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County Fair Ends With Serious Illness for Some Participants

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On July 28, 2009, the director from the Lawrence County Emergency Management Services contacted the nurse at the Lawrence County Health Department (LCHD) to report that three people had been hospitalized with symptoms of bloody diarrhea and one case was diagnosed with hemolytic uremic syndrome (HUS). It was also reported that cases had attended the county fair the week prior. The LCHD contacted the Indiana State Department of Health (ISDH).

Epidemiologic Investigation
The ISDH and the LCHD immediately initiated a collaborative investigation. Six cases were investigated using the ISDH *E. coli* Case Investigation Forms to collect demographic, clinical, epidemiologic, and risk factor data. Among the cases identified early in the investigation, the only common factor was attendance at the county fair. All cases spent time at the fair from July 11 – 19, 2009 and had contact with farm animals or livestock.

No restaurants, food vendors at the fair, or grocery stores were common among all cases. The only common food vendor identified at the fair was the ice cream stand. The vendor was immediately contacted to determine the source of the ice cream, which was purchased from a wholesaler that supplies to other retail food establishments. The vendor also stated that employees did not visit the barns before serving customers. The facility was inspected during the fair, and no critical violations were found. This was a very popular vender at the fair, so it was determined that this was an unlikely source due to the different types of ice cream eaten by those interviewed and the limited number of illnesses reported.

All six of those initially reported ill had extensive direct contact with many different animals in different barns at the fair on almost a daily basis. Four cases had animals or livestock at the fair for exhibits. The exhibits included chickens, rabbits, goats, sheep, pigs, horses, and cows. The cases were responsible for feeding and grooming their animals and cleaning the stalls and cages. One case assisted her boy friend's family with their cattle. The other case was an attendant who visited all barns and passed out show ribbons. Of known data, all cases indicated visiting other

barns. No conclusion could be drawn as the possible source of infection based on barn or type of animal contact.

None of the initial cases were friends or associated with each other. The only common association identified was when the attendant case shook hands with another case while handing out ribbons. The outbreak took place over a 7-day period from July 17 through July 23. One case was confirmed positive with *E. coli* O157 (Shiga-toxin type 2), one case tested positive forShiga-toxin type 2, and one case was diagnosed with HUS. Three other cases were investigated. One case was admitted to the hospital with bloody diarrhea, butShiga-toxin was not found in stool sample. Another case had experienced seven days of cramps and diarrhea, but no testing was done. The third case was symptomatic with vomiting, cramps, and diarrhea with no lab confirmation.

Two of the case investigations revealed that five household contacts were symptomatic with mild diarrhea and cramps lasting approximately two days. A household contact of the HUS case was ill one day prior to the initial case onset. The case identified with Shiga-toxin markers reported a household contact becoming ill one day after the initial case and three secondary illnesses of household members six to ten days from onset of case family member.

Three of the six cases were hospitalized, two were seen as outpatients, and one did not seek medical treatment. Five stool specimens were submitted for testing, and of those, only two had positive results. It is not unusual for *E. coli* bacteria not to grow in culture once a person has progressed to HUS because the bacteria are present at such levels in the intestines that growth is unlikely.

Environmental Assessment

Fair attendees were not specifically counted, but officials roughly estimated that about 20,000 people attended the county fair. Of the 603 4-H members, 337 displayed animals. Many types of animals and livestock are housed on display for public viewing and petting and shown in various categories. Stalls are cleaned and maintained by the 4-H owner. All manure is removed from the stall to a location away from the public. Public restrooms with hand washing facilities are located on the property. Potable hand washing is not available in the livestock barns, but hand sanitizing stations were available at all barns with the exception of the goat barn. Food is vended by many local clubs and organizations as well as vendors that travel with the carnival.

Laboratory Results

The ISDH Laboratory conducted PCR testing of stool specimens. Virulence markers tested by PCR in one case were positive for both *stx2* and *uidA* and another case was positive for *stx2* only. *Stx1* and *stx2* are virulence markers present in Shiga-toxin producing *E. coli*. These organisms are important causes of HUS, hemorrhagic colitis, and diarrhea worldwide. The *UidA* marker is present in *E. coli* serotype O157.

Conclusions

The investigation indicated that an outbreak of lower gastrointestinal intestinal (GI) illness occurred among persons that had some association with the county fair. The likely source of infection for the initial cases was exposure to animal feces. It was not possible to identify which animal or animals were the source of infection because more than one animal barn was visited by those initially infected. It is possible that mild secondary cases occurred in one family. Lab test results were not confirmatory in identifying a relationship between cases.

Escherichia coli (esh-uh-rik-ee-uh koh-lie) is a bacterium that lives in the intestines of most healthy warm-blooded animals, including humans. There are hundreds of strains of *E. coli*, and most are harmless. However, several types of *E. coli*, such as O157, and other Shiga-toxin producing strains, can cause severe and contagious illness in humans. On average, 90 cases of Shiga-toxin producing *E. coli* are reported in Indiana every year.

E. coli is passed in the stool, and people become infected by ingesting feces from an infected animal or person (fecal-oral route). There are many ways to become infected with *E. coli*:

- Eating contaminated foods:
    - Undercooked beef products, particularly ground beef.
    - Drinking unpasteurized milk and fruit juices, including apple cider.
    - Unwashed raw fruits, vegetables, or herbs that have been contaminated by feces, raw meats, fertilizers, or untreated water.
- Swallowing untreated water, e.g., from lakes or streams.
- Having direct contact with the stool of infected cattle, livestock, and animals at petting zoos.
- Having contact with an infected person's stool:
    - Not washing hands after contact with stool from a contaminated surface or diaper/linen and ingesting the bacteria.
    - Having sex that involves contact with stool.

The most common sources of *E. coli* outbreaks are inadequately cooked hamburgers, produce (such as melons, lettuce, spinach, coleslaw, apple cider, and alfalfa sprouts), and unpasteurized dairy milk. Persons who work in certain occupations, such as food handlers, day care providers, and health care providers, have a greater risk of transmitting infection to others.

Symptoms of *E. coli* infection are bloody or non-bloody diarrhea, abdominal cramps and little or no fever. Symptoms usually begin 3-4 days (range of 2-10 days) after exposure and last for approximately 5-10 days. Some people may only have mild diarrhea without blood or no symptoms at all. An infected person can pass the bacteria in their stool for up to 3 weeks after their symptoms have stopped.

Approximately 8% of people infected with *E. coli* (O157 and other Shiga-toxin producing strains) can develop a condition called hemolytic uremic syndrome (HUS). This condition is very serious and can lead to kidney failure and death. Children under 5 years of age and the elderly are more likely to develop this condition.

In general, *E. coli* infection can be prevented by strictly adhering to the following guidelines:

- Practice good hygiene:
    - Thoroughly wash hands with soap and water after using the restroom; after assisting someone with diarrhea and/or vomiting; after contact with animals and reptiles; after swimming; before, during, and after food preparation; and after exposure to raw meat products (please refer to Quick Facts about Hand Washing).
    - Clean food preparation work surfaces, equipment, and utensils with soap and water before, during, and after food preparation, especially after contamination with raw meat products.

- Separate raw and cooked foods:
    - Avoid cross-contamination by keeping uncooked meat products separate from produce, ready-to-eat foods, and cooked foods.
    - Use separate equipment and utensils for handling raw foods, especially for marinades or barbeque sauce.
    - Clean food-preparation work surfaces and utensils with soap and water before, during, and after food preparation, especially after contact with raw meat products.

- Maintain safe food temperatures:
    - Ensure proper temperatures are maintained during refrigeration (<40 ˚F), freezing (<2˚F), holding (keep food hot or at room temperature for no longer than 2 hours), and chilling (chill immediately and separate into smaller containers if needed).
    - Thoroughly cook all food items to USDA recommended safe minimum internal temperatures:
        - 145˚F – steaks and roasts
        - 160˚F – pork and ground beef (should not be eaten pink)

- Eat safe foods (Remember: Contaminated foods may look and smell normal):
    - Do not eat undercooked meat.
    - Do not eat foods past the expiration date.
    - Do not eat unpasteurized dairy products and fruit juices, including apple cider; it is illegal to sell unpasteurized dairy products in Indiana.
    - Wash all produce before eating raw or cooking.
    - Use treated water for washing, cooking, and drinking.

- Handle animals safely:
    - Wash hands after contact with livestock, petting zoos, pets, especially if they are suffering from diarrhea.

- Protect others:
    - Persons with diarrhea and/or vomiting should not prepare food or provide health care for others and should limit direct contact with others as much as possible.
    - Persons with diarrhea and/or vomiting should not attend a day care facility or school.
    - Persons with diarrhea and/or vomiting shall be excluded from employment involving food handling (Indiana Retail Food Establishment Sanitation Requirements, 410 IAC 7-24-122).

References

1. Red Book. 27th Edition. 2006. American Academy of Pediatrics.
2. Communicable Disease Quick Facts. Indiana State Department of Health. http://www.in.gov/isdh/20209.htm

Hand washing: Is it important?

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The single most important habit you can practice to prevent foodborne illness and other communicable diseases is proper hand washing. Transmission of pathogens most commonly occurs via the hands. When done properly, not only will hand washing remove a majority of viruses and harmful bacteria, it is the most effective means to prevent you from becoming ill.

Hand washing can prevent illness in several ways. Each year in the United States, over 76 million individuals become ill with a foodborne illness, and over 5,000 die as a result. Hand washing can prevent foodborne illness in a food service environment as well as other settings. Food handlers can transmit illness through contaminated hands after using the restroom or contact with objects or food contaminated with pathogens. As a result, the pathogens can be transmitted to food items prior to consumption. In health care settings, proper hand hygiene can reduce outbreaks and nosocomial infections by reducing the spread of antimicrobial resistant organisms. Infections such as methicillian-resistant *Staphylococcus aureus* (MRSA), *Clostridium difficile* and respiratory illnesses (e.g., 2009 H1N1) can often be prevented with adherence to hand washing guidelines.

Although there are many health benefits to hand washing, people do not practice this tactic for various reasons. Common complaints for non-adherence to proper hand washing include skin irritation, inaccessible supply/access to soap, sinks, paper towels, preference for wearing gloves, ignorance of guidelines, insufficient time to wash hands, forgetfulness, and understaffing.

Proper hand hygiene includes washing hands with soap and water or using an alcohol-based hand sanitizer. Using soap and water is effective because the combination of washing hands with soap, along with rinsing the hands under water, loosens and removes disease-causing microorganisms. Proper hand washing with soap and water includes the following steps:

* Wet your hands with warm running water.
* Apply soap and lather well.
* Rub hands together vigorously for at least 20 seconds
* Be sure to scrub the backs of hands, between fingers and under fingernails
* Rinse well under running water
* Dry hands with a disposable towel
* After drying hands, shut off faucet with disposable towel

Alcohol-based hand sanitizers are an acceptable alternative to hand washing with soap and water. While soap and water is more effective in removing viruses and bacteria, alcohol-based sanitizers are more effective in killing some disease-causing viruses and bacteria on the surfaces of hands. Not all hand sanitizers contain alcohol, so it is important to make sure that the hand sanitizer

Epi Flashback

1890 – In an article titled "Cheap Disinfectants, Etc." H.V. Brown, MD writes that "… Many of the agents used as disinfectants and deodorizers, are without value entirely for the destruction of disease germs." The article suggests using a one pint mixture of chloride of lime and soft water "for the disinfection of discharge in cholera and typhoid fever." Another powdered disinfectant is "to simply take chloride of lime, one pound, corrosive sublimate, one ounce, plaster Paris, nine pounds, well pulverized and thoroughly mixed, for disinfecting privy vaults, excreta, etc." For disinfecting a room, "burn three pounds of sulphir to each thousand feet of air space."

Source: Ninth Annual Report of the State Board of Health of Indiana for the Fiscal Year Ending October 31, 1890

contains at least 60% alcohol. If hands are visibly soiled, it is best to wash with soap and water. When using alcohol-based hand sanitizers, be sure to:

*Apply approximately ½ teaspoon of the sanitizer to the palm of hand.
*Rub both hands together, making sure to cover all surfaces of hands until they are dry.

It is important to take the time and effort to properly wash your hands. Proper hand hygiene reduces the risk of disease transmission and can protect your health and the health of others.

References

1. Pittet D, Improving adherence to hand hygiene practice: A multidisciplinary approach. Emerging Infectious Diseases. 2001
2. CDC fact sheet, hand hygiene guidelines fact sheet, 2002.
3. Reynolds M, Wash your hands if you pet that bunny, compendium of measures to prevent disease associated with animals in public settings, 2007.
4. Green L, Selman A, Radke V, Ripley D, Mack J, Reimann D, Stigger T, Motsinger M, Bushnell L, Food worker hand washing practices: An observation study, Journal of Food Protection, 2006.
5. Mayo clinic staff, Hand washing: an easy way to prevent infection, Mayo clinic. Com, 2008.

Epidemiology and Problem Solving: An Epidemiologically Based Intervention to Mitigate an H1N1 Outbreak

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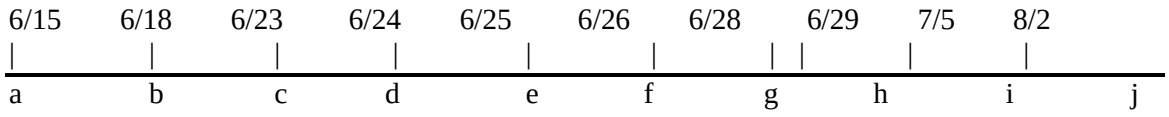
Introduction:
The following is a description of the process used to identify an H1N1 influenza outbreak at an Indiana residential summer camp and the strategies implemented to prevent further illness. The successful outcome was accomplished primarily because of the vigorous efforts of camp staff, in conjunction with the local health department (LHD) and ongoing consultation and support from the Indiana State Department of Health (ISDH).

Timeline:
During outbreak investigations, it is critical to quickly pinpoint the source of disease with the ultimate goal of treating those ill and preventing further spread. The timeline below is a summary of the process, pre-outbreak through outbreak resolution.



a.) Pre-illness education at the camp
b.) Camp opening
c.) First signs of influenza-like illness (ILI)
d.) Several campers presented with ILI; 5 samples collected
e.) 5/5 samples confirmed positive by ISDH Lab
f.) Strategic assessment
g.) Camp closed
h.) Mitigation strategies implemented
i.) Camp reopening
j.) Camp closed for the season

Epi Flashback

1960 – Dr Offutt describes the 5,000 physicians in Indiana as being "daily engaged in a front-line battle against disease, illness, and disability." Therefore the required reporting of certain diseases is essential for painting a picture of the disease battlefield. "In general, there are three types of activities initiated by…" diseases reported to the Indiana State Board of Health. First, "a report of a serious disease capable of spreading rapidly … causes immediate action by state and local public health personnel." Second, since control measures are not always known, collecting a body of information about a disease "may one day enable health officials and physicians to develop such controls." Finally, surveillance of reports "enable the health department to predict the yearly variations in disease prevelence."

Source: The Monthly Bulletin Indiana State Board of Health June 1960

Pre-Outbreak/Initial Outbreak:
Prior to camp opening, LHD representatives educated camp staff and disseminated information regarding prevention and mitigation of influenza.

On 6-24-09, shortly after camp opened, the LHD was informed of an upper respiratory illness circulating among the campers. Initial testing and assessment by the LHD and camp staff prompted a call to the ISDH. The LHD, the camp staff, and the ISDH collaborated to manage and resolve the outbreak.

Investigation:
The ISDH Field Epidemiologist traveled to the camp to assist with the investigation. There were approximately 170 camp residents representing eight states. Staff was also geographically diverse, representing several states and eight countries. Subsequent meetings with the LHD and camp staff were held on that initial day to discuss strategies for further assessment of influenza-like illness (ILI) among campers and staff. Five nasopharyngeal samples were collected from cases with ILI, and all tested positive for influenza A by rapid test. Following analysis at the ISDH Laboratory, all five of these tested positive for H1N1 by RT-PCR.

Strategy Development and Implementation:
Initially, the camp staff decided keep the camp open, and medical staff isolated those with confirmed and suspected influenza. Campers at high risk for complications of influenza were identified. As ILI increased among campers and staff, the camp staff determined that the necessary facilities or capacity to effectively treat and isolate affected campers were available. Following discussions with the Camp Administrator and Board of Directors and the ISDH, a decision was made to end the camping session early and reopen at the next scheduled session after control measures could be put in place.

Parents of campers with influenza were asked to follow up with their physicians and isolate their children until they were non-infectious. Physician follow-up was also recommended for those campers with health compromising conditions. Arrangements were made for all campers to be transported home; those with confirmed cases were transported by their parents. All others were transported by chartered bus to their hometowns. Information was provided to the state

departments of health where campers lived so that surveillance could be conducted. The camp was subsequently closed.

Mitigation and Prevention:
Following the closure of the camp, strategies were developed to safeguard the health of campers for the final session. In addition to pre-screening of all campers at the reopening of camp and effective camp disinfection, enhanced surveillance to detect ILI was conducted during the final session.

The reopening of camp went smoothly and the final session was successfully completed without further disease transmission.

Training Room

INDIANA STATE DEPARTMENT OF HEALTH IMMUNIZATION PROGRAM PRESENTS:

Immunizations from A to Z

Immunization Health Educators offer this FREE, one-day educational course that includes:

- Principles of Vaccination
- Childhood and Adolescent Vaccine-Preventable Diseases
- Adult Immunizations
    - Pandemic Influenza
- General Recommendations on Immunization
    - Timing and Spacing
    - Indiana Immunization Requirements
    - Administration Recommendations
    - Contraindications and Precautions to Vaccination
- Safe and Effective Vaccine Administration
- Vaccine Storage and Handling
- Vaccine Misconceptions
- Reliable Resources

This course is designed for all immunization providers and staff. Training manual, materials, and certificate of attendance are provided to all attendees. Please see the Training Calendar for presentations throughout Indiana. Registration is required. To attend, schedule/host a course in your area or for more information, please reference http://www.in.gov/isdh/17193.htm.

ISDH Data Reports Available

The following data reports and the *Indiana Epidemiology Newsletter* are available on the ISDH Web Page:

http://www.IN.gov/isdh/

HIV/STD Spotlight Reports (June 2007, December 2007, June 2008, January 2009)	Indiana Mortality Report (1999-2006)
Indiana Cancer Report: Incidence; Mortality; Facts & Figures	Indiana Infant Mortality Report (1999, 2002, 1990-2003)
Indiana Health Behavior Risk Factors (1999-2006)	Indiana Natality Report (1998-2006)
Indiana Health Behavior Risk Factors (BRFSS) Newsletter (2003-2008)	Indiana Induced Termination of Pregnancy Report (1998-2005)
Indiana Hospital Consumer Guide (1996)	Indiana Marriage Report (1995, 1997, & 2000-2004)
Public Hospital Discharge Data (1999-2006)	Indiana Infectious Disease Report (1997-2007)
Assessment of Statewide Health Needs – 2007	Indiana Maternal & Child Health Outcomes & Performance Measures (1989-1998, 1990-1999, 1991-2000, 1992-2001, 1993-2002, 1994-2003, 1995-2004, 1996-2005)

HIV Disease Summary

Information as of December 31, 2009 **based on 2000 population of 6,080,485)**

HIV - without AIDS to date:

355	New HIV cases October 2008 thru September 30, 2009	12-month incidence	6.17 cases/100,000
3,963	Total HIV-positive, alive and without AIDS on September 30, 2009	Point prevalence	68.90 cases/100,000

AIDS cases to date:

346	New AIDS cases from October 2008 thru September 30, 2009	12-month incidence	6.01 cases/100,000
4,431	Total AIDS cases, alive on September 30, 2009	Point prevalence	77.03 cases/100,000
9,198	Total AIDS cases, cumulative (alive and dead) on November 30, 2009		

REPORTED CASES of selected notifiable diseases

Disease	Cases Reported in December *MMWR* Weeks 49-52		Cases Reported in January – December *MMWR* Weeks 1-52	
	2008	2009	2008	2009
Campylobacteriosis	74	0	686	413
Chlamydia	2,048	1,182	21,741	21,169
Cryptococcus	1	1	20	35
Cryptosporidiosis	25	0	203	192
E. coli, shiga toxin-producing	10	0	96	33
Giardiasis	Not Reportable	0	Not Reportable	190
Haemophilus influenzae, invasive	27	4	93	81
Hemolytic Uremic Syndrome (HUS)	0	0	1	0
Hepatitis A	1	0	20	16
Hepatitis B	21	3	67	65
Hepatitis C Acute	8	0	13	16
Histoplasmosis	14	0	89	103
Influenza Deaths (all ages)	0	2	15	28
Gonorrhea	751	324	8,531	6,665
Legionellosis	7	1	60	51
Listeriosis	3	0	10	6
Lyme Disease	2	0	42	51
Measles	0	0	0	0
Meningococcal, invasive	3	0	27	32
Mumps	1	0	2	2
Pertussis	171	4	271	372
Rocky Mountain Spotted Fever	0	0	6	3
Salmonellosis	77	1	641	354
Shigellosis	46	0	607	58

REPORTED CASES of selected notifiable diseases (cont.)

Disease	Cases Reported in October – December *MMWR* Weeks 49-52		Cases Reported in January – December *MMWR* Weeks 1-52	
	2008	2009	2008	2009
Severe *Staphylococcous aureus* in Previously Healthy Person	Not Reportable	0	Not Reportable	15
Group A Streptococcus, invasive	30	4	148	143
Group B, Streptococcus, Invasive (All ages)	40	8	331	241
Streptococcus pneumoniae (invasive, all ages)	203	38	902	444
Streptococcus pneumoniae (invasive, drug resistant)	53	12	241	227
Streptococcus pneumoniae (invasive, <5 years of age)	19	3	73	47
Syphilis (Primary and Secondary)	16	7	140	141
Tuberculosis	11	17	118	122
Vibriosis	Not Reportable	0	Not Reportable	0
Varicella	Not Reportable	6	Not Reportable	380
Yersiniosis	1	0	9	7
Animal Rabies	3 (bats)	0	10 (bats)	40 (bats)

***Note: Case totals for 2009 are preliminary.**

For information on reporting of communicable diseases in Indiana, call the *Surveillance and Investigation Division* at 317.233.7125.

Indiana State Department of Health
Epidemiology Resource Center
2 North Meridian Street, 5-K
Indianapolis, IN 46204
317/233-7125

Cover photo of Cryo-EM reconstruction of a norovirus capsid.courtesy of Dr. B.V.V. Prasad, Baylor College of Medicine, Houston, TX 77030

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