



**Cryptosporidiosis Outbreak Report
2007**

**Salt Lake Valley Health Department
Bureau of Epidemiology**

Introduction

During the latter half of 2007, the Salt Lake Valley Health Department (SLVHD) collaborated and coordinated with health officials and many community partners (including pool operators) across the Wasatch Front to investigate and control a large community-wide outbreak of cryptosporidiosis. Statewide, over 1,900 people became infected with *Cryptosporidium* from June 1, 2007 to November 30, 2007. Health districts most affected included Salt Lake, Utah, Davis, Weber-Morgan and Bear River; cases were first reported outside of Salt Lake County. Nationwide, the incidence of cryptosporidiosis has increased in recent years; an estimated 30 outbreaks occurred in 2007. The 2007 Utah outbreak was one of the largest community-wide outbreaks in United States history.

Cryptosporidium is a hardy parasite which thrives in the intestines of humans and animals, causing diarrheal illness. It is most often spread through ingestion of contaminated water and its protective outer shell makes it very resistant to chlorine. Symptoms usually appear about 7 days after exposure and may include watery diarrhea, abdominal cramping, dehydration, nausea, vomiting, loss of appetite and low grade fever; some individuals do not have any symptoms. Most healthy people recover without treatment within 1-2 weeks; however, diarrhea may be intermittent for up to 30 days and immunocompromised individuals may experience prolonged diarrhea and/or severe illness.

Outbreak

A total of 684 lab-confirmed cases of cryptosporidiosis were reported to SLVHD from July 19, 2007 to November 30, 2007. By comparison, only 5 cases are expected during this same time period each year. The majority of cases became ill during August and September (Figure 1).

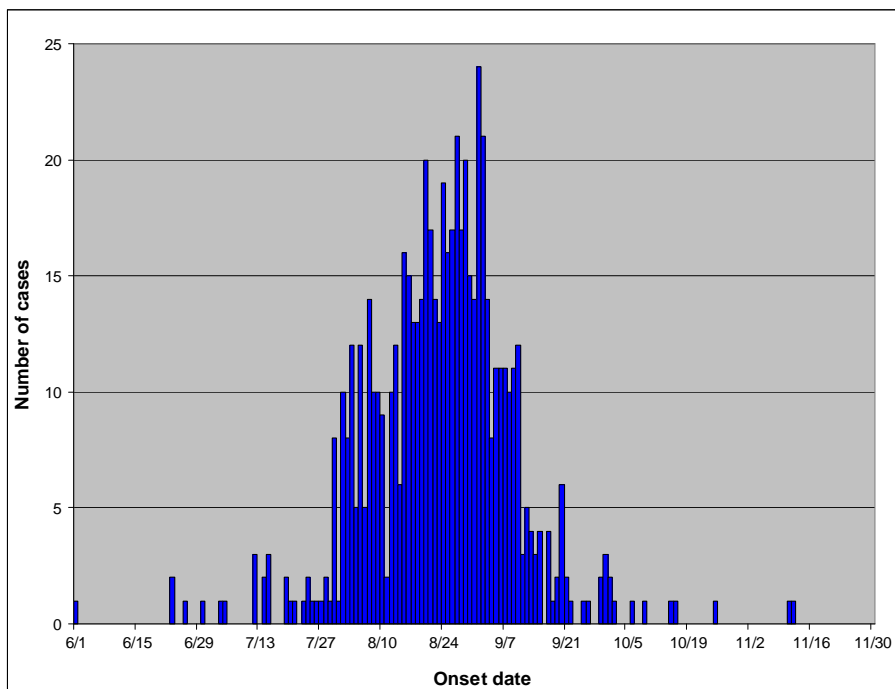


Figure 1. Confirmed cases by date of illness onset.

Of these cases, 51% were male, 8% were hospitalized and 28% were under the age of 5. Age ranged from 1 month to 86 years (average = 15 yrs, median = 9 yrs, mode = 1 yr). Over time, cases shifted from young children to care-providing adults (Figure 2). Preliminary geographic analysis suggested 2 clusters of disease within Salt Lake County: the south end of the valley and the east bench.

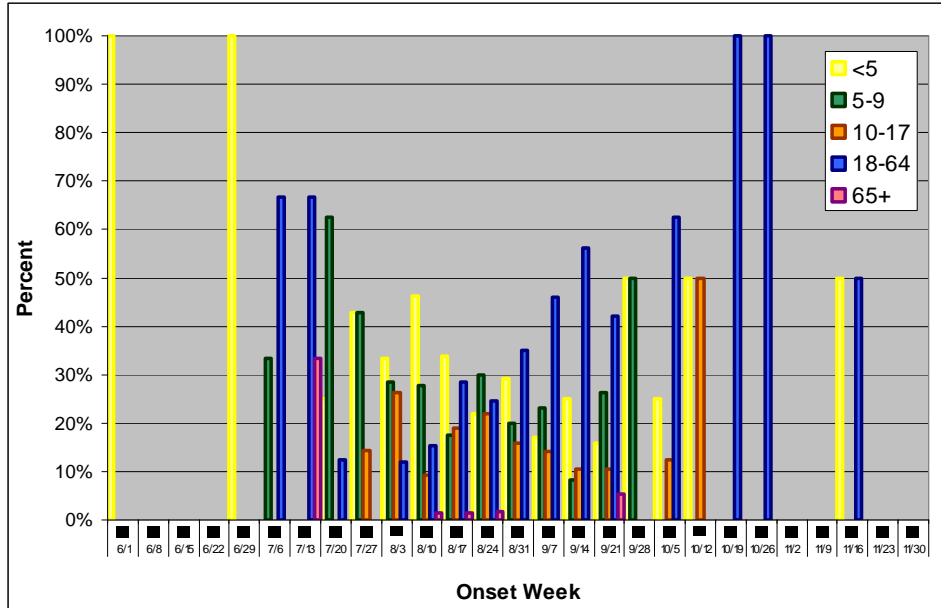


Figure 2. Percentage of cases' illness onset dates by age group.

Exposure to any type of recreational water was the predominant risk factor for infection with *Cryptosporidium* (64%); however, over the course of the outbreak, exposure to an ill contact became more common (Figure 3), as the disease spread among family members and friends.

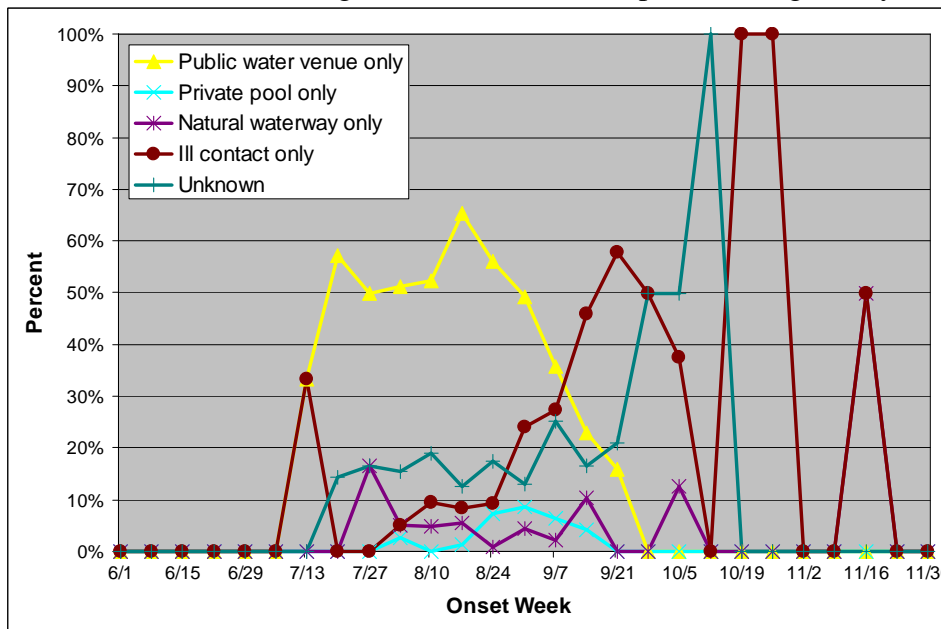


Figure 3. Percentage of cases' illness onset dates by risk factor.

Intervention and Prevention

Early in the outbreak, SLVHD informed and collaborated with the medical community (including health care providers, urgent care facilities, hospitals, emergency departments and infection control practitioners), notifying them of the increase in cryptosporidiosis in the community and requesting that patients with watery diarrhea be tested for *Cryptosporidium*. SLVHD also requested that physicians educate their patients not to swim while ill with diarrhea and for 2 weeks after diarrhea subsides.

Other community-wide notifications and education materials were provided via mailings, website postings, e-mails or personal contact to the following groups and organizations: Make-A-Wish Foundation, YMCA, the Hotel/Motel Association, Salt Lake County Parks and Recreation, licensed child care facilities, summer camps, water play venues such as water fountains, high school athletic associations, swim teams, home owner associations, fitness facilities, pool maintenance companies, chemical suppliers, aquatic directors, Utah Poison Control Center, 2-1-1 information line, Salt Lake County Aging Services, religious organizations, Boy Scouts and Girl Scouts of America and Salt Lake County school nurses.

In addition, guidelines for healthy swimming were posted at water venues:

- Do not swim if you have diarrhea or if you have had diarrhea in the last 2 weeks
- Do not swallow pool water
- Practice good hygiene: shower before swimming and wash your hands after using the toilet or changing diapers
- Take kids on bathroom breaks and check diapers often
- Change diapers in the bathroom and not at poolside
- Wash your child thoroughly (especially the rear end) with soap and water before swimming

State and local officials held several press conferences to inform and educate the public on how to limit the transmission of *Cryptosporidium* in pools across the Wasatch Front; the following prevention measures and restrictions for public swimming pools were implemented:

- Exclude children under 5 years from public water venues
- Exclude people in diapers, regardless of age, from public swimming pools
- Hyperchlorinate at least weekly: raise the chlorine level in the pool to 10-20 parts per million (ppm) for 8-16 hours
- Maintain pool chlorine levels at 5 ppm

Restrictions were modified at various points during the outbreak based on the number of reported cases; the age restriction was lifted on 9/25/07, maintenance of chlorine levels at 5 ppm was lifted on 10/10/07 and all restrictions were lifted on 11/14/07.

Challenges

One of the biggest challenges this outbreak presented to public health was the time lag between an individual's exposure and the individual's report of confirmed disease to SLVHD. This was due to a combination of disease characteristics, medical testing and laboratory reporting. Analysis showed that with an average incubation period of 7 days, an average length of time to seek medical care of 7-9 days and an average reporting time from laboratory to SLVHD of 4-5 days, the time lag was approximately 18-21 days. Once SLVHD received the disease report, however, investigators responded in a timely manner (average < 1 day).

The second biggest challenge of this outbreak was managing the sheer number of cases reported to SLVHD in a short time period. This outbreak was incredibly resource intensive and demanded that priorities be shifted, all whilst maintaining regular disease surveillance and investigation. It should be noted that the number of cases reported to SLVHD during this outbreak may have represented only a small fraction of the true number of affected individuals; the Centers for Disease Control (CDC) estimate that only 2-5% of enteric diseases are reported to public health. Based on this approximation, the estimated burden of *Cryptosporidium* disease in Salt Lake County could have ranged from 13,680 cases to 34,200 cases.

Other challenges related to the chemical interventions. It was difficult for pool operators to keep pool chemistry in balance after hyperchlorination and while attempting to maintain chlorine levels at 5 ppm. SLVHD documented several water venues where the chlorine level was too high or the water chemistry was out of balance and received a number of related complaints, including skin irritation, chemical burns and hair loss after swimming in public pools. In addition, it was difficult for pool operators to obtain the proper chemical supplies required to comply with the interventions.

Finally, an important lesson learned in this outbreak was that initial coordination and communication among many health agencies and community partners is imperative when an outbreak is detected. Upon detection of an anomaly in disease reports, such as in the number, timing and geographic location, jurisdictions that could potentially be affected need to be notified. This point was particularly important in this outbreak due to the movement of individuals between jurisdictions and the initial predominant risk factor for exposure.

Conclusions

Over a period of 6 months, the Wasatch Front experienced a large community-wide outbreak of cryptosporidiosis. According to the CDC, it is possible that a similar event will occur in subsequent years, due in part to the inability of humans to build immunity against *Cryptosporidium* and the continuation of cases over winter throughout the state. Health officials continue to collaborate in order to prepare for next season. Although data from the 4 weeks immediately following the implementation of pool restrictions and control measures (8/31/07-9/28/07) show that the number of confirmed *Cryptosporidium* cases decreased an average of 55% each week, the true effectiveness of these interventions may never be clear. A number of outside factors occurred simultaneously that also likely contributed to the decline in cases, such

as seasonal pool closures, the return of kids to school, the end of summer camps, etc. Nevertheless, enhanced surveillance, public education and coordination with outside agencies will continue in an effort to maintain the significantly reduced number of cryptosporidiosis cases and to prevent future outbreaks.

In addition to the efforts of public health, it is important to remind all citizens of the need for personal responsibility relating to proper personal and pool hygienic practices, not only for his/herself but also for his/her children. This includes: good hand washing, especially after using the restroom, after changing diapers and before preparing food; not swimming while ill with diarrhea and for 2 weeks after diarrhea stops; not swallowing pool water; and not changing diapers at poolside. Ultimately, the public is responsible for adhering to these guidelines in order to prevent the spread of disease through public water venues and to other people.

Respectfully submitted by:

Linda Bogdanow and Jennifer Roberston
Bureau of Epidemiology
Salt Lake Valley Health Department
12/19/2007