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Respiratory Illness Increase

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The Indiana State Department of Health (ISDH) has detected an increase of respiratory illness in certain areas of Indiana. Since May, there have been reports of legionellosis, pertussis, parapertussis, *Mycoplasma pneumoniae*, and other community-acquired types of pneumonias.

These diseases can have significant public health impact. Legionellosis is particularly important, because it is sometimes spread by a point source within the community (such as cooling towers). Therefore, it is necessary to investigate these cases to identify the source and implement necessary control measures. Because these four diseases have certain signs and symptoms in common, appropriate diagnostic tests must be ordered to allow identification of as many cases as possible. It is also important to note that legionellosis is associated with two clinically and epidemiologically distinct illnesses: Legionnaires' Disease, which is characterized by fever, myalgia, cough, and clinical or radiographic pneumonia; and Pontiac Fever, a milder illness without pneumonia. Legionellosis is reportable to the local health department (LHD) within 72 hours.

In reviewing the case reports, the ISDH has found that some cases reported as one of the above diseases are compatible with (and in some instances laboratory confirmed to be) one of the other three diseases. It has been noted that tests ordered for identifying these organisms according to the Communicable Disease Reporting Rule for Physicians, Hospitals, and Laboratories (410 IAC 1-2.3) do not follow recommended guidelines. Listed below are the recommended tests for each of these diseases.

Recommended Laboratory Testing

Legionellosis:

- Culture: isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluid.
- Urinary antigen: detection of specific *Legionella pneumophila* serogroup 1 antigen in urine using validated reagents. This is the fastest way to confirm the diagnosis.
- Seroconversion: fourfold or greater rise in specific serum antibody titer to *Legionella pneumophila* using validated reagents. This is not recommended due to the time required to obtain both acute and convalescent sera.

Pertussis:

- Culture: isolation of *Bordetella pertussis* from nasopharyngeal swabs
- PCR using nasopharyngeal swabs
- Seroconversion: Currently, there is no validated serologic pertussis test commercially available. Therefore, tests performed by individual laboratories may or may not be standardized and may or may not differentiate pertussis from parapertussis. The ISDH discourages clinicians from using serologic testing for pertussis for diagnostic purposes.

Parapertussis:

- Culture: isolation of *Bordetella pertussis* from nasopharyngeal swabs
- PCR using nasopharyngeal swabs
- Seroconversion: Please refer to pertussis

***Mycoplasma pneumoniae*:**

- PCR (polymerase chain reaction) or direct immunofluorenscence assay (IFA) using throat swabs. This is the fastest way to confirm the diagnosis.
- Seroconversion: fourfold or greater rise in antibody titer to specific species or serogroups of *Mycoplasma pneumoniae*. This is not recommended because of the time required to obtain both acute and convalescent sera

OUTBREAK SPOTLIGHT....

Outbreak Spotlight is a regularly occurring feature in the Indiana Epidemiology Newsletter to illustrate the importance of various aspects of an outbreak investigation. The event described below highlights an investigation of a gastroenteritis outbreak in people who attended a wedding rehearsal dinner .

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Background

On October 31, 2006, a representative from the Huntington County Health Department (HCHD) contacted the Indiana State Department of Health (ISDH) to report that a local caterer had reported several people becoming ill after eating at a wedding reception in Fort Wayne, Indiana. That same day, a representative from the Allen County Health Department (ACHD) contacted the ISDH to report that several people had developed symptoms of gastroenteritis after eating at Restaurant A in Fort Wayne.

Epidemiologic Investigation

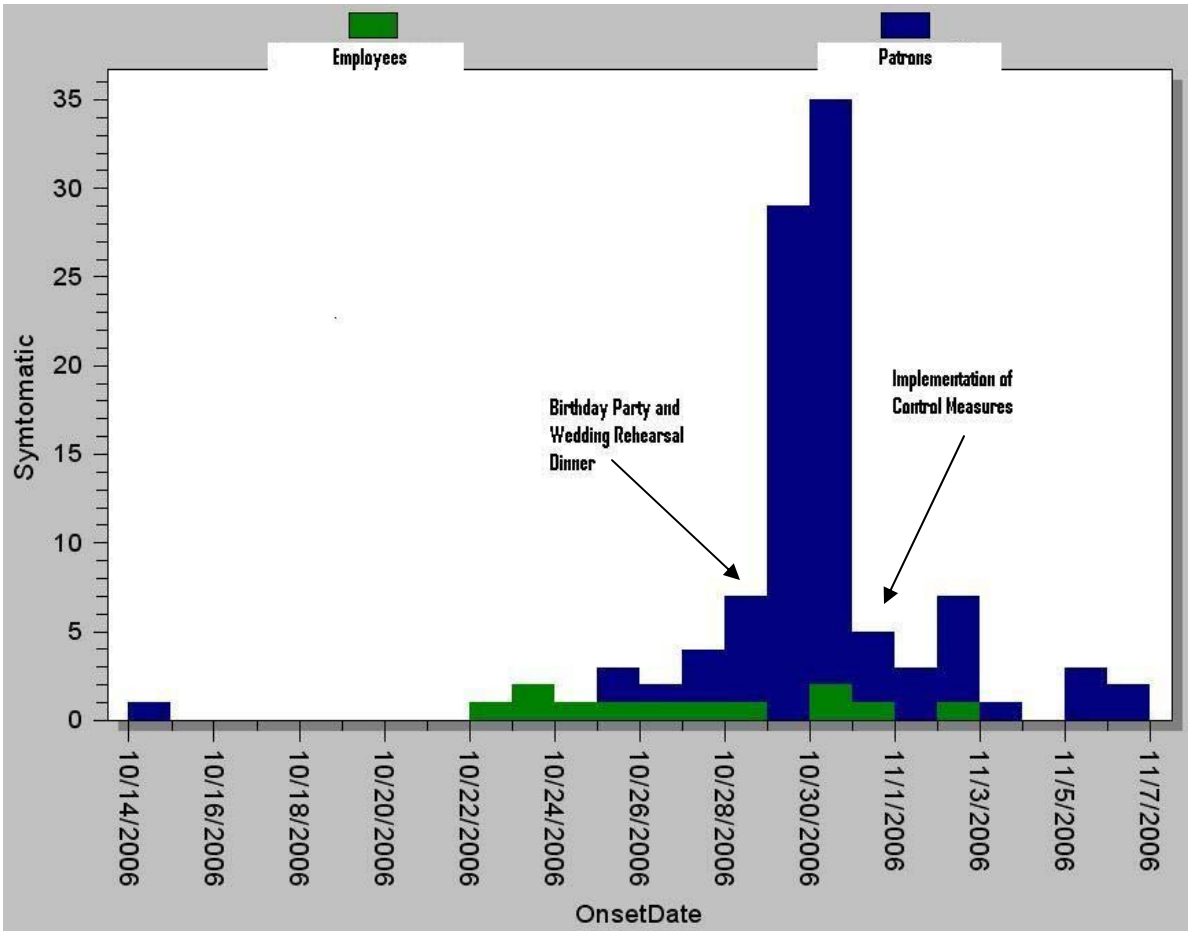
The ISDH, HCHD, and the ACHD initiated investigations to describe the outbreaks, determine the mode of transmission, and identify potential sources. The ACHD had received phone calls from individuals from three unrelated parties who had eaten dinner at Restaurant A on October 22, October 28, and October 29, 2006, and reported becoming ill. The HCHD investigation focused on the private caterer who prepared the wedding reception dinner. However, upon interviewing wedding attendees about the wedding rehearsal dinner, the HCHD and the ACHD learned that guests became ill after attending the wedding rehearsal dinner, not the wedding reception. The rehearsal dinner was held at Restaurant A. A caller who attended a birthday party at Restaurant A on the same day as the wedding rehearsal dinner also reported becoming ill.

Since Restaurant A is located in Allen County, the ACHD obtained a menu of food items served on the days in question. The ACHD and ISDH developed a questionnaire to collect information on symptoms, onset of illness, illness duration, and foods consumed and initiated a case-control study. A confirmed case was defined as any previously healthy person who became ill within 72 hours after eating food from Restaurant A from October 22 through November 4 and had laboratory confirmation of a given pathogen or was epidemiologically linked to a confirmed case. A probable case was defined as any previously healthy person who became ill with compatible symptoms within 72 hours after eating food from Restaurant A from October 22 through November 4 and did not have laboratory evidence of infection or was epidemiologically linked to a confirmed case. A control was defined as anyone who ate at Restaurant A from October 22 through November 4 and did not become ill.

Interviews were completed on 135 patrons and restaurant staff, including residents of Ohio and Michigan, who attended the wedding and rehearsal dinners. One hundred patrons and employees met the confirmed and probable case definitions. Based on the information from the wedding rehearsal dinner and other related calls, the average incubation period was approximately 24 hours (see Figure 1), and the average duration of illness was approximately 24-48 hours. The predominant symptoms reported were nausea (85%), diarrhea (84%), and vomiting (80%). Several cases sought medical attention; one patron was hospitalized. Fourteen people submitted stool specimens to the ISDH Laboratories for analysis (see Laboratory Results).

Due to the limited number of controls identified, statistical analysis to identify a particular food vehicle associated with illness could not be performed.

Figure 1. Epidemic Curve of Illnesses Associated with Restaurant A from Oct 14-Nov 7, 2006. (Counts based on confirmed, probable, and suspect cases.)



Environmental Assessment

A representative of the ACHD visited Restaurant A on October 31, 2006, to review food preparation practices, collect available food samples, inquire about employee illnesses, and obtain clinical histories and exposure information on employees. At that time, no restaurant employees were reported as being ill. At the time of inspection, the final rinse on the dishwashing machine

was not operating at proper temperature, a critical violation. The ACHD conducted an additional inspection of the facility on November 1, 2006. No critical violations were noted.

The ACHD inspected Restaurant A on November 2, 2006, and found that the final rinse on the dishwashing machine was still not operating at proper temperature. At this time, it was also noted that hot water was not available at the employee hand-washing sinks in the kitchen area, employee restrooms, or bar area. The restaurant voluntarily closed for 24 hours to correct these deficiencies. The ACHD conducted daily interviews of employees for symptoms of illness from November 2 until November 17, 2006. Several employees were reported ill prior to the outbreak (see Figure 1). Pursuant to the Indiana Retail Food Establishment Sanitation Requirements, 410 IAC 7-24-120-121, a retail food establishment must exclude employees exhibiting vomiting and/or diarrhea.

On November 3, 2006, a representative from the ACHD provided the employees with information on safe food handling and employee health during two different shifts. The dishwashing machine was operating at the proper rinse temperature, and hot water was provided at all the hand-washing sinks in the kitchen area, employee restrooms, and bar area. Three employees reported being ill in the morning and were excluded from the restaurant until symptoms resolved. In the afternoon, three additional employees reported being ill and were excluded from the restaurant. The restaurant reopened on the evening of November 3, 2006, after a follow-up inspection by ACHD.

Subsequent follow-up inspections on November 4-7 revealed mishandling of consumable ice, lack of soap at the hand-washing sink, food temperature violations, hot water not reaching proper temperature, and additional ill employees. ACHD and ISDH representatives conducted additional follow-up inspections on November 8-17. Several violations were noted, including ready-to-eat foods not being held at proper temperature, dishes being stored in the hand sinks, the dishwashing machine not operating at the proper temperature, and the improper use of single-use gloves. The wait staff was also observed handling ready-to-eat foods with bare hands. During one follow-up inspection, an employee was reportedly working while ill with shigellosis; this employee was identified during the collection of employee stool samples. This employee was subsequently excluded until follow-up testing could be completed. These follow-up inspections resulted in identifying additional education needs for employees and management to ensure food safety.

One patron provided a leftover sample of prime rib from the wedding rehearsal dinner on October 28, 2006, for testing (see Table 2). No food samples were available from the restaurant for testing.

Laboratory Results

Twenty-five individuals submitted stool specimens to the ISDH Laboratories for analysis. Seven patrons and six employees tested positive for *Norovirus*. All specimens were negative for C*ampylobacter, Salmonella,* and *E. coli* O157:H7. One employee specimen tested positive for *Shigella*. That individual was subsequently treated and not considered related to this outbreak.

Several food items were submitted to the ISDH Laboratories for analysis. Several food samples were collected from the wedding reception before the investigation revealed that the reception was not associated with illness; all samples tested within normal limits (Table 1). One sample of prime rib was collected from Restaurant A; the prime rib was negative for bacterial agents (Table 2).

Table 1. Food Sample Analysis Report: Wedding Reception Caterer

Food Item	Petrifilm APC*	Total Coliforms	*E. coli*
Candy (sub 1)	240 cfu/g	not tested	not tested
Candy (sub 2)	290 cfu/g	not tested	not tested
Chicken	100 cfu/g	<10 cfu/g	<10cfu/g
Swiss Steak	30 cfu/g	<10 cfu/g	<10cfu/g
Cake (sub 1)	16,800 cfu/g	<10 cfu/g	<10cfu/g
Cake (sub 2)	2,400 cfu/g	<10 cfu/g	<10cfu/g
Cake (sub 3)	4,200 cfu/g	<10cfu/g	<10cfu/g

*aerobic plate count

Table 2. Food Sample Analysis Report: Restaurant A Rehearsal Dinner

Food Item	Petrifilm APC*	Total Coliforms	*E. coli*	Shigella flexneri
Prime Rib	950 cfu/g	<10 cfu/g	<10 cfu/g	none found

*aerobic plate count

Conclusions

This investigation confirms that an outbreak of viral gastroenteritis associated with a local restaurant in Fort Wayne, Indiana, occurred from October 26 through November 4, 2006. The only common exposure among all the cases was eating at this restaurant. Due to the lack of controls, advanced statistical analysis could not be performed on the cases. Therefore, the point source of this outbreak could not be determined. Transmission of the virus may be due to a common food vehicle and/or person to person.

The causative agent of this outbreak was *Norovirus*. *Norovirus* has a world-wide distribution and is a major cause of gastroenteritis outbreaks. Transmission occurs by the fecal-oral route; however, aerosolized vomitus is also suspected. The incubation period ranges from 10-50 hours, averaging 24-48 hours. Symptoms usually last 24-48 hours and include nausea, vomiting, diarrhea, cramps, headache, and sometimes a mild fever, typical of what was reported in this outbreak. *Norovirus* is highly contagious, and those infected may continue to shed virus for up to two weeks after symptoms stop. Illness is typically self-limiting and is treatable with antibiotics. Dehydration is the most common complication associated with *Norovirus* infections.

Humans are the reservoir for *Norovirus*. Foodborne viral outbreaks usually occur when an infected food handler with inadequately washed hands prepares food that is served raw or ready-to-eat (e.g., salads, vegetables, etc.) or that is handled extensively after cooking (e.g., sliced sandwich meats, rolls, etc.). Although *Norovirus* does not replicate in food, only 50-100 viral particles are needed to cause infection. *Norovirus* is extremely environmentally stable and can survive freezing, temperatures up to 140°F, and chlorine concentrations up to 10 parts per million.

The investigation revealed that employees were ill prior to the outbreak and were the most likely source of infection. According to the ISDH Public Health Emergency Surveillance System (PHESS), hospital emergency department chief complaint data indicated that gastrointestinal symptoms, compatible with *Norovirus* infection, were prevalent in the community prior to the outbreak. The outbreak peaked on October 31. The facility was closed on November 2, and control measures were implemented. The epidemiologic curve shows the effectiveness of the control measures, particularly the exclusion of ill employees. The ISDH commends the Allen

County Health Department and the Huntington County Health Department for their diligent efforts during this investigation.

Recommendations

In general, most viral foodborne outbreaks can be prevented by strictly adhering to the following food safety practices:

1. Thoroughly wash hands with soap and water before and after preparing food, after using the restroom, and before eating.
2. Always use gloves and utensils when handling ready-to-eat foods.
3. Wash all raw fruits and vegetables prior to serving.
4. Thoroughly cook all raw meats, seafood, and shellfish before consumption.
5. Those ill with diarrhea and vomiting should avoid contact with others.
6. Exclude ill food handlers until symptoms cease.
7. Ill children and infants in diapers should be excluded from food preparation and serving areas.
8. Any environmental surface suspected of contamination should be promptly cleaned and disinfected with bleach solution and then rinsed.

References

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American Public Health Association. Epidemic Viral Gastroenteropathy. In: Chin J, ed. Control of Communicable Diseases Manual. 17th ed. Washington, DC: American Public Health Association; 2000, 218.

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E^3 Easy Epidemiology for Everyone

E^3 is a new feature of the Indiana Epidemiology Newsletter dedicated to exploring the fundamentals of epidemiology Each month, a different epidemiology concept will be explored to enhance understanding of basic epidemiology.

Epidemiology

> *"Whoever wishes to investigate medicine properly, should proceed thus: in the first place to consider the seasons of the year, and what effects each of them produces for they are not at all alike, but differ much from themselves in regard to their changes"*
>
> Hippocrates, 400 B.C.E

This quote from Hippocrates represents the very foundations of modern epidemiology. "Epidemiology" is derived from the Greek words, *epi* (upon) + *demos* (people) + *logy* (study of). (The word epidemic has similar roots.) Epidemiology is recognized as the basic science of public health. The textbook definition of epidemiology is "the study of the distribution and determinants of health-related states or events in specified populations and the application of this study to control of health problems" (Last, p 62. 2001). Epidemiology draws on many different disciplines in an effort to describe cause-and-effect relationships and is responsible for directing public health action (Dicker, 2002).

Like other sciences, public health epidemiology is based on a scientific method. In this case, the method, as outlined below, should be thought of as the natural, logical steps taken when "doing" epidemiology.

Step	Purpose
Surveillance	Data gathering, often ongoing, to monitor the level of disease in a population
Descriptive epidemiology	Categorizing and displaying data to better understand aspects of a specific disease or condition
Analytic epidemiology	If differences appear between groups in the descriptive data, further analysis can help determine if the differences are real and if certain groups are at greater/less risk for the outcome of interest
Intervention	Based on the findings of the analysis, actions can be taken to positively influence the health outcome of interest
Evaluation	Follow-up to determine if the intervention was effective

One of the basic premises of epidemiology is that "disease doesn't occur randomly, but rather in distinct patterns that reflect the operation of underlying factors" (Friis and Sellers, p 108., 1999). It is in these patterns that we need to look, and the monthly E^3 topics over the next year will demonstrate how this is accomplished.

There have been many successes attributed to epidemiology—the most famous is Dr. John Snow's removal of the pump handle on a drinking water pump on Broad Street in London in the midst of a cholera epidemic in 1854. More recent examples exist in infectious disease control; cancers; cardiovascular disease, in particular the Framingham study; and advances in maternal and child health. Epidemiology is the very cornerstone of public health science.

The **Indiana National Electronic Disease Surveillance System** (I-NEDSS) is a Web-based application that promotes the collection, integration, and sharing of data at federal, state, and local levels. The purpose of I-NEDSS is to automate the current process for reporting Lab Reports, Confidential Reports of Communicable Disease, and Case Investigations. Eventually, I-NEDSS will replace the paper-based reporting and case investigation system currently in use. Benefits of I-NEDSS include an increase of speed, accuracy, and accountability in our disease surveillance. This will be accomplished by having all reporting and investigation forms accessed, completed, and submitted electronically through I-NEDSS.

The current focus of I-NEDSS is in the electronic laboratory report processing module. When completed, laboratories will have the ability to submit lab reports of notifiable diseases electronically through I-NEDSS. The lab reports will then be consolidated in I-NEDSS, and these observations will be available to investigators at the state and local levels. Future releases of I-NEDSS will focus on automating the Confidential Reports of Communicable Disease process and the Case Investigation process.

Beginning in September, the I-NEDSS project team will be conducting an effort to increase our electronic lab report data sources. This effort will focus on major commercial labs reporting statewide. It is anticipated that this effort will be the focus of I-NEDSS for the remainder of 2007. Please continue to watch the *Indiana Epidemiology Newsletter* and the Local Health Department (LHD) Resource SharePoint site for further information on I-NEDSS progress.

Correction:

Last month on the electronic link to the memoriam for Vivie Dunn, her birth year was incorrectly posted as 1941. Vivie was born in 1949, as stated in the complete newsletter article.

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/programs/immunization.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/dataandstats/data_and_statistics.htm

HIV/STD Quarterly Reports (1998-June 2006)	Indiana Mortality Report (1999, 2000, 2001, 2002, 2003, 2004, 2005)
Indiana Cancer Incidence Report (1990, 1995, 1996, 1997, 1998)	Indiana Infant Mortality Report (1999, 2002, 1990-2003)
Indiana Cancer Mortality Report (1990-1994, 1992-1996)	Indiana Natality Report (1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005)
Combined Cancer Mortality and Incidence in Indiana Report (1999, 2000, 2001, 2002, 2003, 2004)	Indiana Induced Termination of Pregnancy Report (1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005)
Indiana Health Behavior Risk Factors (1999, 2000, 2001, 2002, 2003, 2004, 2005)	Indiana Marriage Report (1995, 1997, 1998, 1999, 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, 10/2006, 5/2007)	Indiana Infectious Disease Report (1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005)
Indiana Hospital Consumer Guide (1996)	Indiana Maternal & Child Health Outcomes & Performance Measures (1990-1999, 1991-2000, 1992-2001, 1993-2002, 1994-2003, 1995-2004)
Public Hospital Discharge Data (1999, 2000, 2001, 2002, 2003, 2004, 2005)	

HIV Disease Summary

Information as of July 31, 2007 **(based on 2000 population of 6,080,485)**

HIV - without AIDS to date:

377	New HIV cases from August 2006 thru July 31, 2007	12-month incidence	6.55 cases/100,000
3,778	Total HIV-positive, alive and without AIDS on July 31, 2007	Point prevalence	65.68 cases/100,000

AIDS cases to date:

325	New AIDS cases from August 2006 thru July 31, 2007	12-month incidence	5.65 cases/100,000
4,063	Total AIDS cases, alive on July 31, 2007	Point prevalence	70.64 cases/100,000
8,327	Total AIDS cases, cumulative (alive and dead)		

REPORTED CASES of selected notifiable diseases

Disease	Cases Reported in July *MMWR* Weeks 27-30		Cumulative Cases Reported January – July *MMWR* Weeks 1-30	
	2006	2007	2006	2007
Campylobacteriosis	70	60	248	258
Chlamydia	1,272	1,105	11,633	11,739
Cryptosporiosis	6	5	31	34
Cyclosporiosis	0	0	1	1
E. coli O157:H7	8	9	29	26
Haemophilus influenzae	13	1	48	32
Hepatitis A	0	1	15	6
Hepatitis B	5	6	27	26
Gonorrhea	534	482	5,041	4,905
Legionellosis	8	4	18	15
Listeriosis	2	2	7	8
Lyme Disease	4	4	11	16
Measles	0	0	1	0
Meningococcal, invasive	1	2	15	15
Mumps	0	0	10	1
Pertussis	24	14	129	40
Rocky Mountain Spotted Fever	0	0	3	2
Salmonellosis	105	86	359	346
Shigellosis	10	8	78	38
Streptococcus pneumoniae (invasive, all ages)	37	22	391	377
Streptococcus pneumoniae (invasive, drug resistant)	4	6	104	109
Streptococcus pneumoniae (invasive, <5 years of age)	6	3	39	26
Syphilis (Primary and Secondary)	5	1	44	24

REPORTED CASES of selected notifiable diseases (cont.)

Disease	Cases Reported in July *MMWR* Weeks 27-30		Cumulative Cases Reported January – July *MMWR* Weeks 1-30	
	2006	2007	2006	2007
Tuberculosis	12	9	79	77
Yersiniosis	1	3	6	10
Animal Rabies	3 (bats)	1 (bats)	6 (bats)	6 (bats)

For information on reporting of communicable diseases in Indiana, call the *Surveillance and Investigation section of the Public Health Preparedness and Emergency Response Division* 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.