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Varicella Surveillance and Investigation

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Varicella, or chickenpox, is a highly contagious illness caused by the varicella-zoster virus (VZV) and includes symptoms of rash, fever and malaise; the most recognizable symptom is a pruritic rash of up to 500 vesicular lesions. Increased vaccination coverage, however, has led to a high occurrence of "breakthrough" cases. Breakthrough cases are often harder to diagnose as they often have fewer lesions (less than 50) and the appearance of just a maculo-papular rash. The difficulty in diagnosis makes increased laboratory testing critically important. The Indiana State Department of Health (ISDH) offers rapid polymerase chain reaction (PCR) testing and viral culture testing to confirm the presence of the virus free of charge in areas where there is a high incidence of activity. School nurses and area providers are encouraged to collect specimens that are epidemiologically linked to an outbreak. These viral isolates will also be shipped to the CDC for strain-typing. To request specimen collection kits, please contact the ISDH Laboratory at 317-921-5843. The virus can be cultured from the skin cells of an infected person up to three days after the appearance of the rash.

VZV is spread through direct contact with skin lesions of an active case or through close contact with the respiratory droplets. A person is most infectious during the prodromal period (1-2 days before rash onset) until all lesions are crusted over (in severe cases) or have disappeared (in cases of "breakthrough" disease). This typically averages seven days.

Current Reporting

The Indiana Communicable Disease Rule for Physicians, Hospitals and Laboratories, 410 IAC 1-2.3, effective December 12, 2008, now requires reporting of all clinically diagnosed varicella cases. Lab confirmation is not required for cases to be reportable.

During the 2009 year, 411 cases were reported, including 10 outbreaks reported to the ISDH.

Varicella Immunization

In 1995, the Advisory Council on Immunization Practices (ACIP) recommended varicella vaccination for healthy children 12-18 months and older, susceptible children and adults . In 2006, with incidence reduced by 90%, the ACIP recommended a seconddose of the vaccine, and implementation began the following year. The ACIP recommends the first dose should be given at age 12-15 months and the second dose at 4-6 years, with a minimum of three months between doses. Adolescents $\geq$ 13 years old should receive two doses, with a minimum interval of four weeks between doses. However, there should be a minimum 28-day interval between receiving a live-virus vaccine, including seasonal influenza/H1N1 and the varicella vaccine.

Evidence suggests that while a single dose of the varicella vaccine may decrease disease severity, it has little impact in reducing overall incidence of disease or in preventing the occurrence of outbreaks where two-dose vaccination coverage is low **(cite 2007 MMWR article with ACIP recommendation).** Vaccine should be offered to susceptible individuals (those with only one or no doses of the vaccine and no disease history) and administered within 3-5 days of exposure to an active case to prevent disease. This would include siblings and other close contacts of active cases.

In order to investigate the effectiveness of the two-dose series in preventing outbreaks, the ISDH, with funding via the American Reinvestment and Recovery Act (ARRA), is participating in enhanced surveillance of varicella outbreaks occurring in schools. Outbreaks are defined as five or more cases under the age of 13 and three or more cases among individuals 13 years of age and older. *To be included in the outbreak, cases must occur within one incubation period (21 days) from the onset of the most recent case, although surveillance will follow through two incubation periods.*

The two-dose series of the vaccine is required for school entry beginning in the 2010 – 2011 school year for the kindergarten and grades 6-12. Physician documentation of disease history, including month and year, is required for documentation of proof of immunity for kindergarten students. A signed statement of disease history from the student's parent or guardian is acceptable to document immunity in grades 6-12.

May is Hepatitis Awareness Month

Hepatitis B and C Awareness

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Introduction

In the United States , an estimated 1.2 million persons are living with chronic hepatitis B infection, and 3.2 million are living with chronic hepatitis C infection. Due to the asymptomatic nature of viral hepatitis, an overwhelming majority of cases are unaware of their infection until they have symptoms of liver cancer or liver disease. Each year, an estimated 85,000 people become newly infected with hepatitis B or C. These diseases infect up to five times as many Americans as HIV/AIDS. Viral hepatitis is the leading cause of liver cancer and the most common reason for liver transplantation in the U.S. Each year about 15,000 Americans will die from liver cancer and related complications caused by these preventable diseases.

Hepatitis B and C can be either acute or chronic. The acute form is a short-term illness that occurs within the first six months after exposure to hepatitis B virus (HBV) or hepatitis C virus (HCV). These diseases can become chronic in some individuals. An estimated 6-10% of adults with hepatitis B develop chronic infection, and an estimated 85% of adults with hepatitis C will develop chronic infection.

The Centers for Disease Control and Prevention (CDC) Division of Viral Hepatitis (DVH) currently receives only $19.3 million each year to fight viral hepatitis in the U.S.; roughly $5 million of its small budget is used to fund one person in each state to oversee the prevention of viral hepatitis.

Early in 2010, the Institute of Medicine (IOM) released *Hepatitis and Liver Cancer – A National Strategy for Prevention and Control of Hepatitis B and C*. This landmark study recognized viral hepatitis as a crisis in the U.S. and an important public health problem. Barriers to prevention and control efforts focused on the lack of knowledge among health care providers, social service providers, at- risk populations, the public, and policy makers concerning the devastating impact of viral hepatitis. The report identifies inadequate public health resources for viral hepatitis prevention, control, and surveillance programs as an apparent cause.

According to the report, without adequate funding and commitment, viral hepatitis epidemics will increase costs to private and public insurers, including Medicare and Medicaid, by billions of dollars and account for additional billions lost due to decreased productivity from the millions of American workers who suffer from chronic hepatitis B and C infections. Recommendations were offered in four categories: surveillance, knowledge and awareness, immunization, and services for viral hepatitis.

Surveillance

The IOM report states that viral hepatitis surveillance systems in the U.S. are highly fragmented and poorly developed. Surveillance data should provide accurate estimates of the burden of disease. From this information, policy makers could allocate sufficient resources to viral hepatitis prevention and control programs. The IOM report recommends that the CDC conduct a comprehensive evaluation of the national hepatitis B and C public health surveillance system to determine its current status. Additionally, the report recommends that the CDC develop specific agreements with all state and territorial health departments to support core surveillance for acute and chronic hepatitis B and C infections, and conduct targeted active surveillance to monitor incidence and prevalence of hepatitis B and C in populations not fully captured by core surveillance. Core surveillance was defined as activities that all jurisdictions must engage in to provide accurate, complete, and timely information to monitor incidence, prevalence, and trends in disease diagnoses, while targeted surveillance was defined as additional data on specific populations that are not represented fully in the collection of core surveillance.

Knowledge and Awareness

The IOM report found that a major challenge to preventing hepatitis B and C infections is the lack of knowledge and awareness about these diseases and the stigma associated with these diseases among health care providers, social service providers, at risk populations and the public. This insufficient understanding about viral hepatitis can contribute to continued transmission, missed opportunities for vaccination, missed opportunities for early diagnosis and medical care, and poor health outcomes. To improve knowledge and awareness, the IOM report recommends that the CDC work with stakeholders to develop hepatitis B and C educational programs for health care and social service providers. As a way to increase awareness about hepatitis B and C among at risk populations and the general public, the IOM report recommends that the CDC work with stakeholders to develop, coordinate, and evaluate innovative outreach and education

programs. Such programs should be offered in a variety of languages that are culturally sensitive and should be integrated into existing health programs that serve at risk populations.

Epi Flashback

1900 – Dr J. N. Hurty describes the sanitation of a Pullman passenger car, specifically ventilation and cleanliness. At a symposium the previous year "an eminent eastern speaker declared the 75% of his pneumonia cases" reported travelling in sleeping cars. Dr Hurty suggests improving ventilation through better design and improving cleanliness by "the abolition of carpets and hangings."

Source: Nineteenth Annual Report of the State Board of Health of Indiana for the Fiscal Year Ending October 31, 1900

Hepatitis Surveillance in Indiana

In 2008, the ISDH, in cooperation with external partners, prepared the Indiana Strategic Plan for the Prevention, Care, and Elimination of Viral Hepatitis which is now in the implementation stage. This Indiana specific plan was developed to provide a blueprint for action with the purpose of eliminating viral hepatitis through education, prevention, and care of those living with viral hepatitis. The plan can be located at http://www.in.gov/isdh/23969.htm.

The ISDH reports cases of hepatitis B and C infection based on standardized case definitions to the CDC. Specific CDC case definitions can be found at http://www.cdc.gov/ncphi/disss/nndss/casedef/case_definitions.htm. The ISDH case investigation forms were revised in 2009 to include required surveillance data. The Indiana National Electronic Disease Surveillance System (INEDSS) began in 2008. This electronic transmission system is progressing to include all local health departments, laboratories and hospitals within Indiana. According to the Communicable Disease Reporting Rule (410 IAC 1-2.3), acute and chronic hepatitis B infections must be reported to local health departments for further investigation. Acute hepatitis C infections are also reportable. Although chronic hepatitis C infections are not reportable, local health departments are highly encouraged to investigate them to determine exposure and risk factor information.

Disease information on statistics and the epidemiology of viral hepatitis in Indiana can be found in the Communicable Disease Annual Reports published on the ISDH Web site at: http://www.in.gov/isdh/files/2007InfectiousDiseases.pdf. Quick fact sheets specific to hepatitis B and C can be found at http://www.in.gov/isdh/20209.htm, and the Viral Hepatitis Resource and Services directory, which is currently being updated, can be located at http://www.in.gov/isdh/files/IndianaResourceDirectory2006.pdf.

Efforts to educate and inform include scheduled viral hepatitis training sessions to various interest groups statewide. The ISDH, in conjunction with the Hepatitis Foundation International (HFI), is hosting a Viral Hepatitis Summit in Indiana on October 7, 2010. The goals of this summit will be to provide health care professionals and others working with at- risk and infected individuals with viral hepatitis information regarding evaluation and effective management.

Conclusion

The IOM report concluded that the present approach to the prevention and control of hepatitis B and C infection is ineffective. Because viral hepatitis is not recognized as a serious public health problem in the U.S., inadequate resources are being allocated to viral hepatitis prevention, control, and surveillance programs. Increased knowledge and awareness about chronic viral hepatitis, improved surveillance for hepatitis B and C infection, and better integration of viral hepatitis services are needed to remedy this problem. Unless action is taken to prevent the transmission of hepatitis B and C and slow the progression of chronic disease, thousands more Americans will die each year from liver disease or liver cancer related to these preventable diseases.

Norovirus Outbreak At A Day Care

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Background

On December11, 2009, the Allen County Health Department (ACHD) received a communicable disease report for a child who was laboratory confirmed with *Campylobacter*. The child's parents were contacted in order to begin an investigation. During the interview the parents stated the child attended a day care. The day care stated that at least six children and teachers had become ill with symptoms of vomiting and diarrhea. The ACHD initiated an investigation concerning the day care on December 14.

Epidemiologic Investigation

The ACHD initiated an investigation in an effort to determine if the disease transmission was from a point source or some other agent. Enteric samples were collected from 11 symptomatic persons and sent to the ISDH Laboratory for analysis. Six samples were tested for *Norovirus* and bacterial agents and five samples were tested for *Norovirus* only. The day care had implemented a policy that ill or symptomatic persons be excluded from the day care until symptom-free. Also, increased sanitation and hand washing were implemented.

Environmental Assessment

A representative of the ACHD performed a food establishment inspection. No significant violations were noted on the report. The ACHD recommended the day care use disposable dishware for approximately two weeks. The two employees who were food handlers had not been ill.

Epi Flashback

Source: Monthly Bulletin, Indiana State Board of Health, March 1940

Laboratory Results

Stool specimens from eleven people were submitted to the ISDH Laboratory for analysis. Three samples tested positive for *Norovirus*. Eleven samples tested negative for *Salmonella*, *Shigella*, *Campylobacter* or *Escherichia coli* 0157:H7.

Conclusions

This investigation confirms an outbreak of *Norovirus* at among day care children and staff. Control measures implemented by the staff helped break the cycle of transmission. The causative agent of this outbreak was *Norovirus*.

Norovirus is the most common cause of acute gastroenteritis in the United States, causing 23 million cases each year and attributing to at least 50% of all foodborne outbreaks. Viral gastroenteritis is passed in the stool, and people become infected by ingesting stool from an infected person (fecal-oral route). The virus is easily spread by contaminated food or beverage, from person to person, and by contact with a contaminated object. These viruses can remain infectious on surfaces for up to 72 hours, and only a very small amount of virus is needed to cause infection.

Symptoms usually begin 24-48 hours (range of 12-72) after exposure and last 24-48 hours. The illness can last 72-84 hours in the elderly or in those with weakened immune systems. Most cases have no or slight fever. Viral gastroenteritis can be a serious illness for people who are unable to drink enough fluids to replace what they lose through diarrhea and vomiting. Infants, young children and the elderly who are unable to care for themselves and people with weakened
immune systems are at increased risk of dehydration. Death is extremely uncommon, but the illness can compound other health problems.

Recommendations:

In general, most gastroenteritis can be prevented by strictly adhering to the following guidelines:

- Thoroughly wash hands with soap and water before preparing and serving food.
- Thoroughly wash hands with soap and water after using the restroom.
- Thoroughly wash hands with soap and water after assisting residents with diarrhea and/or vomiting.
- Persons with diarrhea and/or vomiting should not prepare food for others and should limit direct contact with others as much as possible.
- Patients ill with diarrhea and/or vomiting should not attend meals and activities with other residents not experiencing symptoms.
- Staff with diarrhea and/or vomiting shall be excluded from employment involving food handling (Indiana Retail Food Establishment Sanitation Requirements, 410 IAC 7-24-122).

Epi Flashback

1935 – Public Health Facts:

Police protection taxes each person about $4.52 per year, Health protection about $0.50

Source: The Monthly Bulletin Indiana Division of Public Health, Department of commerce & Industry March 1935

1960 – Legislative Summary

H.B. 1343 – Makes it a misdemeanor for anyone other than a physician or a person supervised by a physician to tottoo the human body. *Chapter 383, Acts of 1963, Approved 03-15-1963.*

Source: The Monthly Bulletin Indiana State Board of Health March 1963

Pneumonia Outbreak of Undetermined Origin At a Long Term Care Facility

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Background

On August 31, the Elkhart County Health Department (ECHD) notified the Indiana State Department of Health (ISDH) of a respiratory outbreak at a long term care (LTC) facility. Three residents had respiratory symptoms that developed on August 25, with 24 more residents developing symptoms since August 29. Six residents had been diagnosed with pneumonia by chest x-ray, and three residents had chest x-rays pending. Predominant symptoms of residents were coughing and vomiting with paroxysmal cough. Symptomatic residents were located in five wings of a seven- wing facility.

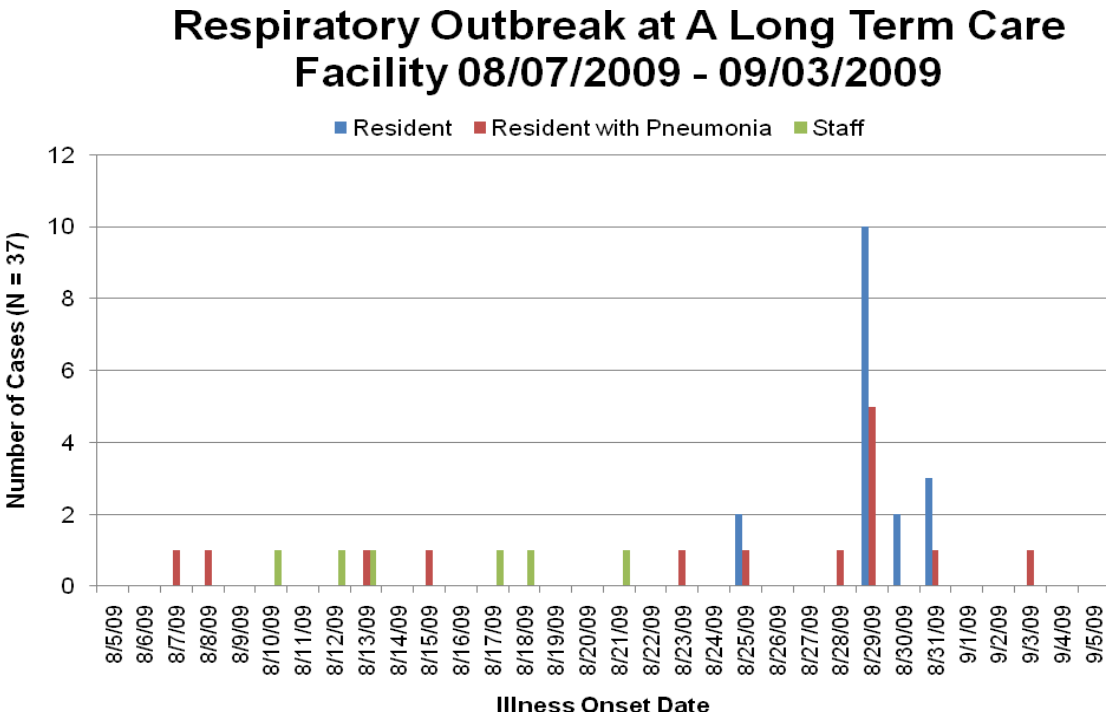
Epidemiological Investigation

On August 31, the ISDH and the LTC Director of Nursing (DON) initiated a collaborative investigation to determine the cause of the respiratory/pneumonia outbreak among 121 residents and 120 staff at the facility. Thirty-seven individuals (31 residents and 6 staff) had developed respiratory symptoms. Fourteen of the 31 residents had chest x-ray diagnosis of pneumonia Two

of the six ill staff members had been clinically diagnosed with pneumonia by private health care practitioners. The residents with a diagnosis of pneumonia were treated with biaxin because of a possible diagnosis of pertussis. Ill residents were isolated for eight days allowing for infectious periods of viral and bacterial agents. Ill staff members were excluded from work until they were fever free for 24 hours. Four residents submitted samples to the South Bend Medical Foundation and the ISDH Laboratory for bacterial analysis. Rapid influenza A and B tests were performed on same four residents with negative results.

Signs and symptoms reported by residents included cough (100%), pneumonia (45.16%), fever (12.90%), sore throat (12.90%), malaise (9.68%), and chills (3.23%). Signs and symptoms reported by staff included cough (100%), malaise (67%), sore throat (50%), myalgia (50%), chills (33.33%), nausea (33.33%), head ache (16.67%), and vomiting (16.67%). The overall attack rate (AR) was 15.35% (resident AR = 25.62% and staff AR = 5.00%). The median duration of illness was 11 days (range: 1 day to 66 days). The incubation period was 1-3 days. Two residents were hospitalized with pneumonia. .

Figure 1: Epidemiology curve



Eleven of the 20 eligible residents received pertussis vaccine (Tdap). No staff members were vaccinated for pertussis. The seasonal influenza vaccine was offered to residents on October 1. The number of residents receiving the seasonal vaccine was unknown; however, 36 staff received the seasonal influenza vaccine. Nineteen staff and one resident (the only resident that met the priority group criteria) received the H1N1 vaccine.

Environmental Assessment

The ISDH requested that the facility implement environmental cleaning of all common surfaces using recommended sodium hypochlorite dilution concentrations. Staff was provided in-service training on respiratory disease prevention and implemented respiratory droplet precautions while caring for ill residents. Staff and residents were educated on proper hand washing etiquette. All residents were requested to eat meals in their rooms because five out of the seven wings were

affected. All symptomatic residents were isolated for eight days or until results were received from pending tests (viral or bacterial). Signs were posted on entrances requesting no visitors.

Laboratory Results

Facility staff collected and analyzed four specimens for influenza A and B. Four throat cultures were submitted to the South Bend Medical Foundation for bacteriologic *(Streptococcus pneumoniae* and "other" pathogens) analysis. Four nasal-pharyngeal swabs were submitted to the ISDH Laboratory for PCR testing (*Bordetella pertussis* and *Mycobacterium pneumonia*) and viral testing.

All four influenza A and B rapid tests were negative. All four specimens tested for *Bordetella pertussis* and the *Mycobacterium pneumoniae* by PCR were negative (unofficial report). All four throat cultures were negative for *Streptococcus pneumoniae* and other bacterial agents.

Conclusions

The investigation confirms that a respiratory illness occurred among the staff and residents at a long term care facility on August 07 – September 3, 2009. The causative agent of this outbreak was not determined. Thirty-seven residents and staff developed symptoms. Fourteen residents had chest x-rays positive for pneumonia. Two residents were hospitalized.

Respiratory agents spread mainly from person to person by respiratory droplets and by contact with a contaminated object, then touching their mouth or nose. Symptoms generally include fever, chills, headache, dry cough, runny/stuffy nose, sore throat, muscle aches, headaches, and extreme tiredness. Most healthy adults may be able to infect others beginning one day before symptoms develop and up to 5-7 days after becoming sick. Residents living in long term care facilities and the facility staff may be at increased risk of disease transmission because of the large number of residents in the facility and the sustained close contact between residents and staff.

Recommendations

In general, most respiratory illnesses can be prevented by strictly adhering to the following guidelines:

- Use your elbow or upper arm (instead of your hands) or a tissue to cover your mouth and nose when you cough or sneeze. Immediately dispose of used tissue.
- To clean your hands after coughing or sneezing, wash with soap and water, or clean with alcohol-based hand cleaner if water is not available.
- Avoid close contact with people who are sick.
- If you become ill, stay home from work, school, and social gatherings.
- Try not to touch your eyes, nose, or mouth.

Preventing Seasonal Influenza:

The single best way to prevent seasonal flu is to get a seasonal flu vaccination each year. Yearly seasonal flu vaccination should begin in September, or as soon as the seasonal flu vaccine is available, and continue throughout the flu season into December, January, and beyond, since timing and duration of flu seasons vary. While seasonal flu outbreaks can occur as early as October, most of the time seasonal flu activity peaks in January or later.

For additional information on influenza, please visit the Centers for Disease Control and Prevention (CDC) Web site at: http://www.cdc.gov/flu/ and www.cdc.gov/h1n1 and ISDH website at: http://www.in.gov/isdh/22104.htm and http://www.in.gov/flu.

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.

Save the Date!

2010 Public Health Nurse and Immunization Conference

"The Basics and Beyond"

May 19 –20, 2010
IUPUI Campus Center, Indianapolis, IN

Presented by:

Indiana State Department of Health

The Immunization Division
and
The Local Health Department Outreach Office

In 2010, the ISDH is going back to the basics of public health nursing. Workshops and breakout sessions are designed to meet the needs of new public health nurses and experienced public health nurses. Attendees will choose from 5 two-hour workshops and 15 one-hour sessions during the 1 1/2 day conference. The conference is free but attendees will need to register online. Online registration will open in March 2010. More information will be available in future issues of the **VacZine**.

For more information, contact April Bailey, at abailey@isdh.in.gov or Jessica Trimble at jtrimble@isdh.in.gov

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 (1997-2008)
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 February 28, 2010 **based on 2000 population of 6,080,485)**

HIV - without AIDS to date:

326	New HIV cases March 2009 thru February 28, 2010	12-month incidence	5.67 cases/100,000
3,911	Total HIV-positive, alive and without AIDS on February 28, 2010	Point prevalence	67.99 cases/100,000

AIDS cases to date:

337	New AIDS cases from March 2009 thru February 28, 2010	12-month incidence	5.86 cases/100,000
4,447	Total AIDS cases, alive on February 28, 2010	Point prevalence	77.31 cases/100,000
9,235	Total AIDS cases, cumulative (alive and dead) on February 28, 2010		

REPORTED CASES of selected notifiable diseases

Disease	Cases Reported in January - February *MMWR* Weeks 1-8	
	2009	2010
Campylobacteriosis	67	46
Chlamydia	3433	1434*
Cryptococcus	0	0
Cryptosporidiosis	38	12
E. coli, shiga toxin-producing	3	1
Giardiasis	31	28
Haemophilus influenzae, invasive	12	14
Hemolytic Uremic Syndrome (HUS)	0	0
Hepatitis A	4	1
Hepatitis B	16	12
Hepatitis C Acute	1	3
Histoplasmosis	22	9
Influenza Deaths (all ages)	1	1
Gonorrhea	1198	483*
Legionellosis	7	5
Listeriosis	0	1
Lyme Disease	1	4
Measles	0	0
Meningococcal, invasive	6	6
Mumps	0	2
Pertussis	68	31
Rocky Mountain Spotted Fever	0	0
Salmonellosis	49	31
Shigellosis	19	1

REPORTED CASES of selected notifiable diseases (cont.)

Disease	Cases Reported in January - February *MMWR* Weeks 1-8	
	2009	2010
Severe *Staphylococcous aureus* in Previously Healthy Person	5	2
Group A Streptococcus, invasive	35	22
Group B, Streptococcus, Invasive (All ages)	47	43
Streptococcus pneumoniae (invasive, all ages)	80	111
Streptococcus pneumoniae (invasive, drug resistant)	47	2
Streptococcus pneumoniae (invasive, <5 years of age)	10	13
Syphilis (Primary and Secondary)	28	1*
Tuberculosis	12	7
Vibriosis	0	0
Varicella	28	52
Yersiniosis	3	1
Animal Rabies	1	0

***Note data is provisional only due to migration to a new reporting system**

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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