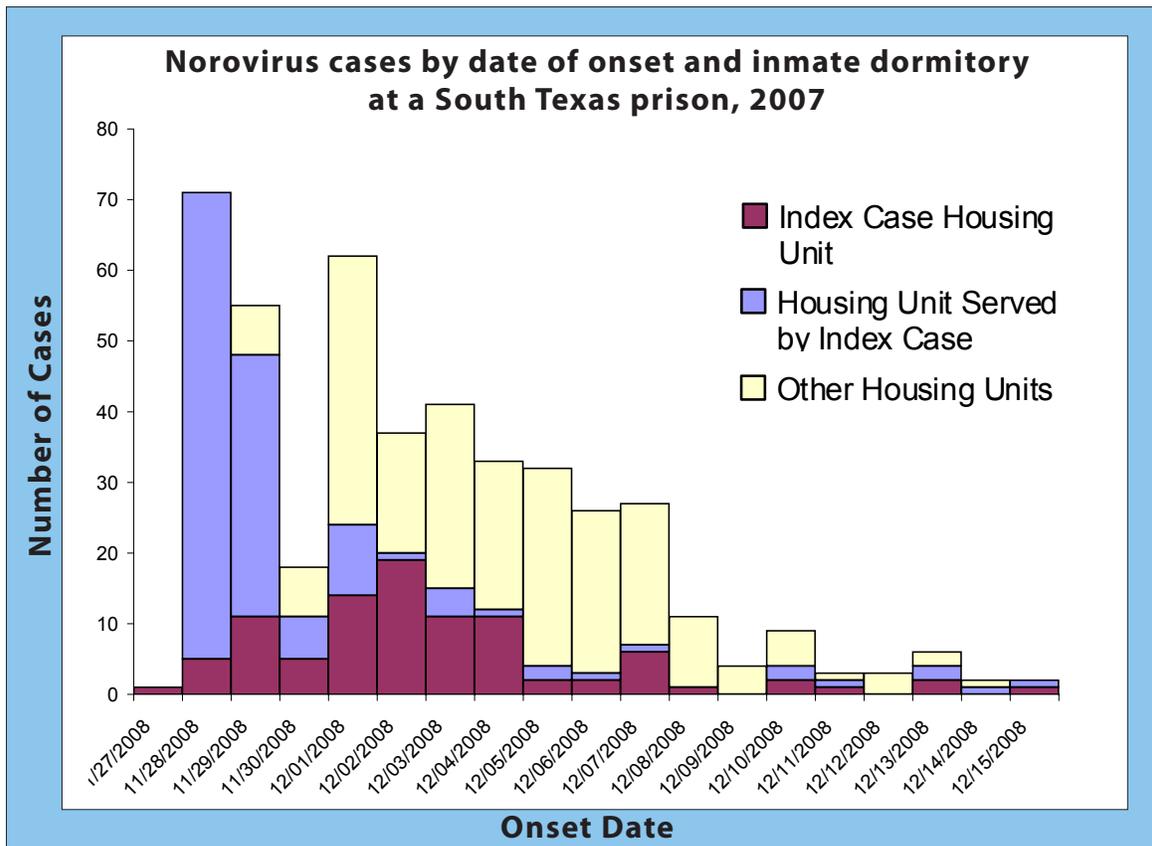
The prison environment, with large confined populations in close quarters, can be particularly vulnerable to outbreaks of Noroviruses. Prevention and control can be hampered by lack of education, security concerns, and housing arrangements. Education about effective cleaning practices and strict adherence to foodhandler guidelines may help to limit norovirus outbreaks in the future.

References

1. Widdowson M-A, Sulka A, Bulens SN, Beard RS, Chaves SS, Hammond R, et al. Norovirus and Food-borne Disease, United States, 1991-2000. *Emerg Infect Dis.* 2005;11:95-102. Available at: <http://www.cdc.gov/ncidod/eid/vol11no01/04-0426.htm>.
2. CDC. Norwalk-Like Viruses: Public Health Consequences and Outbreak Management. *MMWR* 2001;50(RR-9):1-18. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5009a1.htm>.

Prepared by Texas Department of State Health Services Region 11, (956) 423-0130

Figure 1



Pertussis

During the early 1900s, pertussis was one of the most common causes of childhood morbidity and carried with it a high mortality rate. The introduction of pertussis vaccine in the 1940s dramatically reduced pertussis rates in the US. In Texas, further progress was made in 1971 when pertussis vaccine became required for school attendance. Since the early 2000s, however, pertussis has reemerged as a public health concern (see the *Epidemiology in Texas 2006 Annual Report* for a profile of pertussis in the 2000s). Pertussis occurs cyclically, with peaks every 3-5 years. In 2005, pertussis in Texas peaked at 2,224 cases and 9 deaths. In 2006 and 2007, incidence declined to 954 and 1,051 respectively, although localized outbreaks still occurred. Three such outbreaks are described in the following articles.

Pertussis Outbreak in a Highly Vaccinated Elementary School, Denton County, 2007

The reemergence of pertussis as a public health threat has led to discrete outbreaks of the disease. A school-based pertussis outbreak occurred in Denton County from January through April 2007.

Investigation and Outbreak Control Measures

During the fall of 2006, a school in Denton County had sent home a letter to all parents informing them of the availability of the new Tdap vaccine. This letter included an overview of signs and symptoms of pertussis and mentioned that sporadic cases occur within the community.

At the end of February 2007, 49 days after onset of illness, Denton County Health Department (DCHD) was notified of a case of pertussis in a fourth-grade student who attended this elementary school. The following day, a letter was emailed to all parents alerting them that an individual in the school had been diagnosed with pertussis. This letter discussed the clinical signs and symptoms of the disease and advised parents to take their children to the doctor should they develop symptoms and to seek vaccination for un- or under-vaccinated household members. At that time no recommendations were made for prophylaxis of school-based contacts due to the lag between onset and report.

No new cases were reported until March 20, when the school reported 5 cases to DCHD, signaling an outbreak at the school (1). DCHD instituted an aggressive search for additional cases and identified exposed contacts. Prophylaxis was recommended to those who were still in the incubation period. On March 21, DCHD provided the school nurse with a screening tool to use when evaluating coughing children. Teachers were advised to send all coughing students to the school nurse's office. The school opted to exclude any child with paroxysmal coughing and/or post-tussive vomiting until they had completed an appropriate

course of antimicrobial treatment or, if no antimicrobial treatment was completed, through one incubation period (21 days). As the socioeconomic status of the students was relatively high, none reported difficulty with access to healthcare.

The school consisted of two connected buildings. In one building, grades one and two were housed on the first floor, with pre-K, kindergarten, and the third and fourth grade on the second floor. Grades 5 and 6 were housed in the second building. This school was affiliated with a large church, and upwards of 60% of the students also attended the church.

To control spread through the church, news of the outbreak was announced during services and updates were posted in the church bulletin and emailed to congregation members. Informational letters for parents were posted on the doors of all Sunday school classes and at the church daycare, and more than 4000 copies of the information letter were printed and handed out at both Sunday school and Wednesday evening events.

Local physicians were notified of the outbreak via blast-fax alerts. Alerts included general information about the epidemiology of the outbreak and recommendations for prophylaxis, vaccination, and exclusion.

Within a few days, investigators learned that in preparation for a school program, all of the first graders had been meeting in a large room to rehearse and sing for an hour and a half each day. By this point, 4 cases of pertussis had been confirmed in the first grade. A neighboring county health department had recently identified an outbreak of pertussis among members of a choir, prompting concern about this group of students. The intermingling of the students, combined with the instruction to project their voices (and inadvertently their droplets) was sufficient to recommend prophylaxis for this group.

On March 28, recommendations were made that all first graders seek prophylaxis for pertussis exposure. Letters were sent home to parents informing them of the outbreak and the need for control measures. A listing of all of the students' names and primary care provider was given to the health department and letters were faxed to these physicians identifying their patient as someone who may have been exposed to pertussis and for whom prophylaxis was indicated. Physicians were asked to fax a provided form back to the health department indicating whether or not they had prescribed the treatment. Out of 111 students, DCHD received confirmation from physicians that 50 were prescribed prophylaxis. Following this intervention there were no new cases of pertussis among first graders.

Aside from the first grade, recommendations for prophylaxis were made on a case by case basis. In some instances, such as when multiple cases were identified in one class, prophylaxis was recommended for entire classrooms. In other instances, such as when only one case was identified, prophylaxis was recommended only for the children who sat next to the case and other close contacts.

At the request of the school, the health department offered adult Tdap vaccine at an onsite vaccination clinic for all teachers and staff at the school.

During the outbreak, standardized testing became a big concern for both the school and for parents as potentially infectious students would miss the testing period. To accommodate this, DCHD recommended that potentially infectious students be isolated from other students but allowed to take the tests. Students were placed alone in faculty offices with the consent of their parents and were masked during contact with teachers.

On April 9, following a site visit by health department personnel, teachers were asked to reconfigure their classrooms for one incubation period from a pod formation (eight desks in two rows, facing each other) to rows of desks. Following this recommendation, only one additional case (from a kindergarten class) was reported.

Case Overview

This outbreak resulted in 34 cases of pertussis associated with one elementary school. Of these, there were 29 students, 1 teacher, 1 parent, and 3 children who did not attend the school but were epidemiologically linked to cases at the school. A case of pertussis was

defined as a patient with a cough illness lasting ≥ 14 days with paroxysm of coughing, inspiratory whoop, or post-tussive vomiting or a patient with a positive polymerase chain reaction (PCR) test result for *B. pertussis* DNA from a nasal-pharyngeal specimen and a cough lasting at least 2 weeks. Of the 34 cases, 6 had a positive PCR test; the others met the clinical case definition and were epidemiologically linked to the outbreak. Epidemiological links were defined as persons with close contact to a lab-confirmed case and/or attendance at the school. The mean cough duration was 24.8 days, with a range of 14 to 90 days. Other clinical manifestations included paroxysmal coughing (91.2%), post-tussive vomiting (20.6%), inspiratory whoop (17.6%), apnea (11.8%), and cyanosis (5.9%).

Vaccine coverage for the school was 99%. Of the student cases ($N = 29$), all but 2 (93.1%) had received 5 pertussis immunizations. The two remaining students had received 4. One of these was a 4 year old preschooler too young to receive the fifth dose and the other a 9 year old. The overall attack rate for the school was 3.5%, with the highest attack rate occurring in third graders (ages 8 and 9), with 17.5% of third graders contracting the illness (Table 1).

Initial cases had onsets in January and February, with a peak in March (Figures 1 and 2). Because persons may

Table 1. Number of cases and attack rates by grade level within an elementary school, Denton County, 2007

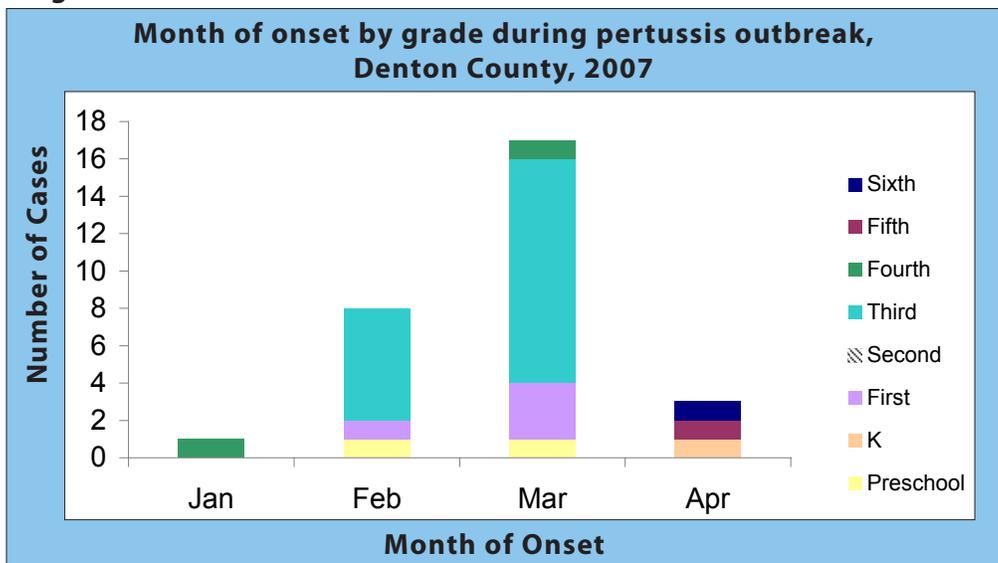
Grade Level	Number of Cases	Number of Students	Attack Rate (per 100)
Preschool	2	111	1.8
Kindergarten	1	94	1.1
First Grade	4	111	3.6
Second Grade	0	102	0
Third Grade	18	103	17.5
Fourth Grade	2	105	1.9
Fifth Grade	1	108	0.9
Sixth Grade	1	100	1.0

exhibit prolonged cough with paroxysms and/or vomiting for reasons other than pertussis, the use of the case definition and epidemiological linkages (rather than laboratory confirmation) may have led to an over-estimation of the case count.

Discussion

Several factors contributed to this outbreak. As noted in

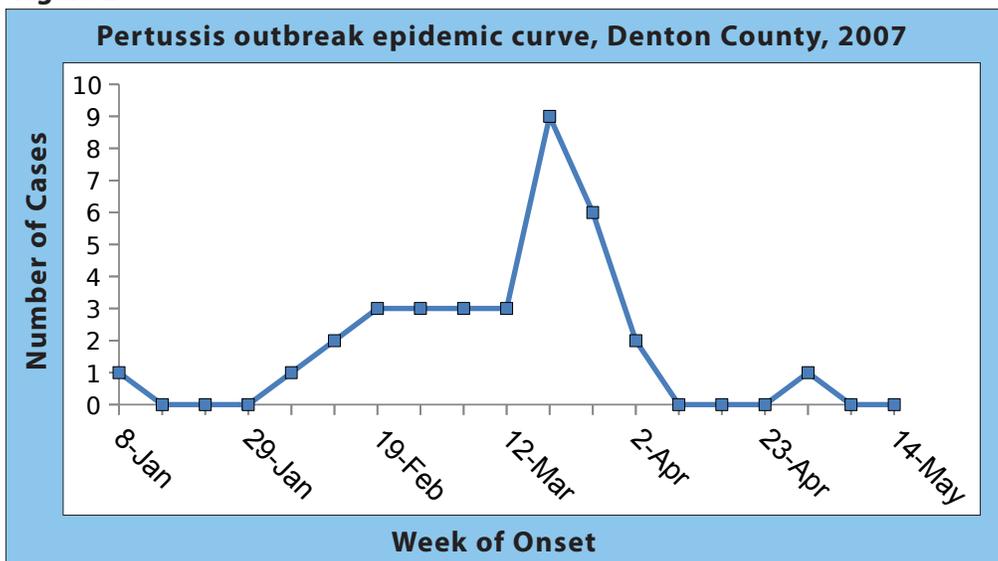
Figure 1



did the children attend school together, but many attended the affiliated church and participated in extra-curricular and social activities together.

Responding to these outbreaks is resource intensive, requiring cooperation among the health department, health care providers and other impacted organizations, as well as community members. Overall, the outbreak was quite disruptive to usual school operations. As the outbreak progressed, the school nurse expressed fatigue with the issue and reported that parents became complacent towards the repeated health messages. The school nurse found rumor control to be an issue, with teachers and parents giving contradictory information, underscoring the need for continued structured communication. Teachers expressed resistance to changes in classroom layout and both teachers and parents expressed concern over prolonged student exclusion. In this school outbreak, the impacted population was highly vaccinated, serving as a reminder to maintain vigilance for vaccine preventable diseases even in the era of immunizations.

Figure 2



previous outbreaks (2), pertussis may be difficult to contain in populations with high levels of social interaction. In this outbreak, initial cases went unrecognized and delays in reporting resulted in delayed public health response. Early diagnosis and treatment has the potential to limit transmission in the community and protect susceptible infants. This outbreak, which began in January, was not identified as an outbreak until mid-March, when the first cluster of cases was reported. Upon further investigation, 12 additional cases with an onset before March 19 were found. On average there was a two week lag between onset of illness and reporting of the case to the health department (range = 1 to 49 days), although this time frame decreased as the outbreak progressed. Slow identification of the early cases appears to have been a major contributing factor to the scope of this outbreak. In addition, the children had multiple opportunities for exposure via high contact rates. Not only

References

- Centers for Disease Control and Prevention. Guidelines for the Control of Pertussis Outbreaks 2000 (amendments made in 2005 and 2006). Available at: <http://www.cdc.gov/vaccines/pubs/pertussis-guide/guide.htm>.
- Schenfeld, S, JK Carney, E Hansen, R Cameron, MJ Celotti. Pertussis Outbreak: Vermont, 1996. MMWR 1997;46(35):822-826. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/00049244.htm>.

Prepared by the Denton County Health Department,
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Pertussis Outbreaks in Childhood Education Facilities: Guadalupe and Calhoun Counties, 2007

Two unrelated outbreaks of pertussis with contrasting characteristics occurred in Health Service Region 8 in 2007. One was associated with a Head Start facility with an enrollment of 20 in Guadalupe County and the other was associated with an elementary school with an enrollment of 800 in Calhoun County. The first report of PCR-confirmed pertussis in Guadalupe County was received by the Texas Department of State Health Services (DSHS), Health Service Region 8 (HSR 8), Epidemiology Response Team on February 22, 2007. The first report of PCR-confirmed pertussis in Calhoun County was reported on March 2, 2007. Through contact investigations, we determined that the index case for each outbreak became ill in December 2006. We implemented similar interventions in both counties, however, the outbreak in Guadalupe County subsided within a few weeks and was limited to school-associated cases, while the outbreak in Calhoun County continued for several months and included community cases that were not associated with the school.

Methods

For each outbreak, we conducted onsite and telephone contact investigations by visiting the affected school to interview staff and parent(s) of every child in the affected classroom(s), as well as the parent(s) of every child named as a close contact to any symptomatic individual. We recommended laboratory testing whenever feasible, and collected all available laboratory results and immunization records. A medical advisory was sent to physicians in the local area of each outbreak to provide them with DSHS recommendations for pertussis chemo-prophylaxis, diagnosis, treatment and immunization. Letters were sent to parents of children in affected classroom(s). Cases and contacts were tracked and followed by telephone and mail to ensure initiation and completion of antibiotic therapy. Active surveillance was maintained until one full incubation period elapsed without any newly identified cases. In Calhoun County, we presented an informational session for parents and staff to educate them about pertussis characteristics and management. For both outbreaks, a clinical case was defined as a person with a cough illness lasting at least 14 days with one of the following: paroxysms, inspiratory whoop or, post-tussive vomiting, without other apparent cause. A confirmed case was a clinical case who was either PCR positive or had direct contact with a laboratory-confirmed case within one incubation period. A probable case was

a clinical case with either a negative or absent PCR and no epi-link to a PCR-confirmed case.

Results

Calhoun County

A total of 171 pertussis case investigations were completed from March through June 2007. From these, we identified 17 (9.9%) confirmed cases (6 laboratory confirmed by PCR, 11 epidemiologically-linked to a PCR-confirmed case) and 20 (11.7%) probable cases. Onset dates for confirmed and probable cases ranged from December 15, 2006 through May 28, 2007. An epi curve is shown in Figure 1. Of the 37 confirmed and probable case patients, 19 (51.4%) either attended the elementary school or had direct contact with an elementary school student or staff person. The remaining 18 (48.6%) were divided between 2 other elementary schools, 1 high school, 1 middle school, no school association, and unknown school association. Ages ranged from less than 1 year to 52 years old (mean 14 yrs, median 9 yrs, mode 9 yrs); 29 were under 16 years of age, and the remaining 8 were adults over the age of 20. Seventeen (45.9%) were male. Of the 24 for whom immunization information was available, 16 were up to date based on ACIP recommendations for pertussis-containing vaccinations.

Guadalupe County

A total of 75 pertussis case investigations were completed from February through March, 2007. From these, we identified 7 (9.3%) confirmed cases (1 laboratory confirmed by PCR, 6 epidemiologically-linked to a PCR-confirmed case) and 2 (2.7%) probable cases. Onset dates for the 9 confirmed and probable cases ranged from December 25, 2006 through February 13, 2007. All 9 (100%) cases either attended or worked at the Head Start or had direct contact with a Head Start student or staff person. Four (44.5%) were male. Ages ranged from 1 year to 47 years old (mean 22 yrs, median 17 yrs); 5 were children less than 6 years of age, and 4 were adults over the age of 28 years. Four of the five children were up to date on pertussis-containing immunizations. None of the four adults had ever received a Tdap booster. The 4 affected adults included 3 Head Start staff persons and 1 parent.

Discussion

The estimated 2007 populations of the communities in Guadalupe County and Calhoun County were comparable, approximately 12,000. The affected Head Start in Guadalupe County had an enrollment of 20 and was located in a small community in which parents knew each other well. Their children spent time socially together, and when asked about close contacts, parents typically named individuals who had already been named by other parents as connected to the Head Start staff and/or attendees. The elementary school in Calhoun County had an enrollment of 800 students and was located in a small yet active resort area located on the coast of Lavaca Bay. Affected persons in this outbreak could not always be readily linked to other cases. Parents typically were only familiar with the names of their child's closest friends, and more often named close contacts who were not associated with the school.

Calhoun County

It is unclear whether the Calhoun County outbreak represented one or more distinct community outbreaks clustered in time or a single large-scale outbreak with two or more generations of transmission. The confirmed case patient with the earliest reported onset (12/15/2006) was a 3-year-old child. The next chronologically documented case (onset 1/25/2007) was a 12-year-old child from a different elementary school with no identified link to the first case patient. While the elementary school appears to have provided an effective transmission setting for the outbreak, nearly half of the overall cases (18 of 39) had no identified link to the school other than residence within Calhoun County. The distribution of the community-associated cases is shown in Figure 2 on page 24.

Guadalupe County

We have attempted to demonstrate the complexity of the classroom-associated pertussis transmission in Guadalupe County in Figure 3, which is a schematic representation of confirmed and probable cases and their relationships. Only symptomatic individuals are included in this figure. Each case patient is represented by a red, blue or grey dot. Red indicates a confirmed case. Blue indicates a probable case, and grey indicates a symptomatic patient who did not meet case definition. Persons with the same colored circles around their dots are from the same household. Persons marked with a yellow triangle are daily attendees of the Head Start in Guadalupe County.

The first case reported to the health department is represented by red dot #10, which was a 1-year-old infant with PCR confirmed pertussis who attended the Head Start. This child was the daughter of the patient represented by red dot #4, who is a teacher at the same Head Start and started coughing a month prior to her daughter. Red dots #3, #5, #14 represent a cook, another teacher, and a 4-year-old from the Head Start. Blue dot #2 is the father of a 3-year-old from the Head Start (Red dot # 8). Blue dot #11 and red dot #9 are 6-year-old and five-year-old sisters, the latter of which attended the Head Start.

Conclusions

Calhoun County

In Calhoun County, case finding was active, since 32 of the 37 probable and confirmed cases experienced onset of symptoms subsequent to the date that the health department was notified on 3/2/07. It is likely that the establishment of heightened surveillance near the beginning of the outbreak in Calhoun County contributed to increased case-finding. Based on the time span of five months from the first reported to last reported onset date and the maximum incubation period of 42 days for pertussis outbreaks in schools (1), it is possible that up to 3 or more generations of disease transmission occurred during the outbreak. The concentration of cases at one elementary school combined with the spread of cases to other schools and to the community suggests that there were multiple pathways contributing to disease transmission.

In the Head Start classroom, case-finding was retrospective, since all nine of the confirmed and probable cases experienced symptom onsets prior to the initial health department notification on 2/22/07. The attack rate among adults serving as teachers or kitchen staff was 100% (3/3), the attack rate among attendees was 21.7% (4/20). All of the affected adults experienced onsets preceding that of the first affected child, suggesting that an infected adult was likely to have been the source of the outbreak. The potential spread of pertussis from adults to children in a childcare setting reinforces the ACIP recommendation that adults aged 16 to 64 years should receive a single dose of Tdap for active booster vaccination against tetanus, diphtheria, and pertussis (2). The decline in cases shortly after the initiation of our investigation was most likely due to the exhaustion of susceptible persons in this small, self-contained Head Start community.

Figure 1. Cases of confirmed and probable pertussis, by date of onset, Calhoun County 2007 (N=37).

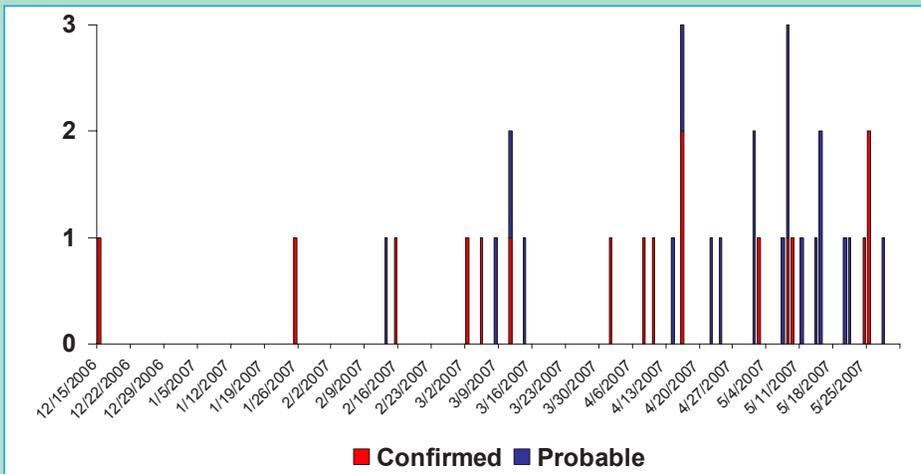


Figure 2. Cases of school and community associated pertussis (includes probable and confirmed cases), by date of onset, Calhoun County (N=37).

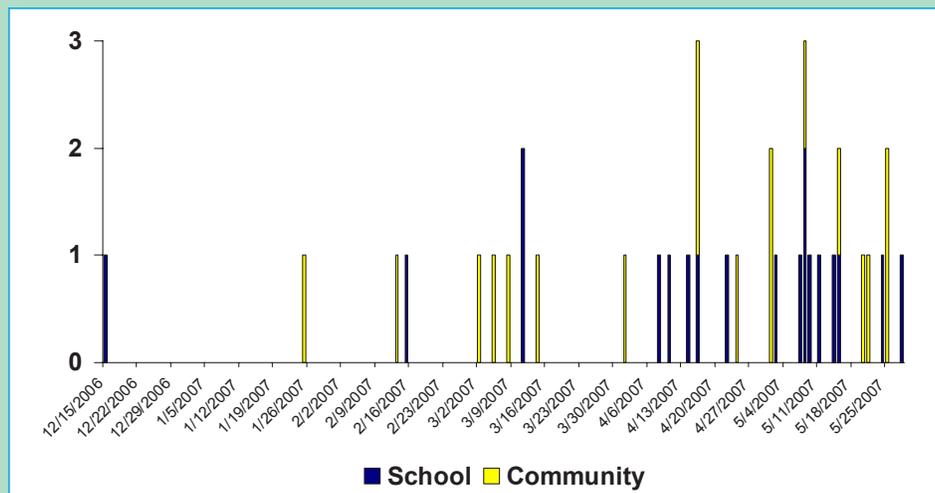
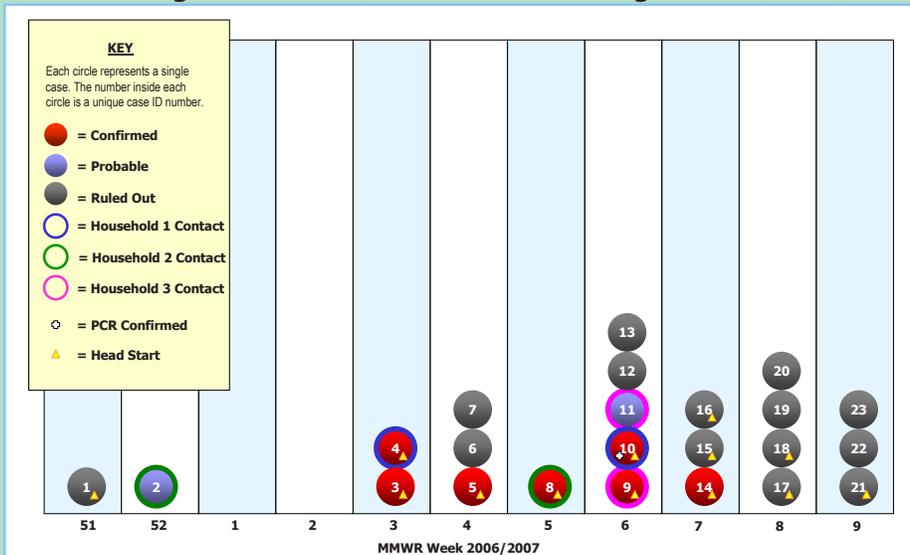


Figure 3. Head Start outbreak: cases of confirmed (N=7), probable (N=2) and ruled out (N=14) pertussis by MMWR week of onset, (week ending December 23, 2006 to week ending March 3, 2007)



References

1. CDC. Chapter 8 — School and child care settings in Guidelines for the control of pertussis outbreaks, 2000 (amendments made in 2005 and 2006). Available at: <http://www.cdc.gov/vaccines/pubs/pertussis-guide/guide.htm>.
2. CDC. Preventing tetanus, diphtheria, and pertussis among adults: use of tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccine. MMWR 2006; 55(RR17);1-33. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5517a1.htm>.

Prepared by Health Service Region 8,
(210) 949-2074



Caddo Lake, © Texas Parks & Wildlife Department

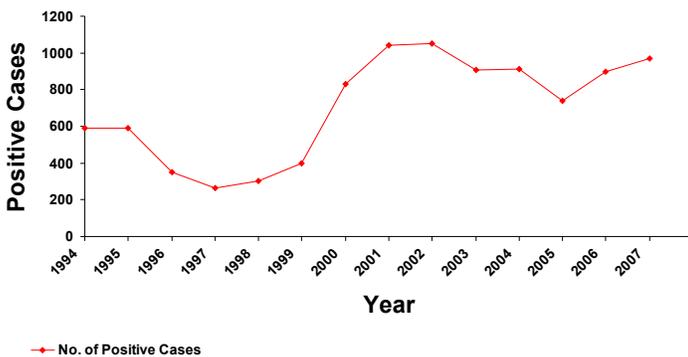
Rabies in Animals

Rabies is a viral zoonosis affecting the central nervous system of warm-blooded animals. Transmission occurs when saliva containing rabies virus is introduced into an opening in the skin, usually via the bite (or possibly scratch) of a rabid animal. Though rare, transmission can also occur through contamination of mucous membranes. Animals considered to be high risk for transmitting rabies in Texas include bats, skunks, foxes, coyotes, and raccoons; the first four of these wildlife species serve as reservoirs for specific rabies virus variants in Texas. Rabies infection in a species other than the reservoir species for the variant is considered "spillover." An example of spillover would be a cat infected with a skunk variant of rabies virus.

Case Counts and Distribution

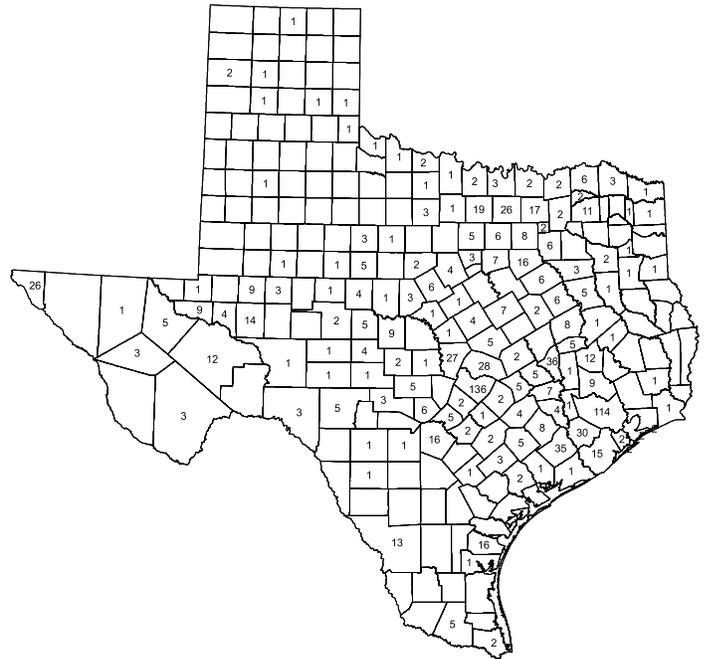
In 2007, 969 (6%) of 15,088 animal specimens in Texas that were successfully tested (confirmed as positive or negative) were positive for rabies. This was a 9% increase in cases from the 888 cases confirmed in 2006. The number of positive cases per 1,000 specimens tested was slightly lower; there were 64 in 2007 compared with 65 in 2006. Yearly totals for 1994 through 2007 are illustrated in Figure 1.

Figure 1. Positive animal rabies cases, Texas 1994 - 2007



During 2007, the highest monthly number of laboratory-confirmed rabies cases (116) occurred in March with skunks (58) being the predominant rabid species reported; September had the second highest number of cases (114) with bats (93) being the predominant rabid species. Cases of rabies were confirmed in 140 of the 254 Texas counties (Figure 2) compared with 137 counties with reported cases in 2006. Travis County had the highest number of reported rabies cases per county with 136 cases in 2007, all of which were bats. In 2006, Harris County had the highest number of reported cases with 146 (145 of which were bats).

Figure 2. Confirmed cases of animal rabies (all species) by county, 2007



Rabid wildlife accounted for 928 (96%) of the confirmed cases throughout the state in 2007 compared with 844 (95%) in 2006 (Table 1). Bats were the primary source of positive cases with 482 (50% of all positive cases) in 2007 compared with 431 (49% of all positive cases) in 2006. Of all bats tested for rabies, 12% were positive in 2007 and 10% were positive in 2006. Rabies in bats is enzootic in Texas; there are numerous bat variants of rabies virus throughout the state. In 2007, there were two cases in which there was spillover of a bat variant to terrestrial animals (one cat and one dog).

Skunks had the second highest number of confirmed rabies cases with 362 (37% of all positive cases) in 2007 compared with 351 (40% of all positive cases) in 2006. Of all skunks tested for rabies, 31% were positive in 2007 and 32% were positive in 2006. The south-central skunk variant of rabies virus is the most prevalent skunk variant in Texas. Rabies cases in 2007 in which the south-central skunk variant could be confirmed included 360 skunks, 16 raccoons, 10 cats, 10 foxes, 7 dogs, 9 horses, 3 cattle, 2 bobcats, 1 coyote, 1 goat, 1 opossum, and 1 wolf-dog hybrid.

Table 1. Confirmed cases of rabies in wild animal species, Texas, 2006 and 2007

Species	2006	2007
Bats	431	482
Bobcats	10	12
Coyotes	1	21
Foxes	31	32
Opossum	0	1
Raccoons	19	17
Ringtail	1	0
Skunks	351	362
Wolf-dog Hybrid	0	1
Total	844	928

There were 41 reported rabies cases in domestic animals (4% of all positive cases) in 2007 (Table 2). The predominate rabies virus variant identified in domestic animals was south-central skunk (73%) followed by Texas fox (22%) and bat (5%). Rabies in domestic animals continues to be a concern because they are more likely to have contact with humans than are rabid wildlife. Cats (14) and dogs (12) each represented 1% of all positive cases in 2007. In 2006, there were 44 reported rabies cases in domestic animals (5% of all positive cases); of these rabies cases, 13 were dogs and 10 were cats (each represented 1% of all positive cases).

Table 2. Confirmed cases of rabies in domestic animal species, Texas, 2006 and 2007

Species	2006	2007
Cats	10	14
Cattle	7	4
Dogs	13	12
Goats	2	1
Hog	0	1
Horses	12	9
Total	44	41

Rabies Epizootics

In 1988, an epizootic incursion of canine rabies began in South Texas (1) and an epizootic of gray fox rabies began in West-Central Texas (2). Since then, 21 counties have been involved in the South Texas canine rabies epizootic and 53 counties have been involved in the West-Central Texas gray fox rabies epizootic.

In response to the canine and gray fox rabies epizootics, the Oral Rabies Vaccination Program (ORVP) for coyotes in South Texas was initiated in February 1995 (3), and the ORVP for gray foxes in West-Central Texas was initiated in January 1996 (4); the programs have continued annually. These programs target reservoir species for the domestic dog/coyote and Texas fox variants of the rabies virus, specifically coyotes and gray foxes, respectively. The goal of the ORVP has been to create zones of vaccinated coyotes and gray foxes along the leading edges of the areas where these rabies variants are located in order to eventually eliminate the epizootics. Immunization is accomplished by aerial distribution of edible bait containing oral rabies vaccine.

In 2007 and 2006, there were no reported cases of the domestic dog/coyote variant of rabies virus statewide. Of the 53 counties with recorded cases of the Texas fox variant of rabies virus, 17 had cases in 2007 compared with 13 counties in 2006. Statewide in 2007, 62 (6% of all positive cases) were infected with the Texas fox variant compared with 45 (5% of all positive cases) in 2006. The 62 rabies cases with the Texas fox variant in 2007 included 22 foxes, 20 coyotes, 10 bobcats, 4 dogs, 3 cats, 1 cow, 1 hog, and 1 raccoon.

Of concern in 2007 was evidence of coyote-to-coyote propagation of the Texas fox variant of rabies virus. After receiving anecdotal accounts of rabid animal exposures, plus evaluating species from which there were laboratory-confirmed rabies specimens, results of field surveillance, and wildlife habitat where cases were occurring, Texas rabies control managers felt that coyotes had become a reservoir host for the Texas fox variant. This perception gained scientific substance when the salivary glands of five rabid coyotes from the epizootic area in West Texas were analyzed for viral load and found to contain sufficient amounts for transmission (5).

During the five-year period from 1995 through 1999, the average number of skunks that were confirmed positive for rabies was 110 cases per year with a range of 69 to 192; for 2000 through 2007, the average number of confirmed cases of rabies in skunks per year was 541 with a range of 351 to 778. Currently, there are no oral or parenteral rabies vaccines approved for use in skunks to address the ongoing skunk rabies epizootic, which began in 2000.

References

1. Clark KA, Neill SU, Smith JS, et al. Epizootic canine rabies transmitted by coyotes in south Texas. *J Am Vet Med Assoc.* 1994;204:536-540.
2. Clark KA, Wilson PJ. Canine and Gray Fox Rabies Epizootics in Texas. In: Masters RE, Huggins JG, editors. Twelfth Great Plains Wildlife Damage Control Workshop Proceedings; 1995; Lincoln, Nebraska. Ardmore : Noble Foundation; 1995. p. 83-87. Available at <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1427&context=gpwdcwp>.
3. Fearneyhough MG, Wilson PJ, Clark KA, et al. Results of an oral rabies vaccination program for coyotes. *J Am Vet Med Assoc.* 1998;212:498-502.
4. Sidwa TJ, Wilson PJ, Moore GM, et al. Evaluation of oral rabies vaccination programs for control of rabies epizootics in coyotes and gray foxes: 1995-2003. *J Am Vet Med Assoc.* 2005;227:785-792.
5. Bean KI, Niezgodka M, Blanton JD, et al. The coyote as an emerging rabies host. Division of Viral and Rickettsial Diseases, Poxvirus and Rabies Branch, Centers for Disease Control and Prevention, Atlanta, GA 30333: Proceedings of XVIII Rabies in the Americas (RITA), 2007 Oct; Guanajuato, Mexico.

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Frio Cave Bat Emergence by Thomas Kunz, © Texas Parks & Wildlife Department

***Staphylococcus aureus* in Texas High School Athletic Department Environments, 2007**

Staphylococcal infections are transmitted directly from person to person and through contact with contaminated environments. Because participating in athletic activities fosters more physical contact and sharing of personal items than perhaps any environment other than the home, staphylococcal infections in athletes are a concern. *Staphylococcus aureus* is the most virulent species within the genus *Staphylococcus* and is a common cause of skin and soft tissue infections such as boils and impetigo. Such infections have become more threatening with the evolution of resistance to a wide array of antibiotics and the emergence of antibiotic resistant strains outside healthcare settings. Serious, sometimes fatal, methicillin resistant *S. aureus* (MRSA) infections among young people without risk factors contrast starkly with the original population at risk of MRSA — older, physically compromised individuals in hospitals or long term care facilities.

Because shedding of *S. aureus* into the environment — where it can survive for days to months — is common and athletes share equipment and facilities, questions over the role of the environment in facilitating the spread of MRSA among athletes have arisen. Interns from Public Health Internship Program at The University of Texas at Austin School of Biological Sciences under the direction of Department of State Health Services (DSHS) staff examined two environments in high school athletic departments, therapeutic whirlpool water and drains and football players' athletic socks, to determine if they might serve as reservoirs of MRSA.

Methods

Subjects

For the whirlpool segment of the study, licensed athletic trainers (LATs) from 15 metropolitan high schools were invited to participate; LATs from 8 of the schools volunteered. Investigators visited one school each week between February 5th and March 19, 2007. Visits were made during times regularly scheduled for athletes' therapy. Information regarding numbers of athletes treated, hygiene requirements, whirlpool volume, and cleaning methods was obtained by observation of the therapy sessions and by administering a standardized questionnaire to the LATs. Water samples from therapeutic whirlpools were taken before any therapy began and again after all therapy was complete.

The investigation of staphylococcal viability in football

players' socks was conducted at one high school. The school voluntarily participated in the study with specimen collection occurring from September 24 through October 22, 2007. Twenty-four of the 34 members of the junior varsity team were randomly selected to receive athletic socks each week. Socks were distributed and collected weekly during a mid-day physical education period that was used for football practice.

Procedures

The inside of the drain of each whirlpool was sampled by passing a sterile swab through the slits of the drain and over the inner surface of the drain pipe. Pre-treatment water samples were taken by turning on the water jet and submerging a sterile 100 ml plastic bottle into the water in the direction of the water stream. Once all therapy was completed, post-treatment water samples were taken. Water samples were filtered and cultured at the DSHS Consumer Microbiology Laboratory using a standardized protocol. Isolates were identified and antibiotic susceptibility testing was performed using standard laboratory techniques.

For the investigation of staphylococcal survival in uniform fabric, players received a pair of knee-high socks at the start of practice and wore them throughout the 45 minute practice. At the conclusion of practice, the athletes placed each sock in an individually labeled zip lock bag. The bagged socks were taken to the DSHS laboratory for testing. The week of October 8th, a school holiday, no samples were collected from players. Samples from socks that had never been worn by players were cultured to serve as controls. Socks from two sources were used in the study. The first week, socks purchased off the rack in an athletic supply store were used; the second and subsequent weeks, packaged socks from an online sporting goods supplier were used. Both types of socks were composed of 83% cotton, 16% polyester, and 1% Lycra.

Using alcohol sterilized scissors, a one-inch square was cut from the lower calf region of each sock, and using alcohol sterilized forceps, the fabric swatch was placed into a vortex tube containing nutrient broth with 3% NaCl. The filled tubes were vortexed and incubated. After incubation, 1 drop of broth was streaked onto selective differential media and incubated. *S. aureus* identification and methicillin resistance testing were carried out using standard laboratory techniques.

Results

In the eight high schools participating in the whirlpool investigation, one school had only a hot whirlpool; three schools utilized only a cold whirlpool; and four schools used both for a total of 12 whirlpools (Table 1). *S. aureus* was isolated at one of eight schools where it was recovered from both hot and cold whirlpools. Positive water samples came from the initial and final samples in the hot water whirlpool and from the final sample taken from the cold water whirlpool.

Table 1. Characteristics and *S. aureus* status of water from therapeutic whirlpools in Texas high school athletic departments, 2007

Whirlpool	<i>S. aureus</i> positive	Positive before or after athletes' treatments	# athletes treated in session	Whirlpool volume (gallons)	Full body shower required prior to therapy	Cleaning solution
School 1 ¹					If athletes worked out	Virahol
Hot	Yes	Both	9	110		
Cold	Yes	After	2	110		
School 2					No	Iso Quin
Hot	No	NA	1	70		
Cold	No	NA	3	115		
School 3					Yes	Iso Quin
Hot	No	NA	2	200		
Cold	No	NA	3	15		
School 4					Yes	Sanizide
Cold	No	NA	1	200		
School 51					Yes	Super Cleaner
Hot	No	NA	1	22		
Cold	No	NA	1	100		
School 6					No	Triadine
Cold	No	NA	1	110		
School 7					No	Gordo-pool
Hot	No	NA	1	75		
School 8					No	Iso Quin
Cold	No	NA	1	40		

Of the 174 players' socks that were tested, 104 (59.8%) were positive for some species of *Staphylococcus* (Table 2). Staphylococcal growth occurred every week regardless of whether socks were from the rack or packaged, the amount of physical contact among players, or whether the team practiced indoors or outside. Based on chi-square testing, players' socks were significantly more likely to have staphylococcal growth than the control socks ($p < 0.001$). There was no significant difference in the proportion of players' staphylococcal-contaminated socks due to amount of physical contact, location of practice, or whether the socks were packaged. Of the 34 players, 11 (32.4%) never had staphylococcal growth in their socks. The remainder had growth at least one week. One player's sock was positive for *S. aureus*, and none were positive for MRSA (Table 2). The *S. aureus* positive sample was found during a week

in which the players wore socks that had been purchased off a store rack. The team practiced special teams positions (minimal physical contact) outdoors that day.

Only one of the 48 control socks (0.02%) was positive for any staphylococcal species. The staphylococcal growth occurred in a sock that had been purchased directly off a store rack. Chi-square testing resulted in a p-value of 0.08 when comparing the proportion of socks with staphylococcal growth between socks purchased off a store rack and packaged socks. No control socks were positive for *S. aureus* or MRSA. See Table 2 on page 31.

Discussion

These investigations demonstrated *S. aureus* but not MRSA in the two athletic environments. The investigations were not performed in association with reported outbreaks, and while the environments were not grossly contaminated, the results do demonstrate that the athletic environment is capable of maintaining the viability of pathogenic staphylococcal organisms. These laboratory results lend support to epidemiological findings that have implicated the athletic environment in MRSA outbreaks.

Whirlpools have been linked to outbreaks of dermatitis in the Centers for Disease Control (CDC) bi-annual report of waterborne disease outbreaks associated with recreational water (1,2). In a 2003 outbreak, use of an inappropriate disinfection agent in a spa at a Connecticut college's athletic facility was deemed to have resulted in MRSA skin infections in 10 football players (2). Athletic department whirlpool use and MRSA infections were also epidemiologically linked at a Connecticut college where football team members who reported sharing the whirlpool with other players two or more times per week had a relative risk of 12.2 (3). Although an investigation of a MRSA outbreak among professional football players recovered no environmental isolates, players did report communal whirlpool use and protocols for cleaning whirlpools were not available (4). The current study identified viable *S. aureus*, though not MRSA, in both a hot and

a cold whirlpool even in the absence of known clinical infections among users.

Uniforms and other fabric items have been shown to harbor viable staphylococcal organisms including MRSA in health care settings but have not been definitively demonstrated to be the source of outbreaks (5). In a high school outbreak that affected athletes from multiple sports as well as non athletes, wearing uniforms more than once without laundering may have played a role in transmission (6). In the outbreak among professional football players, sharing towels was commonplace (4). Among college football players in California, “sharing”—which included but was not exclusive to sharing towels—had a relative risk of 12.1 (95% CI 1.8-108) for MRSA infection (7). In a West Virginia college outbreak, athletes’ use of hydrocollator packs resulted in a relative risk of 2.5 (95% CI 1.1-5.7). Prior to the investigation, the terry cloth coverings of these warm compresses were washed weekly rather than after each use (8). The current study indicates that staphylococcal species, including pathogenic *S. aureus*, remain viable in fabric and further demonstrates that these organisms are shed by players even during indoor activities with no physical contact occurring between athletes.

This study demonstrated that the athletic environment can support staphylococcal survival, including *S. aureus*, even in the absence of outbreaks. While in healthcare associated MRSA infections colonization routinely precedes infection, this is not always the case in community associated infections suggesting that environmental reservoirs play a role in perpetuating community

transmission (9). Recovery of *S. aureus* in the athletic environment in the absence of known clinical infections and the observation that athletes perpetually shed staphylococcal organisms suggests that routine thorough cleaning and laundering of athletic department items is more prudent than sporadic terminal cleaning after infection has occurred.

The CDC gives specific guidance for cleaning athletic facilities including cleaning with diluted household bleach or other EPA-approved disinfectants with a focus on “commonly touched surfaces and surfaces that come into direct contact with people’s bare skin each day (10).” With regard to washing and drying of laundry, follow clothing label directions and dry thoroughly in a dryer (10).

Concerning whirlpool use by athletes, the CDC recommends that athletes should shower prior to use (10). Schools with persistent MRSA problems could consider implementing the more rigorous recommendations for health care facility hydrotherapy tanks and pools: draining, cleaning, and disinfecting after each patient’s use and maintenance of specific chlorine levels (11). Deferment of persons with draining wounds from therapy pools is also imperative in preventing transmission (11).

Personal hygiene with particular emphasis on hand washing should be the top priority in prevention and control of MRSA infections in athletic departments. However, interrupting possible transmission through environmental cleanliness should also be a priority.

Table 2. Staphylococcal growth including *S. aureus* in football players socks by date of collection, sock source, practice location, and practice type in Texas high school athletic departments, 2007

Date	Socks cultured #	Staphylococcal growth positive # (%)	<i>S. aureus</i> positive # (%)	Sock source ²	Practice location	Practice type (physical contact)
Players						
9/24/07	46	32 (69.6)	1 (2.2)	Store rack	Outside	Special teams (minimal)
10/1/07	46	16 (34.8)	0 (0.0)	Packaged	Outside	Offense/defense (maximum)
10/15/07	46	32 (76.2)	0 (0.0)	Packaged	Outside	Offense/defense (maximum)
10/22/07	36	24 (66.7)	0 (0.0)	Packaged	Inside	Weights/videos (none)
Total*	174	104¹ (59.8)	1 (0.5)			
Controls						
NA	4	1 ² (25.0)	0 (0.0)	Store rack	NA	NA
NA	44	02 (0.0)	0 (0.0)	Packaged	NA	NA
Total*	48	11 (0.02)	0 (0.0)			

References

1. Yoder JS, Blackburn BG, Craun GF, Hill V, Levy DA, Chen, N., et al. Surveillance for waterborne disease and outbreaks associated with recreational water --- United States, 2001-2002. *MMWR Morb Mortal Wkly Rep.* 2004 Oct 22;53 (SS-8):5-7. Available at <http://www.cdc.gov/mmwr/PDF/ss/ss5308.pdf>.
2. Dziuban EJ, Liang JL, Craun GF, Hill V, Yu PA, Painter J, et al. Surveillance for Waterborne Disease and Outbreaks Associated with Recreational Water--- United States, 2003-2004. *MMWR Morb Mortal Wkly Rep.* 2006 Dec 22;55(SS-12):6-29. Available at <http://www.cdc.gov/mmwr/PDF/ss/ss5512.pdf>.
3. Begier EM, Frenette K, Barrett NL, Mshar P, Petit S, Boxrud DJ, et al; Connecticut Bioterrorism Field Epidemiology Response Team. A high-morbidity outbreak of methicillin-resistant *Staphylococcus aureus* among players on a college football team, facilitated by cosmetic body shaving and turf burns. *Clin Infect Dis.* 2004 Nov 15;39(10):1446-1453.
4. Kazakova SV, Hageman JC, Matava M, Srinivasan A, Phelan L, Garfinkel B, et al. A clone of methicillin-resistant *Staphylococcus aureus* among professional football players. *N Engl J Med.* 2005;352(5):468-475.
5. Horikawa K, Murakami K, Kawano F. Isolation and characterization of methicillin-resistant *Staphylococcus aureus* strains from nares of nurses and their gowns. *Microbiol Res.* 2001; 155: 345-349.
6. Borchardt SM, Yoder JS, Dworkin MS. Is the recent emergence of community-associated methicillin-resistant *Staphylococcus aureus* among participants in competitive sports limited to participants? *Clin Infect Dis.* 2005;40(6):906-907.
7. Nguyen DM, Mascola L, Brancoft E. Recurring methicillin-resnt *Staphylococcus aureus* infections in a football team. *Emerg Infect Dis.* 2005;11(4):526-532.
8. Hall AJ, Bixler D, Haddy LE. Multiclonal outbreak of methicillin-resistant *Staphylococcus aureus* infections on a collegiate football team. *Epidemiol Infect.* 2009;137(1):85-93. Epub 2008 Apr 18.
9. Miller LG, Diep BA. Clinical practice: colonization, fomites, and virulence: rethinking the pathogenesis of community-associated methicillin-resistant *Staphylococcus aureus* infection. *Clin Infect Dis.* 2008;46(5):752-760.
10. Centers for Disease control and Prevention. About Methicillin-Resistant *Staphylococcus aureus* (MRSA) among Athletes, Updated August 2010. Available at <http://www.cdc.gov/mrsa/groups/advice-for-athletes.html>.
11. Centers for Disease Control and Prevention. Guidelines for environmental infection control in health-care facilities: recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). *MMWR Morb Mortal Wkly Rep.* 2003;52 (RR-10):20-21.

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Unexplained Deaths in a Correctional Facility: Southwestern Texas, Summer 2007

Background

On July 30, 2007, the Texas Department of State Health Services (DSHS), Health Service Region 8 (HSR 8) received a telephone call from a county sheriff requesting assistance with the investigation of an unexplained death of an inmate at Correctional Facility A. By August 6, 2007, a total of four unexplained cases of severe illnesses characterized by neurological or respiratory symptoms had been identified at Facility A. A request for assistance from the Centers for Disease Control and Prevention (CDC) was initiated on August 10, and a coordinated investigation was completed on October 11, 2007.

Methods

Clinical Case Reviews

Cases were defined as respiratory illness, alteration of mental status, or both, of severity requiring hospitalization, occurring in an inmate at Facility A between July 3 and August 10, 2007. Medical records were assessed by the joint (DSHS HSR 8/CDC) investigation team. A CDC neuroepidemiologist examined two case patients.

Epidemiologic Investigation

To assess possible etiologies and epidemiologic links between cases, the investigative team constructed a timeline of housing locations and onsets of disease for cases. To assess baseline rates of respiratory and neurologic symptoms in the population, to identify additional illnesses, and to assess the appropriateness of sick call logs as a surveillance tool, we examined the patient sick call log for Facility A. To obtain additional medical and social histories of case patients, we interviewed known relatives, acquaintances, and asymptomatic inmates.

Environmental Assessment

An instrumental survey of five inmate blocks and one tuberculosis isolation area was conducted. A baseline air evaluation monitor which measures humidity, temperature, carbon dioxide, carbon monoxide, air velocity, and differential air pressure was used to evaluate indoor air quality.

Results

Clinical Case Reviews

Patient A was a 37 year old Hispanic male U.S. citizen who developed poor appetite on July 14, 2007. Three days later, he complained of dizziness, weakness, and anorexia, as well as a cough with non-bloody sputum. Upon admission to the local hospital, he was diagnosed with miliary tuberculosis, isolated and started on standard anti-tuberculosis therapy. He became increasingly

tachypnic with increasing oxygen requirements and died on July 22, 2007.

Patient B was a 25-year old male Honduran national with a history of a positive tuberculin skin test and negative chest x-ray. On June 30, 2007, he was placed on suicide watch due to altered behavior, where he displayed increasingly bizarre behavior, became minimally responsive and exhibited increasing anorexia, incontinence, and lethargy. Upon admission to the local hospital on July 11, 2007, chest x-ray suggested atelectasis, effusion, or infiltrate. An EEG was consistent with encephalopathy. He became intermittently febrile and developed a productive cough with bright red blood and thick brown sputum. A subsequent x-ray demonstrated right pleural fluid, a right pleural effusion, and bibasilar atelectasis, as well as pulmonary vascular congestion. A rash was noted on his right arm and trunk, consisting of small white pustules with an erythematous ring. On July 26, 2007, he was intubated and died later that evening.

Patient C is a 26 year old Hispanic male Mexican national with an apparent long-standing history of schizophrenia and substance abuse, including inhalants and methamphetamine. On July 18, 2007, abnormal behaviors, including ritualistic movements, hallucinations, and agitation were observed. Upon admission to the local hospital on July 26, 2007, he was non-responsive. All diagnostic evaluations were within normal limits. On July 29, 2007, he was transferred to a hospital in San Antonio with a diagnosis of "altered mental status." Upon admission, CSF examination and brain MRI were unremarkable. EEG was consistent with diffuse mild cerebral dysfunction. An extensive evaluation for etiologies of infectious, toxic, and metabolic encephalopathy was undertaken, and all were within normal limits. He was medicated and transferred back to the local hospital, where he was evaluated by a CDC neuroepidemiologist. Physical examination was unremarkable. Neurological examination was normal, with the exception of mutism, and functional imbalance upon standing. The examination was consistent with volitional non-compliance.

Patient D was a 38 year-old Hispanic male Honduran national, HIV positive, with a left below-elbow amputation. On August 7, 2007, he complained of dizziness, and developed shortness of breath, imbalance, incontinence, lethargy, tachypnea, and tachycardia. Upon admission to the local hospital on August 8, 2007, he was placed on oxygen and started on antibiotics. He received fluid therapy for hypotension and dehydration. Chest x-ray

revealed mild bilateral lower lobe infiltrates; however, over the next several days with rehydration, more extensive infiltrates developed. By August 10, 2007, the patient was unresponsive. Brain MRI was markedly abnormal and consistent with either hydrocephalus ex vacuo, or obstruction of the fourth ventricle. An EEG showed diffuse slowing, with no spike or spike-and-wave activity. On August 11, he was intubated due to acute respiratory distress syndrome. He subsequently went into renal failure. Neurologic exam by the CDC neuroepidemiologist were consistent with diffuse cerebral dysfunction with midbrain/pontine involvement. Due to progressively worsening kidney function he was transferred to a tertiary care facility in San Antonio. Imaging revealed fluid and bleeding in the brain, resulting in the placement of a drain. His condition continued to deteriorate to an irreversible state and he died on August 31, 2007. An autopsy was performed later that day.

Epidemiologic Investigation

Through construction of a timeline and housing matrix, it was determined that case patients A, B, C and D were not housed together at any location at concurrent times, and that by the time case D arrived at the facility, the other 3 cases were no longer there. Using broad definitions of respiratory illness and neurological illness, we constructed and examined epidemiologic curves, grouped by week, based on inmate self-reporting as recorded in the inmate sick call log. From these data, there was no evidence of an ongoing outbreak of respiratory or neurologic illness. Medical charts for a subset of inmates in the sick call log were reviewed. No additional inmates were found who met our case definition. Through our investigation, we discovered that five inmates housed with patient A had positive tuberculin skin tests, following removal of patient A from the cell, indicating a possible outbreak of correctional facility acquired tuberculosis (TB). At least one of these individuals was subsequently diagnosed with active TB. No additional contributory information was obtained from family members, acquaintances or inmates.

Environmental Assessment

Air quality checks found dust loading and/or mold on the diffusers of all of the sampled housing pods, as well as slightly elevated carbon dioxide in the pod that housed Case Patient A. Heating, ventilating and air conditioning assessments of unoccupied cells indicated that the availability of fresh air was slightly, but not significantly, lower in the pod that housed Case Patient A.

Discussion And Conclusions

Several lines of evidence suggest that these cases are not epidemiologically, clinically, or etiologically related. First, there is no clear linkage in terms of time and place between cases. Specifically, no patients were housed in the same location at the same time, and notably, the first three patients were no longer in the facility at the time of arrival of patient D. Second, analysis of surveillance data from the patient sick call log indicate no obvious changes in background levels of complaints related to respiratory or neurological illness, suggesting that there is no clear communicable etiology or common environmental exposure causing these symptoms. Lastly, environmental assessments of the facility failed to reveal any strong evidence of a relationship between a toxic exposure and the development of severe respiratory and neurological illness.

Final assessments for each patient were as follows:

- Case A:** Clinical and radiographic findings were consistent with disseminated tuberculosis, although laboratory confirmation is lacking.
- Case B:** Given that no specimens remain and no autopsy specimens were obtained, this case will remain unexplained.
- Case C:** Psychiatric illness.
- Case D:** Autopsy revealed necrotizing pneumonitis and multiple organ infection with herpesviruses.

While our investigation suggests TB disease in both case patients A and B, it should be reiterated that we found no evidence of an epidemiologic linkage between them. However, in our investigation, we did note a cluster of tuberculin skin test conversions linked by housing location to case A and another active TB case.

Inmates housed in detention facilities represent a highly vulnerable population, increasing the likelihood of observing rare diseases or diseases with unusual presentation. This investigation led to the development of an infectious disease algorithm for use in HSR 8 correctional facilities. (Figure 1, page 33)

Reference

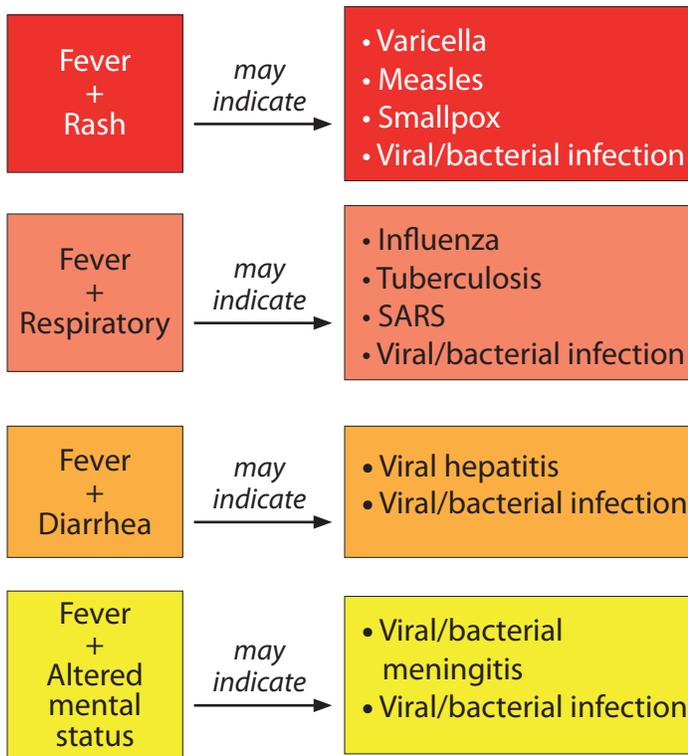
Adapted from Trip Report Epi-Aid # 2007-057: Investigation of Unexplained Neurologic and Respiratory Conditions in a Texas Detention Facility - July, 2007.

Prepared by Health Service Region 8,
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Figure 1.

Algorithm for the detection of clusters/outbreaks of diseases of potential public health significance in a correctional setting

1. Individuals with these symptoms (fever is defined as >100.4F oral temp) should be considered to be contagious, removed from the general population, and medically evaluated **within 24 hrs of symptom onset**:



2. Diagnostic evaluation may be accomplished locally or through a reference hospital or laboratory.

- Rapid Tests:**
Influenza A & B
Streptococcus
- Imaging:**
CXR, CT, MRI, EEG
- Sputum:**
Smear
Culture
- Urine/Stool:**
Urinalysis
Toxicology
Stool Culture
- Blood:**
CBC/Diff/Chem
Antibody tests (IgG/IgM)
Bacterial/Viral Culture
- CSF:**
Counts
Gram stain
Bacterial Antigen
Bacterial Culture
Viral Culture
- Consultation:**
Infectious Disease
Pulmonolog

Note:

The immune status of a patient is often helpful in understanding their presentation and communicability.

An HIV test with CD4 counts is recommended as part of the diagnostic workup.

3. Contact public health 24/7/365. For any of the following, see reporting numbers by county at: <http://www.dshs.state.tx.us/idcu/investigation/conditions/contacts/>

- Any suspected or confirmed case of notifiable disease. See list and reporting time frames at: http://www.dshs.state.tx.us/idcu/investigation/forms/101A_color.pdf
- Any clusters (same cell or same period of time) of similar illnesses of known or unknown etiology
- Any cases of illness, hospitalization or death that remain unexplained after a complete diagnostic evaluation