Indiana State Department of Health

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Fireworks-related Injuries

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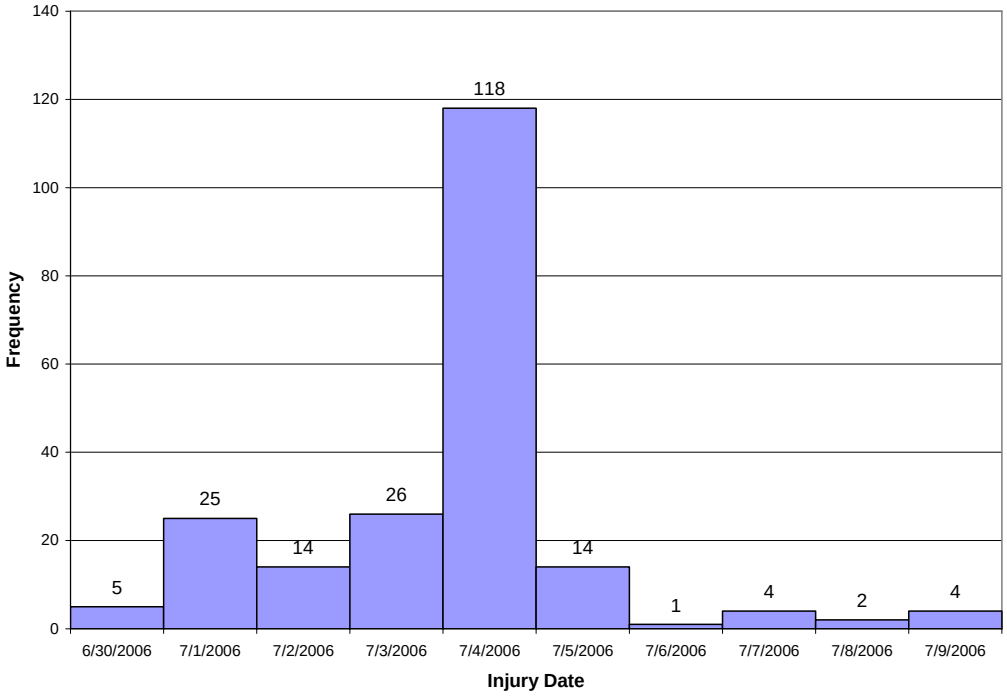
Through the passage of House Enrolled Act 1131, the Indiana State Department of Health (ISDH) received injury reports resulting from fireworks and/or pyrotechnics during 2003 and 2004. No reporting occurred in 2005 due to the expiration of this law. The passage of Public Law 187 in 2006 reinstated reporting of fireworks-related injuries, with identical reporting requirements as those in the previous statute. This report presents fireworks injuries data compiled from March 31-July 31, 2006.

Highlights for 2006

- As of July 31, 2006, 251 unduplicated cases of fireworks-related injuries were reported to the ISDH.
- 55 percent of all reported fireworks-related injuries involved children and adolescents, who represent one fourth of Indiana's population (as of July 1, 2004).
- 73 percent of cases reported burn injuries, with burns to the hands being the most common type of injury.
- 25 percent of reported injuries involved the eyes, with 97 percent of those with eye injuries not using any method of eye protection.
- 23 percent of injured persons required either hospital admission or specialized care for burns or eye injuries.

- 11 percent (28 cases) of injured persons were admitted to a hospital in 2006, compared to 6 percent in 2004.
- Sparklers, rockets, and firecrackers were associated with 58 percent of all reported injuries.
- Mishandling, malfunction, or errant path of fireworks accounted for 70 percent of all those injured.
- Fireworks used on private property accounted for 86 percent of reported injuries.
- 70 percent (175 cases) of reported injuries involved males, and 30 percent (76 cases) involved females. Across all age groups, males accounted for more fireworks-related injuries than females.
- 82 percent (205 cases) of reported injuries occurred among Whites, and Black/African Americans accounted for 13 percent (33 cases) of all injuries.
- The median age of those injured was 17 years. The average age of all injured persons was 21 years, with an age range from 11 months to 67 years.
- 85 percent (213 cases) of all reported injuries occurred between June 30 and July 9, 2006 (Figure 1), with 47 percent (118 cases) on July 4, 2006.

Figure 1: Fireworks-related Injuries by Date, June 30 -July 9, 2006

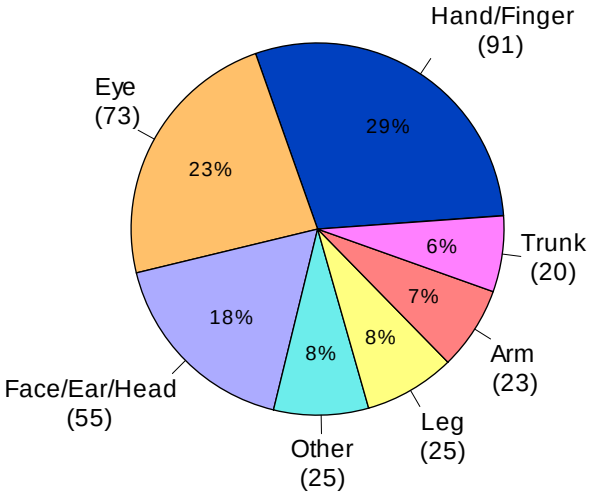


- Sparklers, rockets, and firecrackers accounted for 58 percent of reported injuries. Many other types of fireworks were reported to have caused injury, including mortars, smoke bombs, spinners, missiles, Roman candles, and fountains. Although 29 percent (72 cases) of the reports noted that the injury resulted from mishandling fireworks, 41 percent (104 cases) reported that the injury resulted from fireworks malfunction or an errant path of a rocket.

- 73 percent (182 cases) of reported cases experienced burn injuries. Of these, 121 cases (48%) reported second-degree burns, and 17 cases reported third-degree burns. Other types of injuries included contusions/lacerations/abrasions (57 cases), penetrating foreign body/missiles (13 cases), puncture wounds (10 cases), and sprains/fractures (4 cases).

- 52 percent (164 cases) of all reported injuries involved the hands or eyes (Figure 2). Injuries to the face, ears, and head accounted for 18 percent of all reported injuries.

Figure 2: Areas of the Body Injured by Fireworks, Indiana 2006



- 63 percent (159 cases) of reported injuries occurred at the injured person's private home, yard, or property. A friend/neighbor/relative's home or property was involved in 22 percent (56 cases) of injuries; public or school property was involved in 8 percent (21 cases).

- 91 percent of all reports did not provide information on alcohol consumption; 23 cases (9%) stated alcohol was related to the injury, and 15 of these cases reported alcohol use within three hours of the injury. Seven cases reported alcohol use by other people at the scene.

- 17 percent (42 cases) of all people injured were bystanders.

- Among those injured who were less than 18 years of age, 64 percent (83 cases) of reported injuries occurred while in the presence of an adult.

Year Comparisons (2003, 2004, and 2006)

For all three years, the most frequently reported fireworks-related injury was burns, accounting for over 60 percent of all injuries (Table 3). Although burns increased slightly from 67 percent in 2004 to 73 percent in 2006, the increase was not significant (p=0.22). After hand injuries, eyes were the second most reported area of the body harmed by fireworks. The proportion of reported eye injuries increased significantly from 17 percent in 2003 to 25 percent in 2004 (p=0.01); however from 2004 to 2006, the slight increase (to 29%) was not statistically significant (p=0.53).

The proportion of people with fireworks-related injuries admitted to the hospital increased in 2006, when compared to 2003 and 2004. The increase from 5 percent in 2004 to 11 percent (28 people) in 2006 was significant ($p<0.05$).

Across all three years, the types of fireworks causing most injuries (sparklers, rockets, and firecrackers) and the reasons for injury (mishandling, errant path, and malfunctioning) did not change significantly ($p>0.05$).

Table 1 compares percentage of fireworks-related injury categories by year.

Table 1: Comparison of 2003, 2004, and 2006 Data

Category	2003 (n=261)	2004 (n=233)	2006 (n=251)
Demographics			
Median Age/Range	18 (0-74 yrs)	18 (0-72 yrs)	17 (0-67 yrs)
Children/Adolescents	53%	52%	55%
Males	73%	76%	70%
Females	27%	24%	30%
White	84%	87%	82%
Black or African American	10%	8%	13%
Injury Type			
Burns	76%	67%	73%
Body Part Injured			
Hand	34%	32%	36%
Eye	17%	25%	29%
Injury Circumstances			
Injured on Private Property	83%	89%	86%
Cases with No Eye Protection	82%	88%	97%
Children Injured with Adults Present	60%	50%	64%
Received Specialized Care for Burn or Eye Injuries	8%	19%	12%
Hospitalized	3%	6%	11%
Fireworks Circumstances			
Injuries from Sparklers, Rocket, or Firecrackers	63%	64%	58%
Injuries from Mishandling Fireworks	27%	23%	29%
Errant Path or Malfunctioning Fireworks	21%	37%	41%

Source: ISDH, Injury Prevention Program

SUMMARY OF 2006 DATA

For the 251 cases of fireworks-related injuries that comprise this report, 85 percent (213 cases) occurred during a 10-day period surrounding July 4, 2006, including 47 percent (118 cases) of injuries that took place on Independence Day. While those injured ranged in age from 11 months to 67 years, children and adolescents comprised more than one half (55 percent) of the reported cases. According to the 2004 U.S. Census population estimates for Indiana, persons under 18 years of age represent one fourth of the population. Adults were present 64 percent (83 cases) of the time for reported injuries in children and adolescents. Males were involved in 70 percent of all reported cases, which is a common finding for many traumatic injuries. The racial distribution of those injured was similar to that of the population of Indiana.

As expected, the most frequently reported type of injury was burns, involving 73 percent (182 cases) of all cases and 59 percent of all injuries. While the hands were the part of the body most commonly injured (36 percent), injuries to the eye (29 percent) were also common.

Bystanders were injured in 17 percent (42 cases) of reported cases. Hospital admission was needed for 11 percent of those injured, with an additional 12 percent requiring specialized care for either burn or eye injuries. There were no reported deaths resulting from fireworks injuries during the time period of this report.

For cases who noted where they used fireworks, 86 percent (215 cases) of reported cases occurred at private homes, yards, or properties (self-owned, friend, neighbor, or relative). The type of fireworks involved in injuries varied somewhat by age. Sparklers caused the most injuries in young children, rockets caused the most injuries in adolescents, and sparklers, closely followed by firecrackers and aerials, caused the most injuries in adults.

Mishandling, malfunction, or errant path of fireworks was the most frequent mechanism reported for fireworks-related injuries, accounting for 70 percent of all those injured. Alcohol use was not stated for 91 percent of the reported cases. Of the 9 percent reporting use of alcohol, 96 percent reported alcohol use at activities affecting injured adults.

OUTBREAK SPOTLIGHT....

***Outbreak Spotlight* is a regularly occurring feature in the *Indiana Epidemiology Newsletter*. The event described below highlights a situation where a seemingly obvious mode of transmission was not the actual route of infection.**

The Foodborne Outbreak That Wasn't

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District 2

Background

On May 16, 2006, a local health department (LHD) alerted the Indiana State Department of Health (ISDH) of a possible gastroenteritis outbreak at an international conference held from May 9-13. Approximately 300 persons from 23 states and Mexico attended the conference. The predominant symptoms included vomiting and diarrhea. The conference was held at two adjoining facilities. Eight different meals were prepared and served at the two adjoining facilities and one local university.

Epidemiologic Investigation

A complete list of attendees, vendors, speakers, and conference activities was requested from the conference organizer. Menus for seven meals served were obtained from the two adjoining facilities. The food item choices (buffet-style meal) consumed at the off-site location were solicited from interviewees. Notification was sent via the Centers for Disease Control and Prevention (CDC) Epi-X electronic exchange and the National Foodborne Illness Listserve to all involved states.

The LHD and the ISDH developed a five-page foodborne gastroenteritis questionnaire to determine onset of illness, symptom history, and food consumption. The LHD conducted interviews within its jurisdiction. The ISDH conducted the remaining in-state interviews as well as interviews on behalf of two other states, and the CDC offered to serve as the contact for the Mexico residents.

An unmatched case control study was conducted, with 159 total interviews completed. A case was defined as any previously healthy person who attended the conference on May 9-13, 2006, or

who was a contact of a conference attendee and developed diarrhea or vomiting after May 9. Sixty cases and 99 controls were identified. Symptom onset dates ranged from May 10-18 (Figure 1). The median duration of illness was 59 hours. In addition to diarrhea (95.0%) and vomiting (40.0%), other reported symptoms included nausea (66.7%), fatigue (61.7%), headache (58.3%), cramps (55.0%), chills (35.0%), body aches (33.3%), and low-grade fever (28.3%). Four were hospitalized or visited the emergency department.

The following events were analyzed to evaluate the significance of association between illness and specific conference events: 1) contact with ill people, 2) eating at other restaurants, and 3) eating any of the eight conference meals. Table 1 indicates the statistical association of each event with the likelihood of developing illness.

Figure 1: Epidemic Curve

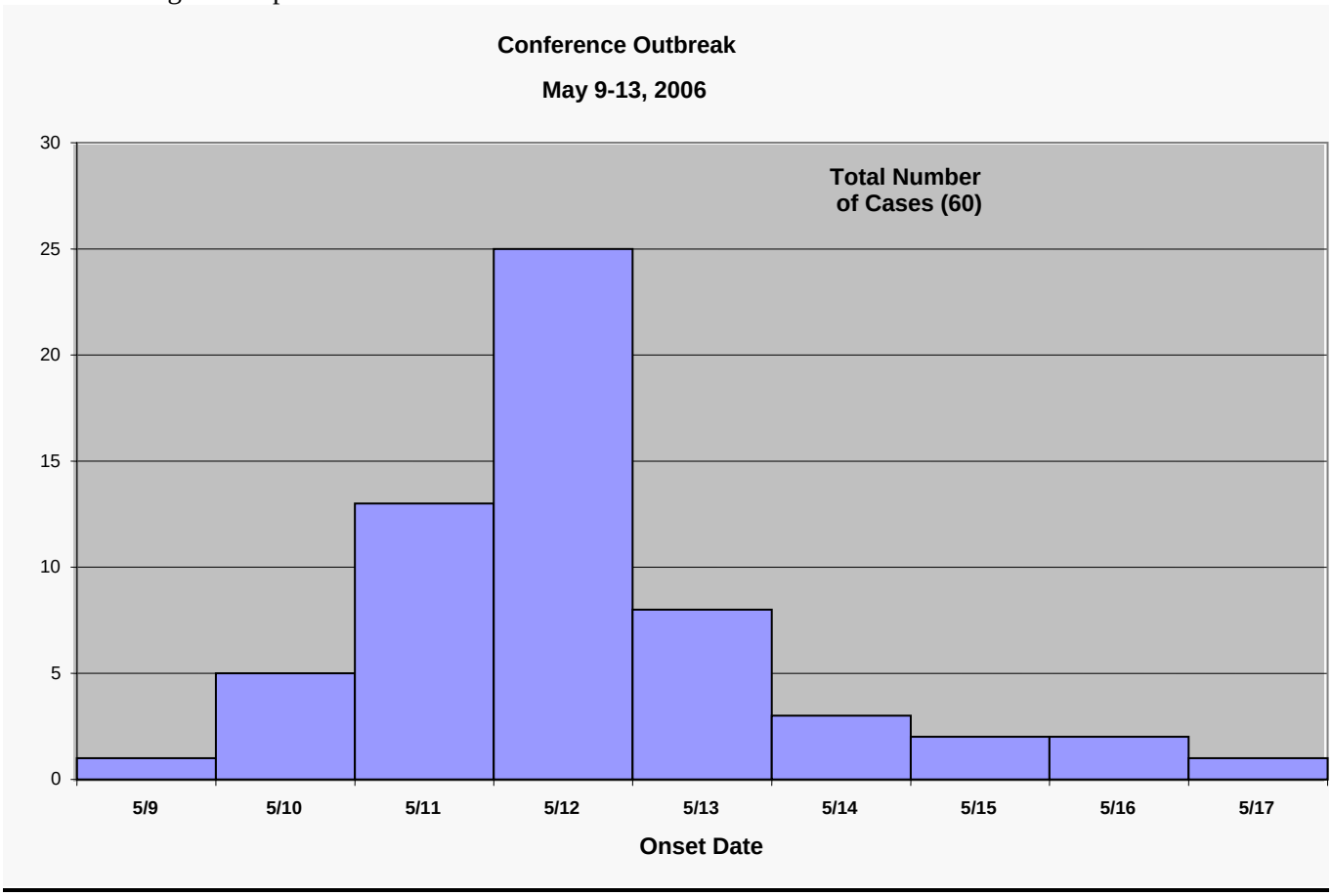

Table 1.

Variable	Odds Ratio (95% CI)	P-Value
Contact with Ill People	1.954 (0.873 – 4.373)	0.1030
Ate at Restaurants	0.725 (0.325 – 1.617)	0.4323
May 9 Dinner	0.600 (0.213 – 1.693)	0.3347
May 10 Dinner	2.169 (0.660 – 7.135)	0.2023
May 11 Breakfast	1.587 (0.551 – 4.569)	0.3918
May 11 Lunch	0.237 (0.068 – 0.825)	0.0237
May 11 Dinner	2.071 (0.458 – 9.353)	0.3442
May 12 Breakfast	1.689 (0.586 – 4.871)	0.3321
May 12 Lunch	2.305 (0.721 – 7.368)	0.1590
May 12 Dinner	0.286 (0.100 – 0.818)	0.0196

Environmental Investigation

Environmental health specialists from the LHD visited the adjoining facilities to conduct inspections, including Hazard Analysis of Critical Control Points (HACCP), and to inquire about employee illness. The university health center reported no spike in gastrointestinal illnesses in their students, and the meal for the students included the buffet items. Therefore, the university dining hall and kitchen were not inspected. No leftovers from either facility were available for testing, but two common food preparation items were sent to the ISDH Laboratory for testing. However, since no meal was significantly associated with illness, the items were not tested.

The initial inspection of the two adjoining facilities revealed that the dishes were not properly sanitized, as the dishwashers were not heating to the required temperature. Attendees also reported water leaking on and near the food buffet and dinner tables at one of the facilities. The findings from the food inspections were determined not to be conclusive factors in the outbreak investigation. No food handlers employed by the facilities or the temporary agency utilized during the conference reported any illness.

Laboratory Results

Ten stool samples were collected and analyzed by various state laboratories for bacterial (*E. coli* 0157:H7, *Campylobacter, Shigella,* and *Salmonella*) and viral (*Norovirus*) pathogens (Table 1). Four samples tested positive for *Norovirus* at the ISDH Laboratory, with one of these also testing positive for *Shigella.* The Illinois state laboratory reported one specimen positive for *Norovirus*. The South Carolina state laboratory analyzed two stool specimens, with one positive for *Clostridium perfringens*. The Florida state laboratory analyzed two stool samples, both positive for *Norovirus*. All other results were negative.

Conclusion

The investigation confirmed an outbreak of illness among attendees at the conference. The only common exposure among the cases was attendance at the conference or their subsequent contacts. The causative agent of this outbreak was *Norovirus*. Seven attendees tested positive. In addition, the 53 other attendees who were identified during the same time period had symptoms compatible with *Norovirus* infection. The median duration of illness was 59 hours; the wide range of illness

duration could be the result of interpretation of symptoms and/or illness. One attendee reported an onset date of May 9 without an onset time, according to the questionnaire. This case was ruled out as the index case, because the only symptom reported on May 9 was nausea; case descript symptoms did not start until May 10.

Although two specimens tested positive for two bacterial agents, these were ruled out as causative agents of this outbreak. The one positive *Shigella sonnei* culture was identified from a contact case who attends elementary school and after-school care and, therefore, may be unrelated to this outbreak. The incubation period of the one attendee positive for *Clostridium perfringens* was not consistent with ingestion of a meal during the conference to the onset of symptoms; in addition, the reported symptoms were atypical of *C. perfringens.*

This outbreak was most likely a result of person-to-person transmission rather than foodborne. None of the conference events was statistically associated with illness, including contact with ill people, eating at other restaurants, and eating any of the eight conference meals. In addition, the epidemiologic curve most likely indicates person-to-person transmission (Figure 1). Point source outbreaks, including foodborne, have a sharp, abrupt upslope following exposure and a gradual down slope. Person-to-person outbreaks have a more gradual upslope reaching a peak, followed by a gradual down slope, as illustrated by this epidemic curve.

Although one staff member (non-food handler) was symptomatic and tested positive for *Norovirus*, the onset of illness for this case occurred at the peak of the outbreak (May 12). Therefore, this employee was not implicated as a source of the outbreak. Although the findings from the environmental inspections warranted corrective actions, they were not contributing factors to this outbreak. Upon further inspections, the establishments associated with this investigation became compliant with all violations.

Recommendations

Most *Norovirus* outbreaks can be prevented by adhering to the following the guidelines:

1) Thoroughly wash hands with soap and water before preparing and serving food, after using the restroom, or after assisting anyone with diarrhea and/or vomiting.

2) Children with diarrhea and/or vomiting should be excluded from day-care centers and schools.

3) Persons with diarrhea and/or vomiting should not prepare food for others and should avoid close contact with other people while symptoms persist.

4) Disinfect contaminated surfaces with a 1:10 solution of household bleach.

References

ISDH November 13, 2004. Retail Food Establishments Sanitation Requirements. Title 410 IAC 7-24-122)

Norovirus Fact Sheet, Centers for Disease Control and Prevention,

www.cdc.gov/ncidod/dvrd/revb/gastro/norovirus.htm

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:

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- Childhood and Adolescent Vaccine-Preventable Diseases
- Adult Immunizations
    - Pandemic Influenza
- General Recommendations on Immunization
    - Timing and Spacing
    - Indiana Immunization Requirements
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    - Contraindications and Precautions to Vaccination
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- 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 contact Angie Schick **317.460.3671 or aschick@isdh.IN.gov; or http://www.IN.gov/isdh/programs/immunization.htm**

ISDH Data Reports Available

The ISDH Epidemiology Resource Center has the following data reports and the Indiana Epidemiology Newsletter available on the ISDH Web Page:

http://www.IN.gov/isdh/dataandstats/data_and_statistics.htm

HIV/STD Quarterly Reports (1998-Dec 05)	Indiana Mortality Report (1999, 2000, 2001, 2002, 2003, 2004)
Indiana Cancer Incidence Report (1990, 95, 96, 97, 98)	Indiana Infant Mortality Report (1999, 2002, 2003, 2004)
Indiana Cancer Mortality Report (1990-94, 1992-96)	Indiana Natality Report (1998, 99, 2000, 2001, 2002, 2003, 2004)
Combined Cancer Mortality and Incidence in Indiana Report (1999, 2000, 2001, 2002)	Indiana Induced Termination of Pregnancy Report (1998, 99, 2000, 2001, 2002, 2003, 2004)
Indiana Health Behavior Risk Factors (1999, 2000, 2001, 2002, 2003, 2004, 2005)	Indiana Marriage Report (1995, 97, 98, 99, 2000, 2001, 2002)
Indiana Health Behavior Risk Factors (BRFSS) Newsletter (9/2003, 10/2003, 6/2004, 9/2004, 4/2005, 7/2005, 12/2005, 1/2006, 8/2006)	Indiana Infectious Disease Report (1997, 98, 99, 2000, 2001, 2002, 2003)
Indiana Hospital Consumer Guide (1996)	Indiana Maternal & Child Health Outcomes & Performance Measures (1990-99, 1991-2000, 1992-2001, 1993-2002, 1994-2003)
Public Hospital Discharge Data (1999, 2000, 2001, 2002, 2003, 2004)	

HIV Disease Summary

Information as of August 31, 2006 (based on 2000 population of 6,080,485)

HIV - without AIDS to date:

352	New HIV cases from September 2005 thru August 2006	12-month incidence	6.12 cases/100,000
3,647	Total HIV-positive, alive and without AIDS on August 31, 2006	Point prevalence	63.40 cases/100,000

AIDS cases to date:

346	New AIDS cases from September 2005 thru August 2006	12-month incidence	6.02 cases/100,000
3,876	Total AIDS cases, alive on August 31, 2006	Point prevalence	67.38 cases/100,000
8,040	Total AIDS cases, cumulative (alive and dead)		

REPORTED CASES of selected notifiable diseases

Disease	Cases Reported in August *MMWR* Weeks 31-34		Cumulative Cases Reported January – August *MMWR* Weeks 1-34	
	2005	2006	2005	2006
Campylobacteriosis	66	76	283	324
Chlamydia	1,563	1,555	12,906	13,189
E. coli O157:H7	9	15	38	44
Hepatitis A	0	1	11	18
Hepatitis B	8	7	26	35
Invasive Drug Resistant *S. pneumoniae* (DRSP)	7	8	144	114
Invasive pneumococcal (less than 5 years of age)	3	1	49	43
Gonorrhea	643	708	5,214	5,746
Legionellosis	1	4	13	19
Lyme Disease	9	4	24	14
Measles	0	0	33	1
Meningococcal, invasive	1	2	15	17
Mumps	1	0	1	10
Pertussis	18	19	191	153
Rocky Mountain Spotted Fever	0	1	0	5
Salmonellosis	81	143	374	502
Shigellosis	59	8	106	86
Syphilis (Primary and Secondary)	5	11	45	54
Tuberculosis	8	12	76	93
Animal Rabies	0	2 (bats)	7 (bats)	12 (bats)

For information on reporting of communicable diseases in Indiana, call the *Epidemiology Resource Center* at (317) 233-7125.

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

The *Indiana Epidemiology Newsletter* is published monthly by the Indiana State Department of Health to provide epidemiologic information to Indiana health care professionals, public health officials, and communities.