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In This Issue

Epidemiology of Vaccine-Preventable Diseases Part 3: Hepatitis A, Hepatitis B, and *Haemophilus influenzae* Serotype b (Hib)

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Vaccine-preventable diseases are still a serious threat to the population of the United States and, specifically, Florida. The results of the 2007 National Immunization Survey indicate that vaccination coverage for vaccines recommended routinely since 2000 and before reached record high levels (1). Despite this, outbreaks of vaccine-preventable diseases continue to occur in the United States. One study has suggested the increasing number of vaccine exemptions among children who attend school in states that allow philosophical exemptions has played a role in facilitating transmission (2). This four-part series of articles will examine the history of these diseases, description of the vaccines and their history, and the epidemiology of these diseases in Florida. Part 3 covers hepatitis A, hepatitis B, and *Haemophilus influenzae* serotype b (Hib). Please see the December 2008 issue of Epi Update for Part 1 covering measles, mumps, and rubella and the January 2009 issue of Epi Update for Part 2 covering diphtheria, tetanus, and pertussis.

Disease History

Hepatitis A is a disease caused by infection with a non-enveloped RNA virus from the family Picornaviridae, the hepatitis A virus (HAV). The illness is usually characterized by abrupt onset of fever, malaise, anorexia, nausea, and abdominal pain, with the development of jaundice several days later. The illness can range from mild disease lasting between one and two weeks to severely disabling disease lasting several months. Approximately 15% of cases experience relapsing hepatitis A for up to one year, although chronic infection is not thought to occur. Disease severity increases with age and the case fatality rate ranges from 0.3% in younger people to 1.8% in those over 50. Children often have asymptomatic or unrecognized illness and serve as an important source of infection for others.

HAV is transmitted by the fecal-oral route and in the U.S. most commonly affects household and sexual contacts of acute cases. Additionally, sporadic cases are often associated with people who travel to areas where HAV infection is endemic, as well as childcare facilities where there are children in diapers with cases occurring in the children and the staff. In countries with poor sanitation, HAV infection is common and over 90% of the general population can show serologic evidence of previous HAV infection (3). Point source outbreaks continue to occur in the U.S. and are most commonly associated with food contaminated by ill food workers or contaminated produce. These outbreaks require intensive public health efforts to control. The incidence of HAV infection in the U.S. has decreased since vaccine licensure in 1995-1996 from over 30,000 cases per year to fewer than 10,000 cases per year in 2001-2002 (4). That trend has continued, as there were 4,488 and 3,579 cases reported nationally in 2005 and 2006 respectively (4).

Hepatitis B is a caused by infection with a DNA virus from the family Hepadnaviridae, the hepatitis B virus (HBV). Although hepatitis B and hepatitis A are similar in name, the etiologic agents for the two infections are very different, as are the outcomes of illness. Illness is characterized by the gradual development of malaise, anorexia, nausea, vomiting, abdominal pain, fever, headache, myalgia, skin rashes, arthritis, and dark urine. Jaundice develops three to ten days later. Once jaundice develops, illness can last one to three weeks, followed by the convalescent phase during which the jaundice usually resolves but malaise and fatigue may last. The majority of adults infected with HBV fully recovers and are immune to future infection. However, 1%-2% of acute infections develop into fulminant hepatitis, which has a case fatality rate of 63%-93%.

Although the outcomes of acute infection can be serious, the most severe overall outcomes of HBV infection are from chronic infection. Approximately 5% of all HBV infections result in chronic disease though the risk of developing chronic disease decreases with age. Up to 90% of infants infected with HBV at birth will develop chronic disease (5). Risk of chronic disease in infants born to infected women can be reduced by the administration of hepatitis B immune globulin (HBIG) and vaccine at birth, and completion of the vaccine series. Chronic infection is often asymptomatic, but the carriers are still capable of infecting others. Outcomes of chronic HBV infection include chronic hepatitis, cirrhosis, liver failure, and hepatic carcinoma. About 25% of people with chronic HBV infection will die prematurely from liver disease or liver cancer, which represents an estimate of over 600,000 deaths worldwide in 2002 (5).

HBV is transmitted through parenteral or mucosal exposure to the body fluids of a person who has acute or chronic HBV infection. The most common route of exposure in the U.S. is sexual contact, but other routes of exposure are important including injection drug use, tattooing, body piercing, acupuncture, and accidental needle sticks in the healthcare profession. It is also possible to transmit the disease from mother to child perinatally. Perinatal transmission does not occur as frequently in the U.S. as it does in other parts of the world due to the efforts of U.S. health providers to screen pregnant women and appropriately vaccinate at-risk infants.

Hepatitis B incidence in the U.S. peaked around 1985-1986 when approximately 26,000 cases were reported each year (5). The number of cases in the U.S. then steadily declined to fewer than 10,000 cases per year in 1996. This decrease is attributed to decreased incidence in specific populations, mainly among men who have sex with men and among injection drug users, as a result of HIV prevention interventions. The number of acute hepatitis B cases reported nationally stayed near the 10,000 case per year threshold for many years but has recently fallen to below 5,000 cases per year. In 2006, there were 4,758 acute cases reported nationally (4).

Haemophilus influenzae is a bacterium that can either be encapsulated or unencapsulated. The capsule can occur as one of six different serotypes, a through f. The nontypable (unencapsulated) strains of *H. influenzae* are generally less virulent than the typable strains and rarely cause serious infections; they are mostly associated with ear infections in children and bronchitis in adults. Invasive infection is primarily caused by the typable strains of *H. influenzae*, with over 95% of invasive disease caused by serotype b in the pre-vaccine era. There is an age-dependant susceptibility associated with *H. influenzae* serotype b (Hib) infection, as Hib disease is not common after five years of age. In the pre-vaccine era the majority of children were immune to Hib by five or six years of age, with the majority of these infections being asymptomatic. The carriage rate of Hib among infants and children was estimated at 0.5%-3% in the pre-vaccine era, but was not common among older age groups.

The major manifestations of Hib infection include meningitis, epiglottitis, pneumonia, arthritis, and cellulitis. Meningitis is the most common of these manifestations accounting for 50%-65% of all cases in the pre-vaccine era. Symptoms of Hib meningitis are similar to those for other bacterial meningitides, including fever, altered mental status, and stiff neck. Permanent neurologic sequelae, including hearing loss, occur in 15%-30% of survivors. The case fatality rate for Hib meningitis is 2%-5% even with appropriate antimicrobial therapy.

In the early 1980s (pre-vaccine) there were approximately 40 to 50 cases per 100,000 population of *H. influenzae* invasive disease per year in the U.S. Serotype information is not available for those early years, but in 1990 there were over 20 cases of Hib per 100,000 children under five years of age. This rapidly declined and since 1994, Hib incidence has been less than one case per 100,000 children under five years of age. Overall, Hib incidence has declined 99% since vaccine licensure. Data from 1998-2000 show that 68% of the confirmed Hib cases under five years of age reported in the U.S. were either incompletely vaccinated or their vaccination status was unknown. A recent Morbidity and Mortality Weekly Report (MMWR) article discussed five Hib cases in Minnesota, including one death, in children less than five-years-old (6). Of those five children, only one was completely immunized and three had received no doses of the vaccine due to parental deferral or refusal.

Vaccine History

Millions of people have benefited from vaccines for more than two centuries. Vaccination is one of a small group of medical interventions with direct and simultaneous benefits to both individuals and communities. Sustained person-to-person disease transmission is more difficult in populations with large numbers of immune persons. The more individuals in a community who are vaccinated, the less likely susceptible persons are to be exposed to the disease, which translates into protection known as herd immunity.

Hepatitis A vaccines were first licensed in 1995 and 1996 in the U.S. and were highly effective, preventing disease in 94%-100% of persons receiving vaccine. These inactivated whole-virus vaccines were initially approved for persons aged two years and older and were recommended for people who live in communities with high incidence of hepatitis A (e.g., Alaska Native villages,

American Indian reservations, some Hispanic communities, and some religious communities) and people traveling to endemic countries. The Food and Drug Administration (FDA) subsequently approved the use of both hepatitis A vaccines for children aged 12 to 23 months in 2005. While hepatitis A vaccination is not required for school entry in Florida, the Advisory Committee on Immunization Practices (ACIP) currently recommends hepatitis A vaccination of all children at age 12 to 23 months, catch-up vaccination of older children in high risk areas, and vaccination of persons at increased risk for hepatitis A (e.g., travelers to endemic areas, users of illicit drugs, and men who have sex with men). Two doses of hepatitis A vaccine are recommended, with at least six months between doses. One dose provides good short-term protection for travelers who do not have time to get both doses before departure. Hepatitis A vaccine can also be used for post-exposure prophylaxis. For healthy persons aged 12 months to 40 years who have recently been exposed to HAV, the ACIP recommends one dose of hepatitis A vaccine as soon as possible after exposure. Vaccine is generally preferable to immune globulin because it provides long-term protection; however, for persons over 40 years of age, immune globulin is recommended as post-exposure prophylaxis due to a lack of information regarding vaccine performance and outcomes in this age group (7).

Hepatitis B vaccine is made from small, inactivated parts of HBV called hepatitis B surface antigen (HBsAg). It is highly effective, with 98%-100% of children receiving the vaccine developing immunity. Hepatitis B vaccines have been available in the U.S. since 1981, though their impact has been less than optimal for several reasons. From 1981 to 1991, vaccination was targeted to groups at high-risk for acquiring HBV infection, including persons having contact with infected persons or multiple sexual partners, injection-drug users, men who have sex with men, and healthcare workers. However, 25%-30% of people with HBV infection deny having any risk factors, making targeted strategies less effective. A comprehensive approach to the elimination of HBV transmission was implemented in 1991 that included prenatal testing of pregnant women, and routine vaccination of infants, adolescents, and adults at high risk for infection. Three doses of hepatitis B vaccine are recommended for lifelong immunity: one at birth, the second at 1 to 4 months, and the third at 6 to 18 months.

The first Hib vaccine, licensed in 1985 in the U.S., was a polysaccharide vaccine that proved to be only moderately effective. The polysaccharide antigen, a part of the Hib bacterium, is relatively ineffective for vaccine use, unless chemically bonded to a protein carrier in a process called conjugation. The first Hib conjugate vaccine was licensed in 1987. Today two brands of conjugate vaccine are available with 95%-100% of children receiving vaccine developing immunity. Additionally, there is some evidence that Hib vaccination decreases the carriage rate in children, which decreases the chance that an unvaccinated child will be exposed to the bacterium. All infants should receive a primary series of conjugate Hib vaccine. Vaccine doses are recommended at 2, 4, 6, and 12 to 15 months of age for one brand (ActHIB) and two, four, and 12-15 months of age for the other brand (PedvaxHIB). Vaccine can be given as early as six weeks of age.

Several combination vaccines are available to decrease the number of shots a child receives. Examples discussed in previous articles in this series include MMR for measles, mumps, and rubella and DTaP for diphtheria, tetanus, and pertussis. Hepatitis A, hepatitis B, and Hib are available as part of combination vaccines as well. Dosing schedules for these combination vaccines differ from the single-antigen vaccines and detailed schedule information can be found in the Epidemiology and Prevention of Vaccine Preventable Diseases, 10th edition (the Pink Book).

Epidemiology in Florida

Recently, Rousch, et al. published a compilation of VPD morbidity and mortality data for the United States (8). This article provided the basis for completing a similar summary of Florida data. The following tables and charts are compiled from surveillance data collected in Florida over the past thirty-seven years to quantify and visually assess the impact that vaccination practices have had on the burden of disease in this state.

Table 1 depicts the decline in the number of hepatitis A, hepatitis B, and *H. influenzae* meningitis cases and deaths after widespread use of vaccination. Serotype information for *H. influenzae* cases is not readily available historically; therefore, *H. influenzae* meningitis was used as a proxy for Hib in estimating the decline in cases after the introduction of vaccine.

Table 1: Average Hepatitis A, Hepatitis B, and H. *influenzae* Meningitis Cases and Deaths Pre-Vaccine Compared to Post-Vaccine (2007) in Florida

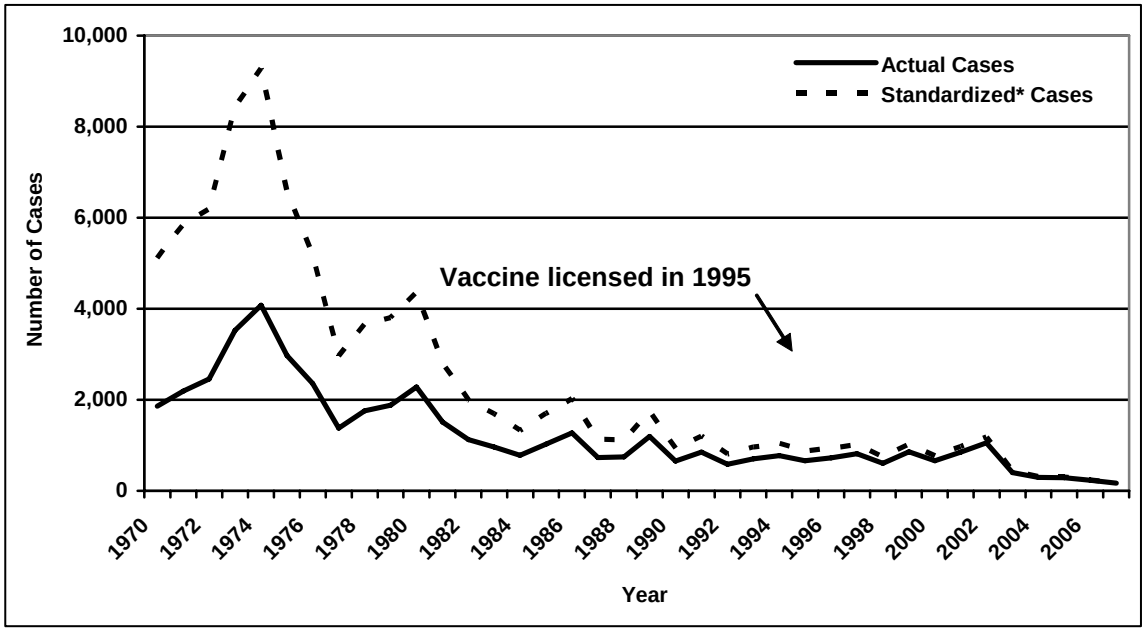
Disease (Pre-Vaccine Years Averaged)	Pre-Vaccine		Year Vaccine in Wide Use	Post-Vaccine (2007)	
	Cases/ Year	Deaths/ Year		Cases	Deaths
Hepatitis A (1986-1995)	816	6	1995	171	2
Acute hepatitis B (1982-1991)	1,364	44	1986	368	38
H. influenzae meningitis (1980-1989)	378	9	1990	10	0

While comparing the number of hepatitis A, hepatitis B, and *H. influenzae* meningitis cases in 2007 to the number of cases in 1970 is certainly meaningful, this may not be a fair comparison due to the change in Florida's population over time. Florida's population has grown from 6.8 million residents in 1970 to over 18.7 million in 2007; a larger population would be expected to have a larger number of cases, all else being equal. To address this, the 2007 population (18,762,014 residents) was used to estimate the number of cases that would have been reported for each year, had the population size been the same as the 2007 population. This standardized estimate was calculated by dividing the 2007 population by the population for a given historical year to get a population ratio. The number of cases reported for that given year was multiplied by the population ratio. For example, the 2007 population (18,762,014 residents) was 2.7 times the population in 1970 (6,841,500 residents). The number of cases reported in 1970 was multiplied by 2.7 to estimate the number of cases that would have been reported in 1970 if the 1970 population was equal to the 2007 population. These standardized estimations are represented in Charts 1-3 as a dashed line. The actual number of cases reported for each year is represented in the charts as a solid line. Note that as the population size approaches the 2007 population, the dashed line and the solid line converge.

Consistently high numbers of hepatitis A cases were reported in Florida in the late nineties (605-854 cases per year) with a peak of 1,056 cases in 2002. Since then, incidence in Florida has decrease dramatically to 233 cases in 2006 and 171 cases in 2007. Acute hepatitis B incidence has been decreasing in Florida over the past ten years. The incidence rate was 4.4 cases per 100,000 population in 1997 and declined to 1.96 cases per 100,000 population in 2007. Early historical data on the number of Hib cases in Florida are not available, but 21 cases were reported from 1997-2007 with four of those cases in 2006 and none in 2007. *H. influenzae* meningitis, a

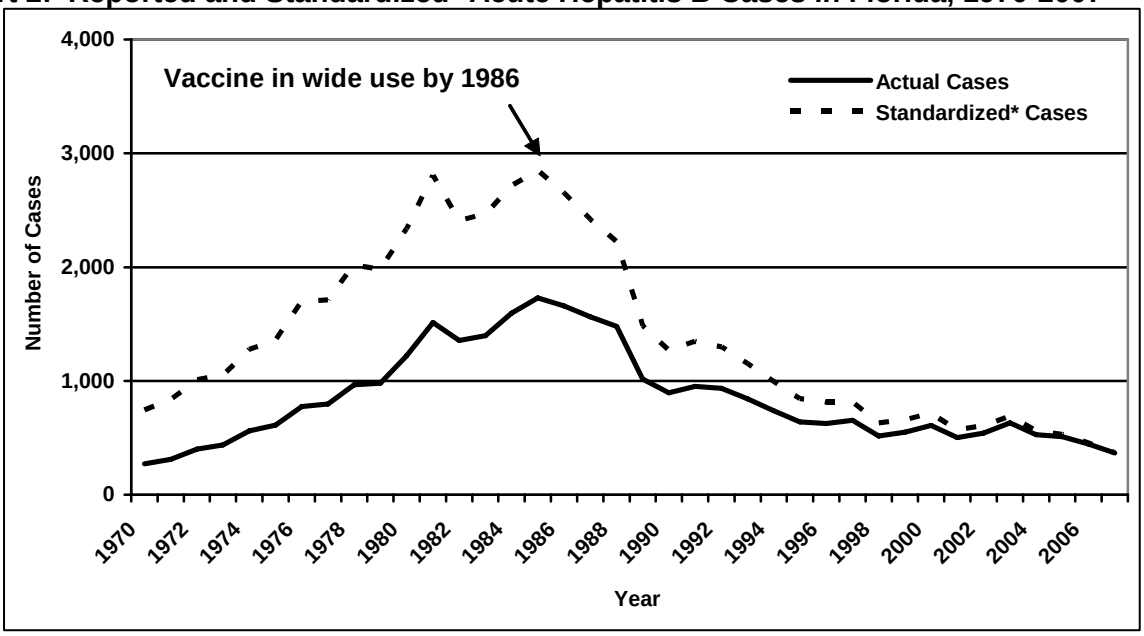
proxy for Hib disease, decreased significantly from 337 cases in 1982 to 10 cases in Florida in 2007.

Chart 1: Reported and Standardized* Hepatitis A Cases in Florida, 1970-2007



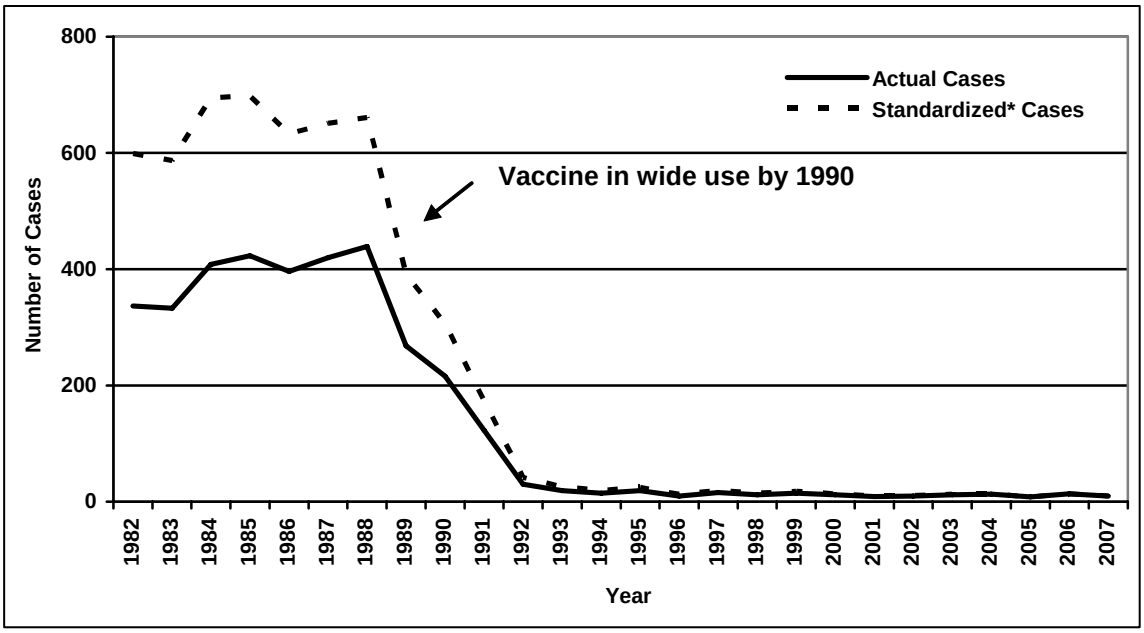
*Number of cases that would have occurred in Florida each year if Florida had a population of 18,762,014 (see text for further explanation).

Chart 2: Reported and Standardized* Acute Hepatitis B Cases in Florida, 1970-2007



*Number of cases that would have occurred in Florida each year if Florida had a population of 18,762,014 (see text for further explanation).

Chart 3: Reported and Standardized* *H. influenzae* Meningitis Cases in Florida, 1982-2007



*Number of cases that would have occurred in Florida each year if Florida had a population of 18,762,014 (see text for further explanation).

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Additional Resources

Bureau of Immunization website: http://www.doh.state.fl.us/disease_ctrl/immune/index.html

Bureau of HIV/AIDS, Hepatitis Program website:
www.doh.state.fl.us/disease_ctrl/aids/hep/index.html

Bureau of Epidemiology, Annual Morbidity Statistics Reports:
http://www.doh.state.fl.us/disease_ctrl/epi/Morbidity_Report/amr.html

Centers for Disease Control and Prevention (CDC) websites:
Viral Hepatitis
http://www.cdc.gov/hepatitis/index.htm
Hepatitis A Vaccination
http://www.cdc.gov/vaccines/vpd-vac/hepa/default.htm
Hepatitis B Vaccination
http://www.cdc.gov/vaccines/vpd-vac/hepb/default.htm
Haemophilus influenzae Serotype b
http://www.cdc.gov/ncidod/dbmd/diseaseinfo/haeminfluserob_t.htm
Haemophilus influenzae Serotype b Vaccination
http://www.cdc.gov/vaccines/vpd-vac/hib/default.htm
CDC Pink Book
http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm

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Head and Neck Cancer in Florida 2005

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The Florida Department of Health (DOH) recognizes the month of April as *Head and Neck Cancer Awareness Month*. Head and neck cancers account for approximately 3% to 5% of all cancers in the United States. During the month of April in Florida, efforts are dedicated to educate, increase awareness, and support detection of head and neck cancer. Head and neck cancer is often called a "neglected cancer."

Cancers that are categorized as head and neck cancer include those found in the lip; tongue; salivary glands; tonsils; floor of the mouth; gums and other areas of the mouth; larynx; hypopharynx; oropharynx; nasopharynx; nose; nasal cavity and middle ear; as well as other oral cavity and pharynx. Among the 12 sites, the larynx is the most commonly reported cancer site. Tobacco and alcohol use are the most important risk factors for developing head and neck cancer.

For this article, data on head and neck cancer incidence and diagnosis stage are from the Florida Cancer Data System (FCDS), and mortality data are from the Florida Department of Health, Office of Vital Statistics. The Florida data are compared with that from the Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute (NCI). The U.S. mortality data reported by SEER are provided by the National Center for Health Statistics (NCHS).

In Florida in 2005, the head and neck cancer incidence rate was 17.0 per 100,000 population and the mortality rate was 4.1 per 100,000 population. Both incidence and mortality rates were higher among males and those in older age groups. The incidence rate was higher among whites (17.3 per 100,000 compared to 14.6 per 100,000), while the mortality rate was higher among blacks (5.2 per 100,000 compared to 3.9 per 100,000). The 2005 incidence rate was 23% lower than the rate observed in 1981 (22.1 per 100,000). The 2005 mortality rate was 40% lower than the rate observed in 1981 (6.8 per 100,000).

Of all Florida head and neck cancer cases, 49.3% were diagnosed at an advanced stage in 2005. The percentage of cases diagnosed at an advanced stage was higher among males (50.2%) and blacks (57.9%) compared to their counterparts. The percentage of cancer cases diagnosed at an early stage decreased in 2005 (37.7%) compared to the percentage in 1981 (44.5%).

A comprehensive fact sheet with detailed data tables on head and neck cancer in Florida is available at the Florida Department of Health, Bureau of Epidemiology's website at: http://www.doh.state.fl.us/disease_ctrl/epi/cancer/Head_Neck_Report.pdf.

For additional information, please contact Florida Department of Health, Bureau of Epidemiology at 850.245.4401 or visit our website: www.floridachronicdisease.org.

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Legionnaires' Disease Outbreak Associated with a Health Fitness Club, Orange County, Florida June-September 2008

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Introduction

On September 30, 2008, the Orange County Health Department (OCHD) Epidemiology Program was notified by a local hospital of a laboratory-confirmed case of Legionnaires' disease with illness onset on September 25. The initial interview of the 33-year-old female disclosed that during her incubation period she lived in several rooms at a local hotel that she described as humid, moldy, and containing wet carpet. The patient denied hot tub or pool use during the two weeks prior to illness onset. She stated she believed that her illness originated in her hotel room where she lives. Her spouse, who lives in the hotel room with her, reportedly was not ill. After some difficulty in obtaining the relevant hotel room numbers of the patient, environmental health personnel evaluated the facility on October 15.

On October 7, the OCHD Epidemiology Program was notified of another laboratory confirmed case of Legionnaires' disease with illness onset of September 29. The 70-year-old female reported frequenting a local health fitness club (Fitness Club A) during the exposure period with no other reported relevant exposures. Exposures at Fitness Club A included a hot tub. Environmental health personnel conducted an inspection of the hot tub on October 14 in addition to providing the facility managers with information on prevention of *Legionella* transmission.

On October 22, the OCHD Epidemiology Program learned that the initially reported 33-year-old female patient had also visited the same fitness club during the two weeks prior to her illness onset. Her exposures included both the hot tub and shower facilities. As a result of this new information indicating a potential cluster of two or more similar illnesses linked to a common source, the OCHD Epidemiology Program initiated an investigation.

Methods

A case was defined as any person with both X-ray confirmed pneumonia and a urine-antigen laboratory test positive for *Legionella* who utilized facilities at Fitness Club A in Orlando, Florida within the two weeks prior to illness onset. To facilitate case finding, local hospitals were queried as well as surrounding county health departments. In addition, a notice was posted statewide on EpiCom requesting that any reported Legionnaires' disease cases with history of travel to Orlando be reported to the OCHD. Local epidemiologists attempted to re-interview all *Legionella* cases reported in Orange and surrounding counties from January 1, 2008 in order to elicit detailed exposures, specifically the implicated fitness club. The standard investigation case report and Centers for Disease Control and Prevention (CDC) Legionellosis Case Report forms were used to collect data in addition to the standard medical records and case notes.

An initial environmental health inspection and informational site visit of Fitness Club A in Orlando, Florida was conducted on October 14 in response to information received from the initial *Legionella* case of visits to this facility during her exposure period. After learning of an epi-linked case on October 22, the facility was re-assessed based on known specific exposures of both patients and was provided with remediation requirements on October 23. A follow-up visit was

conducted on October 27. Maintenance records for the hot tub were obtained for September and October.

Based on the environmental assessment and epidemiological data, environmental samples were collected from the hot tub and women's showers at Fitness Club A on October 23. Samples included both swabs and water from the hot tub and swabs from the interior of the shower heads in the women's showers. A one-liter bottle was used to collect water from the hot tub. Five 1-milliliter bottles were used to collect samples from the hot tub filter tanks. Two swabs were used to collect media from hot tub cartridge filter pleats and three were used to collect samples from the interior of three showerheads. All samples had sodium thiosulfate added (1 tablet per 1-ml. bottle and 10 tablets in the 1-liter bottle). Samples were shipped on October 27 and arrived at the Jacksonville Bureau of Laboratories (BOL) on October 29 for analysis.

Results

There were 125 cases of legionellosis reported in Florida from January 1 to November 1, 2008 compared to a three-year average of 119 cases and 124 cases the during the same time period in 2005-2007. Orange County reported 14 cases including those epi-linked in the reported cluster during the January 1 to November 1 time period. The OCHD reported 12 cases during this time-frame for 2007 with a three-year average of 8.7 cases. Case counts from Orange County and surrounding counties for the four-year time period are shown in Table 1.

Table 1: Number of Reported Legionellosis Cases, January 1, 2008 to November 1, 2008 for Selected* Central Florida Counties Compared to 2007 and Three-Year Averages

County	2008	2007	2005-2007 Average
Orange	14	12	8.7
Seminole	7	2	3.0
Osceola	1	0	1.7
Lake	3	2	2.0

*Note: Selection limited to counties where routine daily travel to Orange County is likely.

One additional case matching the case definition was identified through active surveillance and through re-interviewing willing and accessible legionellosis cases reported January 1 to November 1. Three confirmed cases that matched the case definition are described in this report. All patients are residents of Orange County, aged 33, 65, and 70 years. All are female. All of the patients had underlying health conditions. One patient reported being a current smoker. All three patients reported using the hot tub and shower during visits to Fitness Club A during the two weeks prior to illness onset. See Table 2 for a line list of case characteristics. Signs and symptoms reported by the patients are presented in Table 3.

Table 2: Characteristics of Cases, Legionnaires' Disease Cluster, Orange County, June-September, 2008

Patient-Case Status	Gender	Age	Fitness Club Visits	Onset Date	Medical Risk Factors	Smoker
1-Confirmed	Female	33	M, W, F since 7/26; last visit 9/24	9/25/08	Obese	Yes
2-Confirmed	Female	70	3-4x/week for summer, last visit on 9/29/08	9/29/08	Diabetes	No
3-Confirmed	Female	65	5-6x/week prior to illness	6/25/08	Diabetes	No

			onset			

Table 3: Frequency of Symptoms, Legionnaires' Disease Cluster, Orange County, June-September, 2008

Sign/Symptom	Number Reporting Sign/Symptom
Fever	3
Diarrhea	3
Cough	3
Vomiting	2
Chills	1
Muscle aches	1
Abdominal cramping	1
Nausea	1
Loss of appetite	1

Fitness Club A in Orlando has a 2014-gallon hot tub with a cartridge filter. There are no cooling towers associated with the air conditioning functions of this facility. The facility also has a 51,387-gallon indoor swimming pool with a high-rate sand filter. No other water features or fountains are located on the property. Showers are provided for male and female guests. The environmental inspection of the pool and hot tub conducted on October 14 revealed residual chlorine levels of greater than 10 ppm in the pool with a pH of 8.2. The hot tub had a residual chlorine level of 1.0 ppm and a pH of 8.2. Chlorine levels were not within the proper levels of 1.0-5.0 ppm for indoor pools and 2.0-10.0 ppm for hot tubs. The pH levels must also be between 7.2 and 7.8. The required maintenance logs were not consistently being used to record daily chemical readings. One filter instead of the required two was being used at the time of this inspection. The water temperature in the hot tub was 104º F, which is within the optimal temperature range (77-108 º F) for the growth of *Legionella* bacteria. The OCHD Swimming Pool Inspector closed both the pool and hot tub based on these findings per standard Department of Health protocols.

The environmental health assessment of Fitness Club A on October 23 revealed a residual chlorine level of 10.0 ppm with a pH of 8.2 for the hot tub. Maintenance logs did not indicate that routine super-chlorination or scrubbing activities had been performed. During this assessment, the management of the facility was instructed to implement remediation procedures for the reduction of *Legionella* bacteria for both the hot tub and female showerheads. The showerheads were thoroughly cleaned and sanitized with 100 ppm chlorine water. The hot tub was drained and scrubbed and filters were cleaned and sanitized with 10 ppm chlorine solution. The hot tub was then filled and super-chlorinated with 20 ppm for 24 hours. Follow-up visits were conducted to ensure the completion of remediation.

All environmental samples obtained from Fitness Club A collected on October 23 were culture negative for *Legionella pneumophila*. It should be noted that the chlorine reading of the samples upon arrival at the laboratory on October 29 was between 0.2-0.3 ppm.

Discussion

This investigation characterizes a small cluster of Legionnaires' disease that occurred in Orange County, Florida with onset dates from June to September 2008. Three laboratory-confirmed cases were identified with a common link to a fitness facility in Orlando. Risk factors for Legionnaires' disease include: smoking; age (usually 65 years of age or older); chronic lung disease; and a weakened immune system due to cancer, diabetes, kidney failure, or other

underlying health conditions (CDC, 2008). All three of the confirmed cases had underlying health conditions, making them more susceptible to Legionnaires' disease.
Epidemiologic data indicate that the source of the *Legionella* outbreak was Fitness Club A in Orlando, Florida. The only common exposure among the three cases was visiting this facility during the 14 days prior to the reported illness onset. Exposure occurred between June 11 and September 26, 2008. No common community exposures outside Fitness Club A were identified among the patients. All three patients reported frequenting the hot tub and showers at the fitness center. Previously documented outbreaks have been linked to aerosol sources, with one of the most likely sources being whirlpool spas (CDC, 2008). Past outbreaks have further indicated that transmission can occur without a person actually entering the water of a whirlpool spa (Jernigan et al. 1996; Benkel et al. 2000). Showers and water systems that provide water to showers are shown to harbor *Legionnella* bacteria if water temperatures are not sufficient to kill *Legionella* or inadequate disinfection procedures are used (Kool et al, 1999; Borella et al, 2004; and Flannery et al 2006). Showerheads can also be a source of aerosolized mists (ASHRAE, 2000 and Kool et al 1999).

Environmental inspection observations at the fitness club hot tub indicated conditions that could possibly support biofilm production and the harboring of *Legionella* bacteria. Maintenance logs indicated chlorine levels below 2 ppm intermittently (five days) during September 2008. The October 14 inspection also showed inadequate disinfection and pH levels. There was no record of routine scrubbing or supershocking of the hot tub. The improper use of the required two filters for the hot tub created a condition where a large volume of water was passing through an insufficiently sized filter. Hot tubs produce aerosolized water droplets when the therapeutic jets are operating, less than 5-microns, which can be inhaled. The temperature of the hot water heater supplying water to the showerheads was not available.

The lack of positive laboratory results for *Legionella* from the environmental samples could be due to laboratory error, sampling error, organism not present in detectable quantities for methods used, or the organism not present at time of sampling (Barbaree et al 1987). Other limitations of this investigation include a small sample size and the inability to obtain pulmonary clinical specimens and perform genetic analysis.

Legionnaires' disease is a common cause of community-acquired pneumonia, with an estimated 8,000 to 18,000 cases in the United States each year. This disease is caused by *Legionella* bacteria, which can be found naturally in the environment, particularly in the type of warm water found in hot tubs, cooling towers, hot water tanks, large plumbing systems, or parts of sizeable air conditioner systems in large buildings. The bacteria do not seem to grow in car or window air conditioners. People who are susceptible become infected with Legionnaires' disease when they breathe in a mist that contains the bacteria. For instance, water contaminated with *Legionella* bacteria in a hot tub that is not properly cleaned, disinfected, and maintained could be aerosolized in the form of mist. These bacteria are not spread person-to-person (CDC, 2008).

Symptoms of Legionnaires' disease, including high fever, chills, and cough, usually develop 2 to 14 days after exposure to the bacteria. Some people may also experience muscle aches and headaches. Symptoms are similar to many other forms of pneumonia, so diagnosis can be difficult. Most healthy people who contract Legionnaires' disease recover from the infection, and most cases can be treated successfully with antibiotics prescribed by healthcare providers. Pontiac Fever is a less severe clinical manifestation of *Legionella* infection and results in a self-limiting, flu-like illness that usually resolves within two to five days (CDC, 2008).

As with many investigations, lack of prompt recall of exposures by the cases was a limitation in this investigation. The relatively long incubation period for Legionnaires' disease resulted in a considerable time lapse between the exposure and report of cases. Although environmental assessment and sampling activities were conducted at the time of the initial case reports, negative samples collected weeks or months after exposure do not rule out the possibility that *Legionella* bacteria were present at the time of exposure or intermittently during multiple exposures.

Recommendations

Low water volumes combined with high temperatures and heavy bather loads make public spa operation challenging. The result can be low disinfectant levels that allow the growth and spread of a variety of bacteria, including *Legionella*, that can cause skin and respiratory illnesses (CDC, 2008). It is critical to maintain all pools, hot tubs, spas, and whirlpools on a regular basis in a prescribed manner to prevent the transmission of disease. Maintain pH and chlorine or bromine levels at recommended levels according to the CDC or the manufacturer's guidelines. Test disinfectant and pH levels frequently to ensure the presence of prescribed disinfection and water quality levels. Complete and accurate records of disinfectant/pH measurements and maintenance operations should be maintained. Filtration and recirculation systems should be designed and maintained according to manufacturer recommendations. Spa surfaces should be scrubbed and hyper-chlorinated regularly to remove any biofilms and water should be drained and replaced on a regular basis (CDC, 2008). Personnel should be appropriately qualified and competent to operate, maintain, and monitor public swimming pools and spas. Water supplies in public buildings need to be designed and maintained in a prescribed manner to prevent the growth and harborage of pathogenic bacteria. (Florida Administrative Code, 2004)

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Foodborne Illness Outbreak Summary Report *Staphylococcus aureus* Outbreak at a Bradford County Church Supper, December 10, 2008

Rebecca Lazensky, M.P.H., Winifred Holland, M.P.H., M.A., L.M.C.H., Amie Johns, R.N., B.S.N., Ed Rensberger

Background

On December 11, 2008, a church reported to the Bradford County Health Department (CHD) that approximately 30 members had developed gastrointestinal illness following a church supper on December 10. Approximately 200 persons attended the event. The supper was catered by a local company and hosted in the dining hall of the church. The following food items were served: ham, turkey, stuffing, green beans, mashed potatoes, gravy, rolls, peach cobbler, banana pudding, cranberry sauce, butter, water, iced tea, and ice. All attendees were served the same food items with tableside service from a wait-staff including friends and family of the caterer.

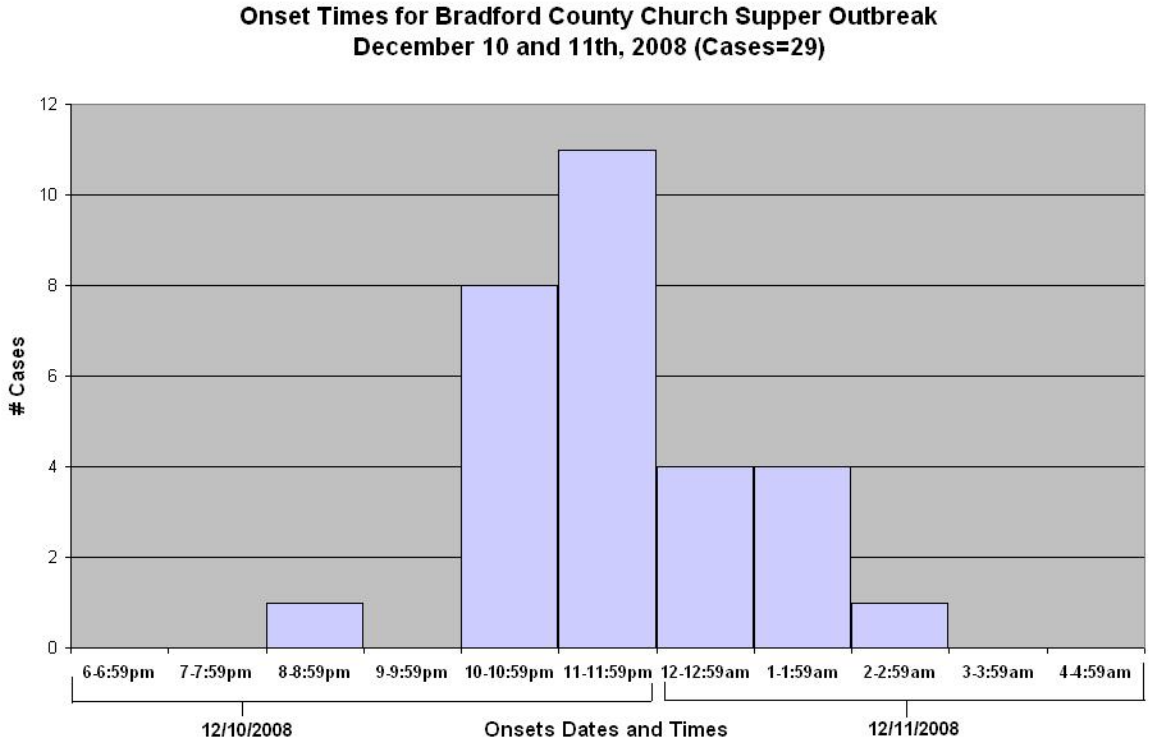
Investigation Summary

Telephone interviews were conducted with 30 cases and 30 controls. Cases and controls were selected using a line list provided by the church including the names of all supper attendees and categorized by illness status (ill/non-ill). A case was defined as an attendee of the supper who developed vomiting and/or diarrhea on December 10 or 11. All 30 ill people who met the case definition for the outbreak were selected as cases. The first 30 people reached by telephone from the group who were not ill were selected as controls. A questionnaire was developed to assess food and clinical histories and common exposures. Data were entered and analyzed in Microsoft Excel (version 8.0) and Epi Info (version 3.5.1). Due to the small sample size (30 cases and 30 controls) in this study, results may have less statistical power.

Samples of turkey and ham were shipped to the Jacksonville Bureau of Laboratories (BOL) Microbiology Department and analyzed for *Clostridium perfringens, Bacillus cereus, and Staphylococcus spp.* using a standard plate count analysis method. Nine stool specimens were analyzed for enteric organisms *(Salmonella, Shigella, Campylobacter, E.coli 0157).* Four specimens were analyzed for Norovirus GI and GII.

Results

The following symptoms were reported by the 30 cases interviewed: diarrhea (97%), vomiting (90%), nausea (83%), abdominal cramps (76%), fatigue (60%), sweating (50%), chills (40%), dizziness (33%), headache (27%), and muscle aches (20%). Fifty-seven percent (17) of cases were female and 43% (13) were male. The mean age was 64 for the cases and 45 for the controls. The mean incubation period was 5 hours, with a mean duration of illness of 7 hours. The range in illness onset times which all occurred in a seven hour time period from December 10-11 is displayed below the epi-curve that follows.



Laboratory results received on December 19 detected *S. aureus* in leftover ham and turkey samples. Tests were conducted at the Jacksonville BOL using a standard plate count which detected >250,000/gram of *Staphylococcus aureus* (>100,000/gram will confirm an outbreak). The food samples tested negative for *C. perfringens* and *B. cereus* using a standard plate count analysis method. Nine stool specimens analyzed for enteric organisms tested negative. Four specimens analyzed for Norovirus tested negative. The odds ratios for the ham was 2.31 (CI: 0.71, 7.81; p-value: 0.2516) and 5.35 (CI: 0.25, 116.30; p-value: 0.2377) for the turkey.

Interviews with the proprietor, who is the sole employee of the catering company, indicated several food preparation methods of concern. Hams and turkeys were purchased frozen and

thawed for one day in an ice bath. It is uncertain if running water was used in conjunction with the ice bath. Both meats were cooked in a smoker. Turkeys were smoked overnight and hams were smoked for two hours the day of the supper. Hams and turkeys were sliced and stored in insulated cambro containers for approximately seven hours before being served. The caterer prepared the majority of foods and personally sliced all meats prior to storing in the cambro containers. Event staff were friends and family of the caterer and most lacked basic food safety training. Staff assisted in plating and serving food. Those interviewed reported wearing gloves while plating food but not all reported wearing gloves while serving food. Staff reported practicing routine hand-washing before and during their shift. No open sores, wounds, or cuts were observed or reported on their hands.

The Department of Business and Professional Regulation (DBPR) and the Bradford CHD Environmental Health Section conducted an inspection of the catering company. The company was operating without a license and without an approved food service facility. The caterer prepared the food items for the church supper in her home and in a friend's restaurant because her facilities were undergoing renovations prior to the catered event. Following a DBPR inspection, an administrative determination and order of closure was placed on the company until proper licensure, inspection, and approval of the restaurant facility can be obtained. Several of the caterer's upcoming events were canceled, as the company was required to cease operations until achieving the appropriate permits and pre-inspections.

Conclusions

Cambro containers are a common food storage device often utilized by caterers to transport food using insulation to trap heat, but the temperatures were not monitored once the meats were stored in the containers. Food safety concerns included inadequate time and temperature control during the food storage phase and the location where the food was prepared. Turkeys and hams were likely held in the containers below the optimal holding temperature of 140°F or higher for a long duration (seven hours), allowing for bacterial proliferation. The caterer prepared food for the event in her personal home kitchen and in a restaurant owned by a friend. Preparing foods in an unlicensed facility presents several food safety challenges such as maintaining a sanitary work environment where personal and public items are kept separate and the environment often lacks basic food safety control measures that are routinely incorporated into licensed food preparation facilities.

Recommendations

The caterer received food handling, preparation, and safety messages from DBPR and DOH and was advised on how to participate in the food service license application process as required by DBPR. The proprietor was instructed on the temperature and time controls needed to keep foods safe and the risks for illness if foods are not held at the proper temperature. Since the turkeys and hams should have been kept at a temperature at or above 140ºF during periods of preparation and service, it is unlikely that temperatures were maintained during the long time period between food cooking and service at the church supper.

Approximately 25% of people are *S. aureus* carriers. Staphyloccci are heat–stable and produce toxins in foods with lower water activity. Common food items implicated in past *S. aureus* outbreaks include: sliced meat and meat products, salad dressings, sandwiches, pastries, custards (1), inadequately processed or unprocessed cheese, and inadequately cured ham and salami. Several risk factors for intoxication include consuming foods held at room temperature several hours prior to serving and eating foods which have been contaminated through food-worker contact (1). Symptoms include severe nausea, cramps, diarrhea, vomiting, prostration, and low blood pressure; often with a rapid onset of illness. The average incubation period is 2 to

4 hours, with a range of 30 minutes to 8 hours (1). The majority of cases recover within two days (1).

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Florida Year-to-Date Mosquito-Borne Disease Summary Through March 13, 2009

Elizabeth Radke, M.P.H., Kristina Weis, Ph.D., Danielle Stanek, D.V.M., Carina Blackmore, D.V.M., Ph.D.

During the period from January 1 through March 13, 2009, the following arboviral activity was recorded in Florida:

Eastern equine encephalitis virus (EEEV) Activity
Positive samples were obtained from three equines, four sentinel chickens, and two live wild birds in seven counties.

West Nile virus (WNV), St. Louis encephalitis virus (SLEV) Activity
None

Highlands J virus (HJV) Activity
Positive samples were obtained from two sentinel chickens in one county.

California encephalitis group viruses (CEV). Activity
None

In addition the following imported mosquito-borne disease was reported and reviewed:

Dengue Virus (DENV)
Eight cases were reported from four counties. Countries of origin included Puerto Rico (2), Panama (2), Bolivia (1), Honduras (1), Suriname (1), and Santo Domingo (1).

Malaria
Seventeen cases were reported from four counties. Countries of origin included Haiti (11), Africa (5), and Venezuela (1).

Dead Bird Reports

The Fish and Wildlife Conservation Commission (FWC) collects reports of dead birds, which can be an indication of arbovirus circulation in an area. Since January 1, 98 reports representing a total of 259 dead birds (28 crows, 2 jays, 12 raptors, and 217 others) were received from 35 of Florida's 67 counties. Please note that FWC collects reports of birds that have died from a variety of causes, not only arboviruses. Report dead birds to www.myfwc.com/bird/.

See the following web site for more information:
http://www.doh.state.fl.us/Environment/medicine/arboviral/index.html.

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Florida Influenza Surveillance Report

Kateesha McConnell, M.P.H.

Influenza surveillance in Florida consists of seven surveillance components: 1) Florida Sentinel Provider Influenza Surveillance Network (FSPISN); 2) Florida Pneumonia and Influenza Mortality Surveillance System; 3) State laboratory viral surveillance; 4) County influenza activity levels; 5) Notifiable Disease Reports 6) Influenza or influenza-like illness (ILI) outbreaks and 7) Syndromic surveillance.

For the most up-to-date information regarding influenza surveillance and the progress of influenza season in Florida please visit the Bureau of Epidemiology influenza surveillance reports website at: http://www.doh.state.fl.us/disease_ctrl/epi/htopics/flu/reports.htm.

During weeks six through nine of 2009 (02/08/09-03/07/09), statewide influenza activity was reported as widespread, using the national CDC influenza activity criteria. Widespread activity was reported for the first time in week six (02/08/09-02/14/09). The average proportion of patient visits for ILI as reported by the FSPISN during weeks six through nine was 3.50% which is above the state threshold for moderate activity of 2.98%. Influenza activity across the nation also increased during this same time period. So far this season, there have been six reported ILI outbreaks investigated in Florida. Two deaths of children are being evaluated as influenza-associated deaths. Nationally, most of the viruses characterized this season have been related to the strains found in the 2008-09 vaccine. In Florida, laboratory testing has shown a recent change in the proportion of positive influenza A and B isolates or specimens. Earlier this season Florida was seeing a larger proportion of influenza B, whereas in the last several weeks a greater proportion of the isolates have been influenza A. Influenza A is typically associated with more severe illness and the ability to cause more outbreaks than influenza B.

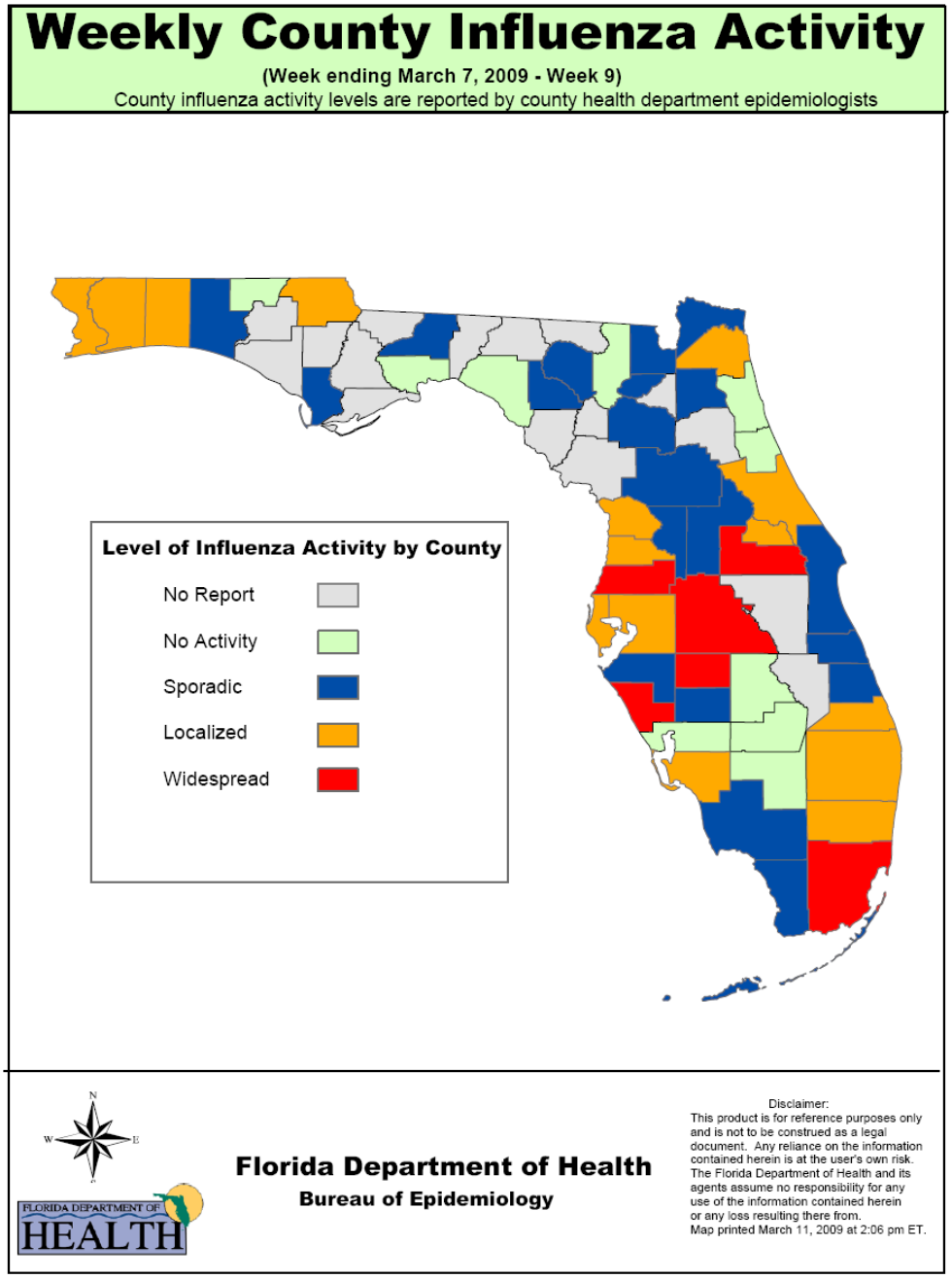
Florida Bureau of Laboratories in Jacksonville and Tampa have tested a total of 463 specimens for influenza viruses since September 28, 2008. Two hundred forty-seven (53%) of the

specimens have tested positive for influenza. Of the 247 specimens, 119 were influenza A and 128 were influenza B isolates.

During week nine, six counties reported widespread activity and fifteen counties reported localized activity. Twenty counties reported sporadic activity and ten counties reported no activity. Sixteen counties did not report.

Influenza is active in the community, so now is an excellent time to protect yourself and your family from the flu. Practice good respiratory etiquette by covering your cough and washing your hands after coughing or blowing your nose. Help prevent the spread of flu by staying home from social gatherings, work, or school when you are sick.

Thank you to all of our surveillance partners for their continuous surveillance efforts in monitoring influenza activity in the state.



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Upcoming Events

Bureau of Epidemiology Monthly Grand Rounds
Date: Last Tuesday of each month
Time: 10 a.m.-11 a.m., E.T.
Location: Building 2585, Room 310A
Dial-In Number: 877.646.8762 (password: Grand Rounds)

Upcoming Topics:

- April 28 – "Reported Cases of *Vibrio* Illness in Florida, 1998-2007" presented by Kristina Weis, Ph.D.

- May 26 – "BRFSS Survey Bias and Response Rates" presented by Youjie Huang, M.D., Dr.PH., M.P.H. and Tammie Johnson, Dr.PH., M.P.H.

Reportable Diseases in Florida

Up-to-date information about the occurrence of reportable diseases in Florida, based on the Merlin surveillance information system, is available at the following site: http://www.floridacharts.com/merlin/freqrpt.asp. Counts can be displayed by disease, diagnosis status, county, age group, gender, or time period.

Monthly Notifiable Disease Data

Table 1. Provisional Cases* of Selected Notifiable Diseases, Florida, Februaury 1-28, 2009

	Month				Cumulative (YTD)	
Disease Category	**2009**	**2008**	**Mean†**	**Median¶**	**2009**	**2008**
A. Vaccine Preventable Diseases						
Diphtheria	0	0	0	0	0	0
Measles	0	0	0	0	1	0
Mumps	5	6	2.0	2	5	10
Pertussis	18	14	16.8	14	53	21
Poliomyelitis	0	0	0	0	0	0
Rubella	0	0	0	0	0	0
Smallpox	0	0	0	0	0	0
Tetanus	0	0	0.4	1	0	0
Varicella	148	261	76.2	191	249	355
B. CNS Diseases & Bacteremias						
Creutzfeldt-Jakob Disease	1	3	1.2	3	4	4
H. Influenzae (invasive)	23	12	10.6	3	42	28
in those ≤5	2	8	5.0	4	4	14
Listeriosis	0	0	2.0	3	1	3
Meningitis (bacterial, cryptococcal, mycotic)	14	15	10.8	10	27	33
Meningococcal Disease	5	6	7.8	7	11	12
Staphylococcus aureus (VISA, VRSA)	0	0	0	0	0	0
Streptococcal Disease, Group A, Invasive	33	27	24.6	25	54	59
Streptococcus pneumoniae (invasive disease)						
Drug resistant	118	74	67.6	70	203	169
Drug susceptible	93	82	69.0	68	175	175
C. Enteric Infections						
Campylobacteriosis	79	87	76.8	73	154	171
Cholera	0	0	0	0	0	0
Cryptosporidiosis	22	29	17.4	22	48	52
Cyclospora	4	6	2.2	2	9	6
Escherichia coli, Shiga-toxin producing (STEC)**	15	1	2.2	2	26	8
Giardiasis	145	79	81.4	81	274	163
Hemolytic Uremic Syndrome	0	0	0.2	1	0	0
Salmonellosis	224	257	228.8	235	519	636
Shigellosis	28	83	93.4	87	83	178
Typhoid Fever	2	0	1.2	2	2	4
D. Viral Hepatitis						
Hepatitis A	18	13	17.6	16	37	28
Hepatitis B, Acute	31	35	39.6	35	55	59
Hepatitis C, Acute	1	6	5.4	5	2	12
Hepatitis +HBsAg in pregnant women	52	56	42.2	39	103	108
Hepatitis D, E, G	2	0	0	1	2	0

* Confirmed and probable cases based on date of report as reported in Merlin

Incidence data for 2009 is provisional, data for 2008 will be finalized on April 1, 2009

† Mean of the same month in the previous five years

¶ Median for the same month in the previous five years

** Includes *E. coli* O157:H7; shiga-toxin positive, serogroup non-O157; and shiga-toxin positive, not serogrouped

†† Includes neuroinvasive and non-neuroinvasive

N/A indicates that no historical data is available to caculate mean and median

Table 1. (cont.) Provisional Cases* of Selected Notifiable Diseases, Florida, Februaury 1-28, 2009

	Month				Cumulative (YTD)	
Disease Category	**2009**	**2008**	**Mean†**	**Median¶**	**2009**	**2008**
F. Vector Borne, Zoonoses						
Dengue	6	6	2.2	2	9	10
Eastern Equine Encephalitits††	0	0	0	1	0	0
Ehrlichiosis/Anaplasmosis	0	0	0.4	1	1	0
Leptospirosis	0	0	0	0	0	0
Lyme Disease	10	3	2.4	3	24	4
Malaria	10	7	4.6	3	15	13
Plague	0	0	0	0	0	0
Psittacosis	0	0	0	0	0	0
Q Fever (acute and chronic)	0	0	0	1	0	0
Rabies, Animal	20	13	13.6	14	36	21
Rabies (possible exposure)	115	106	88.6	80	228	188
Rocky Mountain Spotted Fever	1	1	0.4	1	1	1
St. Louis Encephalitis††	0	0	0	0	0	0
Toxoplasmosis	2	1	1.8	2	3	1
Trichinellosis	0	0	0	0	0	0
Tularemia	0	0	0	0	0	0
Typhus Fever (epidemic and endemic)	0	0	0	1	0	0
Venezuelan Equine Enchephalitis††	0	0	0	0	0	0
West Nile Virus††	0	0	0	0	0	0
Western Equine Encephalitis††	0	0	0	0	0	0
Yellow Fever	0	0	0	0	0	0
G. Others						
Anthrax	0	0	0	0	0	0
Botulism-Foodborne	0	0	0	0	0	0
Botulism-Infant	1	0	0	0	1	0
Brucellosis	0	0	0	0	1	1
Glanders	0	0	0	0	0	0
Hansen's Disease (Leprosy)	1	1	0.4	1	1	3
Hantavirus Infection	0	0	0	0	0	0
Legionella	8	11	10.2	11	21	26
Melioidosis	0	0	0	0	0	0
Vibriosis	2	2	2.4	2	7	5

* Confirmed and probable cases based on date of report as reported in Merlin
Incidence data for 2009 is provisional, data for 2008 will be finalized on April 1, 2009

† Mean of the same month in the previous five years

¶ Median for the same month in the previous five years

†† Includes neuroinvasive and non-neuroinvasive

N/A indicates that no historical data is available to caculate mean and median

Note: The 2008 case counts are provisional and are subject to change until the database closes. Cases may be deleted, added, or have their case classification changed based on new information and therefore the monthly tables should not be added to obtain a year to date number.

Please refer any questions regarding the data presented in these tables to Kate Goodin at Kate_Goodin@doh.state.fl.us or 850.245.4444 Ext. 2440.

This Month on EpiCom

Christie Luce

EpiCom is located within the Florida Department of Health's Emergency Notification System (FDENS). The Bureau of Epidemiology encourages *Epi Update* readers not only to register on the EpiCom system by emailing the Florida Department of Health Emergency Notification System Helpdesk at FDENS-help@doh.state.fl.us, but to sign up for features such as automatic notification of certain events. Users are invited to contribute appropriate public health observations related to any suspicious or unusual occurrences or circumstances through the system. EpiCom is the primary method of communication between the Bureau of Epidemiology and other state medical agencies during emergency situations. Following are selected recent postings:

- GI illness outbreaks, Nassau County
- Norovirus outbreak in a hospital, Brevard County
- Suspected pediatric influenza-associated death, Palm Beach County
- GI illness outbreak at a skilled nursing facility, Marion County
- GI illness outbreak at a correctional facility, Marion County
- Suspected foodborne outbreak from food catered to a medical office, Palm Beach County
- Norovirus outbreak in a daycare center, Alachua County
- Update on Investigation of *Salmonella* E1 serotype Muenster Lab-identified cluster, Miami-Dade
- Norovirus at a skilled nursing facility, Hillsborough County
- Probable meningococcal disease, Martin County
- GI illness in an assisted living facility, Citrus County
- Norovirus outbreak in a nursing facility, Brevard County
- Scombroid poisoning investigation, Hillsborough County
- Norovirus outbreak in an assisted-living facility, Seminole County
- Norovirus outbreak in a retirement home, Alachua County
- Pertussis outbreak, Sarasota County
- Probable bacterial meningitis case, Pasco County

For physicians and other health care providers who want more information on diagnosis and treatment of foodborne illness: *Recommendations and Reports April 16, 2004 / Vol. 53 / No. RR-4: Diagnosis and Management of Foodborne Illnesses A Primer for Physicians and Other Health Care Professionals* at http://www.cdc.gov/mmwr/PDF/rr/rr5304.pdf

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For submission guidelines or questions regarding Epi Update, please contact Leesa Gibson at 850.245.4409 or by email at Leesa_Gibson@doh.state.fl.us.


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