Indiana State Department of Health
Indiana Epidemiology Newsletter

Volume 19, Issue 6 November/December 2011

Two Cases of Human Infection with a Novel Influenza A Virus Identified in Indiana

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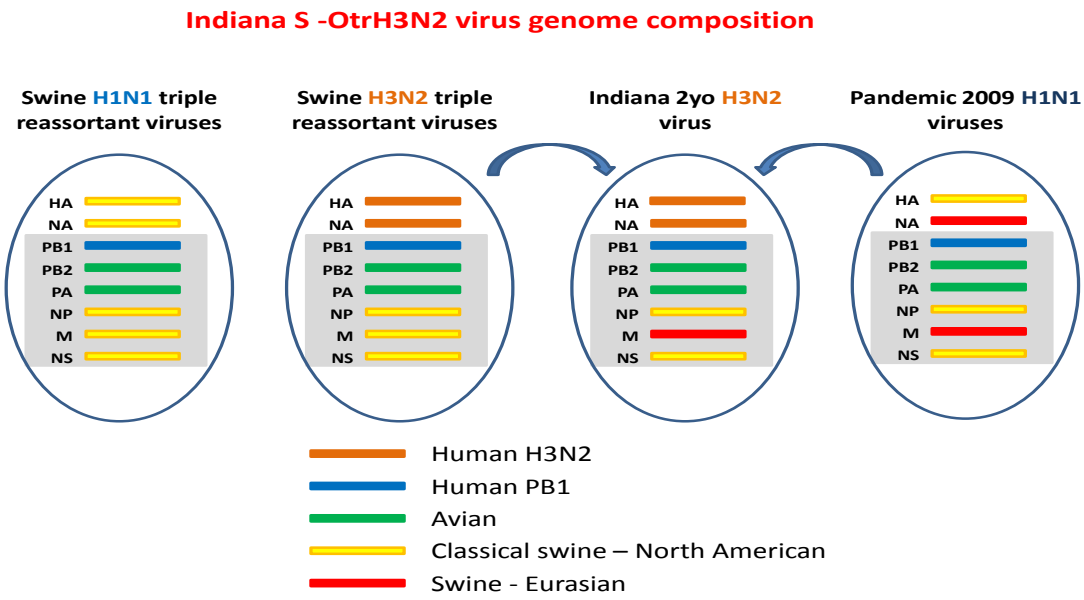
Two cases of human infection with a novel influenza A virus were identified through laboratory surveillance at the Indiana State Department of Health (ISDH) Laboratory. The specimens were sent to the Centers for Disease Control and Prevention (CDC) Laboratory, where they were confirmed as a triple reassortment H3N2 (S-OtrH3N2) influenza virus. The cases were investigated by ISDH Epidemiology Resource Center Surveillance and Investigation Division, the ISDH Laboratory, the local health department and the Indiana Board of Animal Health.

In 2011, twelve cases of human infection with S-OtrH3N2 with the M segment gene from the 2009 pandemic H1N1virus have been identified: Indiana [2], Iowa [3], Maine [2], Pennsylvania [3] and West Virginia [2]. Human infections with influenza viruses currently circulating among swine are rare. Since 2005, only 35 cases have been reported in the United States, but the frequency with which they have been detected increased in 2011. No community transmission has been documented in any of the cases. Following discussion among international human and animal health agencies, the CDC advised state health officials in late December 2011 that these viruses will now be referred to as "variant influenza viruses" and, as an abbreviation going forward, will be designated with a "v"; recent examples include A(H3N2)v, A(H1N1)v, and A(H1N2)v. See figure 1 for the genome reassortment process for A(H3N2)v

Figure 1



Case 1

On August 17, 2011, the ISDH notified the CDC of a suspected case of a non-human origin influenza A (H3N2) infection. The patient experienced onset of fever, cough, shortness of breath, diarrhea and sore throat on July 23, 2011. The patient was taken to a local emergency department where a specimen was positive for influenza A by rapid diagnostic test. The patient was not treated with influenza antivirals but had received influenza vaccine the previous September. An ISDH virologist identified the specimen in a database and requested it to be forwarded to the ISDH Laboratories, where testing identified a suspect swine-origin influenza A (H3N2) virus (S-OtrH3N2). The specimen was forwarded to CDC where genome sequencing confirmed the swine origin of the virus on August 19, 2011. The patient had multiple chronic health conditions and was hospitalized for worsening of these conditions. The patient was discharged and has since recovered. No direct exposure to swine was identified for this patient; however, a home caretaker reported having close contact with swine in the weeks prior to the patient's illness onset and provided care to the patient two days before illness onset. No respiratory illness was identified in any of the patient's family, close contacts or in the family or contacts of the caretaker with reported swine exposure.

Case 2

On October 28, 2011, the ISDH notified the CDC of a suspected case of S-OtrH3N2. This patient experienced fever, cough with yellow sputum, vomiting, abdominal pain and profuse sweating. The patient was admitted to the hospital via the emergency room. The patient originally tested negative for influenza by direct fluorescent assay, but cultured positive for influenza A. The ISDH virology team requested the sample from the hospital laboratory because it was the hospital's first case of the season. The ISDH Laboratory identified a suspect swine-origin influenza virus on October 28, 2011. The specimen was forwarded to CDC where genome sequencing confirmed the swine origin of the virus on October 31, 2011. This second case patient had minimal underlying medical conditions, was discharged three days later and has fully recovered. The patient worked closely with

pigs and had very close contact to several pigs in the week prior to his illness onset. No illness was reported in the case's household or close contacts.

As of December 28, 2011, no epidemiologic link among cases identified in Indiana, Iowa, Maine, Pennsylvania or West Virginia has been established. The ISDH Surveillance and Investigation Division and the ISDH Laboratory continue to work closely with our partners to identify circulating respiratory and influenza activity. Influenza and other respiratory surveillance data is included in the weekly influenza report located on the ISDH website at http://www.in.gov/isdh/22104.htm.

General information about triple reassortment influenza is available at
http://www.cdc.gov/flu/swineflu
http://www.cdc.gov/flu/swineflu/influenza-variant-viruses.htm
/http://www.cdc.gov/mmwr/preview/mmwrhtml/mm60e1223a1.htm?s_cid=mm60e1223a1_w

For questions or comments, contact Shawn Richards at srichard@isdh.in.gov or 317-233-7740.

References

Centers for Disease Control and Prevention (CDC). Swine-origin influenza A (H3N2) virus infection in two children — Indiana and Pennsylvania, July–August 2011. *MMWR Morb Mortal Wkly Rep* 2011 Sep 9; 60:1213.
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm60e1223a1.htm?s_cid=mm60e1223a1_w
http://www.cdc.gov/flu/swineflu/influenza-variant-viruses.htm

Carbapenem-resistant *Enterobacteriaceae*

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Antibiotic resistance is a global issue that has significant impact in the field of infectious diseases. It has been recognized for several decades that up to 50 percent of antibiotic use is either inappropriate or unnecessary. Antibiotics are the only drugs where use in one patient can impact the effectiveness in another. Improving antibiotic use is a public health imperative.

Klebsiella pneumoniae and *Escherichia coli*, which are included in the family of Gram-negative bacteria known as *Enterobacteriaceae,* are epidemiologically and clinically important organisms due to their level of antibiotic resistance. The carbapenem-resistant strains of these organisms are referred to as carbapenem-resistant *Enterobacteriaceae* (CRE). Carbapenem-resistant *Klebsiella pneumoniae* (CRKP) is the CRE species most commonly seen in the United States. Sometimes these drug-resistant bacteria are referenced to the *Klebsiella pneumoniae* carbapenemase (KPC), the enzyme that inactivates carbapenems. This KPC enzyme is also present in some strains of *Escherichia coli*. The gene that confers this resistance pattern is contained on plasmids, which are highly mobile and very easily spread from one bacterial cell to the next. Since these cells are harbored in the gut, the plasmids are potentially transferrable to multiple coliforms.

Healthcare-associated infections reported to the CDC showed the overall prevalence of KPC rising from less than one percent in 2000 to eight percent in 2007.

Healthcare providers should be concerned about CRE infections as they are associated with high rates of morbidity and mortality, serious treatment challenges, increased length of stay and increased cost. The frequent movement of patients between acute and long term care provides the opportunity for transmission of these resistant organisms. Aggressive communication between both acute and long term care is important so that appropriate intervention can take place.

CRE are an emerging important healthcare challenge, resistant to almost all current available antibiotics. The number of new antibiotics being developed has dropped sharply. From 1983-1987, sixteen new antibiotics were approved by the US Food and Drug Administration (FDA). However, from 2008-2011, only two new antibiotics were approved, and neither addressed the issue of resistance. In 1990, nineteen companies developed antibiotics; presently only four produce them. It will be five to ten years before new antibiotics are available to treat resistant organisms.

Given this lack of new antibiotics to treat CRE infections, an aggressive infection control strategy is critical to prevent the transmission of these resistant organisms. Early detection and implementation of necessary strict infection control measures can prevent carbapenem-resistant organisms in healthcare facilities from becoming a more significant threat to patients.

Microbiology laboratories in all acute care facilities must implement enhanced protocols to detect carbapenemase production in *Enterobacteriaceae.* When these organisms are identified, the laboratory must immediately alert acute and long term care infection preventionists. This will allow important control measures to be implemented including vigorous hand hygiene practices, contact precautions and minimizing the use of devices. Further detailed guidance from the CDC and Healthcare Infection Control Practices Advisory Committee (HICPAC), which includes recommendations for active surveillance, the review of microbiology results for past 6-12 months and the charting of staff or patients, is available at:
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5810a4.htm.

To slow the evolution of resistance, healthcare providers must focus on antibiotic stewardship. Stewardship programs will enforce pathogen-directed therapy and short-course treatment. In a recent study, the CDC reported that patients with exposure to a carbapenem antibiotic had a 15-fold greater risk of getting an infection with a carbapenem-resistant strain. When ordering antibiotics, healthcare providers are encouraged to appropriately select antibiotics including specific dose, duration, route and indication. Antibiotic use should be reassessed after 24-48 hours to review susceptibility results and determine if treatment can be altered. Further detailed guidance describing the development an antibiotic stewardship program from the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA) is located at http://cid.oxfordjournals.org/content/44/2/159.full

The ISDH strives to heighten awareness of the challenges posed by antibiotic resistance and specifically CRE. The combination of a comprehensive infection prevention program and effective antibiotic stewardship will minimize the emergence and transmission of

CRE in Indiana. Further detailed information from ISDH regarding CRE can be viewed at http://www.in.gov/isdh/18953.htm

CRE Resources

1. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5810a4.htm
2. http://www.cdc.gov/hai/
3. http://www.infectiousdiseasenews.com/print.aspx?id=70587
4. http://www.medscape.com/viewarticle/713709?src=mp&spon=24&uac=96567PY
5. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5937a4.htm?s_cid=mm5937a4_w
6. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5924a5.htm?s_cid=mm5924a5_w
7. College of American Pathologists (CAP) 2012 Survey catalog Breakpoint Implementation Tool (M100-S21) http://www.cap.org/apps/docs/proficiency_testing/2012_surveys_catalog.pdf
8. http:/www.medscape.com/viewarticle/733113
9. http://www.medscape.com/viewarticle/735068
10. http://www.journals.uchicago.edu/doi/pdf/10.1086/510393
11. http://www.cdc.gov/getsmart/healthcare/?s_cid=dhqp_002

Keeping Fit and Germ Free in the Gym

Jill Stauffer, MS
ISDH Field Epidemiologist, District 9

People commonly use the equipment in a public gym for exercising and keeping fit. This equipment can also serve as a surface where microorganisms could be transmitted to the hands of someone using the equipment and possibly cause disease. According to the *Clinical Journal of Sports Medicine*, some of the microorganisms that may be found on the surfaces of workout equipment in gyms include influenza viruses, rhinoviruses, enteroviruses, adenoviruses, herpes viruses and hepatitis A viruses, as well as bacteria such as *Shigella* and *Staphylococcus aureus*.

Disinfectant regimens in which the equipment users are expected to wipe down the equipment after exercising are a popular method of cleaning in fitness facilities. Does this help reduce the number of germs on surfaces or does it leave the exerciser a false sense of security?

A study published in the *Clinical Journal of Sports Medicine* sampled equipment for viruses and bacteria in two different gyms. Facility staff disinfected the equipment twice a day in addition to disinfection by exercisers throughout the day. The study revealed the presence of typical skin bacteria on both the aerobic and weight-training equipment. None of the bacteria found had known potential to cause disease.

Viral cultures revealed that 63 percent of hand-contact surfaces showed presence of rhinoviruses, the most common cause of the common cold. Weight training equipment was significantly more often contaminated than aerobic machines (73% vs. 51%), presumably because daily exercisers used significantly less disinfectant on the weight lifting equipment than the aerobic equipment. The disinfection regimen used in the study did not result in lowering the rhinoviral activity (48% of samples tested positive before cleaning and 86% of samples tested positive after cleaning). It was suggested that the

disinfectant used may not have been effective against the virus or the disinfectant may not have penetrated the surface of the equipment.

This study concluded that disinfection with the product used in the facilities studied did not reduce viral activity. The study did indicate the importance of knowing what products are used in facilities and how to use them to effectively kill disease-causing organisms. It also highlighted the importance of taking personal precautions, especially during peak seasons of colds and flu.

Some points to remember while at the gym:

- Avoid contact with someone who clearly has symptoms of illness.
- Know the disinfectants your gym uses. The label should say what disease organisms they kill.
- Cleaning with detergent-based cleaners or Environmental Protection Agency (EPA)-registered detergents/disinfectants will remove most disease causing organisms from surfaces.
- Cleaning procedures should focus on commonly touched surfaces and surfaces that come into direct contact with people's bare skin.
- Never use the same cloth or wipe for more than one piece of equipment because this can spread germs from one surface to another.
- Wash your hands with soap and water before and after exercise; and before touching your eyes, nose or mouth. Relying strictly on disinfectants to protect you can be unproductive.
- Alcohol-based sanitizers must contain at least 60 percent alcohol to be effective.
- Don't touch exercise machine rails or handles unless necessary to safely maintain balance.
- Bring your own towels to spread on exercise benches.
- Bring your own exercise mat for classes.

References

Centers for Disease Control and Prevention. "Cleaning and Disinfection Athletic Facilities for MRSA." Aug 2010.

Centers for Disease Control and Prevention. "Environmental Cleaning and Disinfecting for MRSA." Aug 2010.

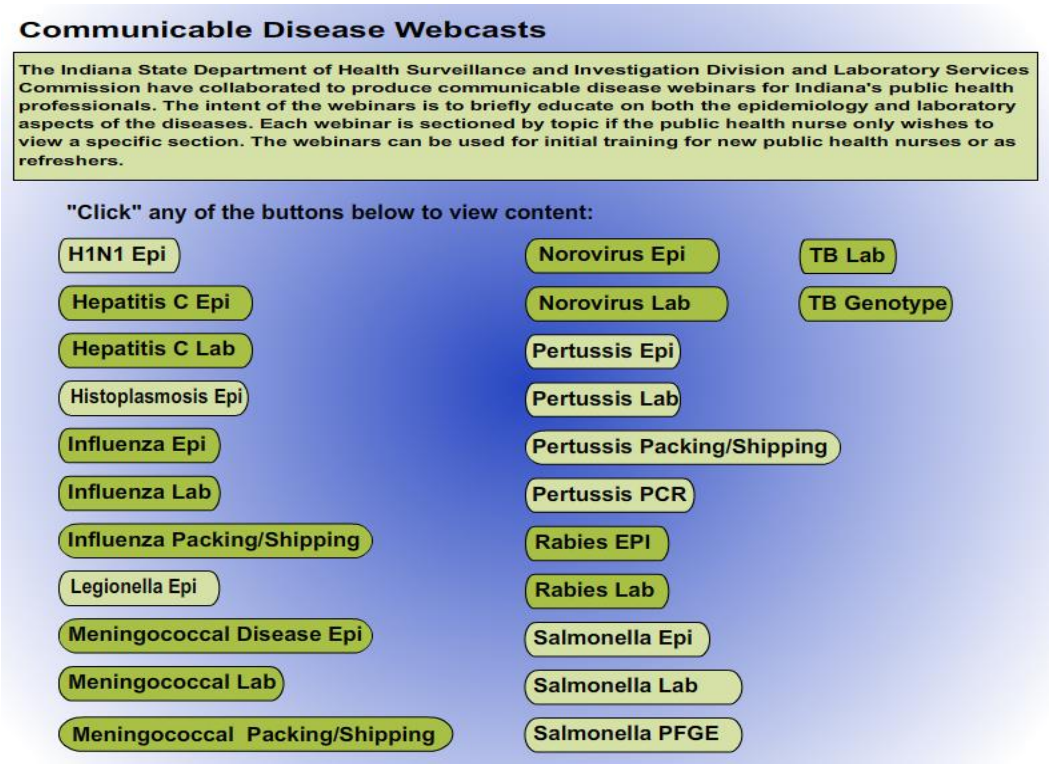
Healthy Living. "The 5 Germiest Places in the Gym and How to Protect Yourself." Aug 17, 2011.

Kristen A. Goldhammer, MD. "Prospective Study of Bacterial and Viral Contamination of Exercise Equipment." *Clinical Journal of Sports Medicine*, 2006: 34 - 38.

New Indiana State Department of Health Communicable Disease Webcasts Posted

Tina Feaster, RM(AAM), M(ASCP)[CM]
Invasive Disease Epidemiologist

Legionellosis and Histoplasmosis are the latest presentations added to the ISDH Communicable Disease Webcasts. These webcasts are a collaborative effort between the ISDH Surveillance and Investigation Division (SID) and the Laboratory Services Commission. Each webcast is sectioned into 15-minute presentations on laboratory or epidemiology topics related to the given disease and are a great way to learn more about communicable diseases.



Visit https://myshare.in.gov/ISDH/LHDResource/erc/default.aspx to view the webinars.

Training Room

INDIANA STATE DEPARTMENT OF HEALTH IMMUNIZATION PROGRAM PRESENTS:

Immunizations from A to Z

Immunization Health Educators are offering 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. A training manual, materials and a 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, visit: http://www.in.gov/isdh/17193.htm**.**

State Health Department Data Reports Available

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

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

HIV/STD/Viral Hepatitis Semi-Annual Report (June 2007- June 2011)	Indiana Mortality Report (1999-2008)
Indiana Cancer Report: Incidence; Mortality; Facts & Figures	Indiana Infant Mortality Report (1999, 2002, 1990-2003)
Indiana Health Behavior Risk Factors Report (1999-2009)	Indiana Natality Report (1998-2008)
Indiana Health Behavior Risk Factors (BRFSS) Newsletter (2003-2010	Indiana Induced Termination of Pregnancy Report (1998-2008)
Indiana Hospital Consumer Guide (1996)	Indiana Marriage Report (1995, 1997-2004)
Public Hospital Discharge Data (1999-2010)	Indiana Infectious Disease Report (1997-2009)
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, 1997-2006, 1998-2007)

HIV Disease Summary

Information as of October 31, 2011 **based on 2000 population of 6,080,485**

HIV - without AIDS to date:

326	New HIV cases from November 2010 thru October 31, 2011	12-month incidence	5.36 cases/100,000
4,622	Total HIV-positive, alive and without AIDS on October 31, 2011	Point prevalence	76.01 cases/100,000

AIDS cases to date:

357	New AIDS cases from November 2010 thru October 31, 2011	12-month incidence	5.87 cases/100,000
5,594	Total AIDS cases, alive on October 31, 2011	Point prevalence	92.00 cases/100,000
11,497	Total AIDS cases, cumulative (alive and dead) on October 31, 2011		

REPORTED CASES of selected notifiable diseases

Disease	Cases Reported in September – October *MMWR* Weeks 35-43		Cases Reported in January - October *MMWR* Weeks 1-43	
	2010	2011	2010	2011
Campylobacteriosis	117	72	669	473
Chlamydia	3,620	5,249	15,113	21,148
Cryptococcus	3	6	22	33
Cryptosporidiosis	56	0	253	50
E. coli, shiga toxin-producing	16	0	76	47
Giardiasis	77	3	342	192
Gonorrhea	1,076	1,282	4,279	5,097
Haemophilus influenzae, invasive	20	12	85	87
Hemolytic Uremic Syndrome (HUS)	2	3	7	13
Hepatitis A	0	0	11	13
Hepatitis B	13	12	63	57
Hepatitis C Acute	2	5	24	55
Histoplasmosis	21	21	94	98
Influenza Deaths (all ages)	0	0	3	24
Legionellosis	15	20	54	54
Listeriosis	5	3	14	8
Lyme Disease	2	2	62	45
Measles	0	0	0	14
Meningococcal, invasive	3	6	21	18
Mumps	1	2	4	2
Pertussis	176	85	598	238
Rocky Mountain Spotted Fever	0	0	1	1
Salmonellosis	127	65	649	376
Shigellosis	9	2	53	49

REPORTED CASES of selected notifiable diseases

Disease	Cases Reported in September – October *MMWR* Weeks 26-34		Cases Reported in January - October *MMWR* Weeks 1-34	
	2010	2011	2010	2011
Severe *Staphylococcous aureus* in Previously Healthy Person	6	2	23	11
Group A Streptococcus, invasive	29	20	118	166
Group B, Streptococcus, Invasive (All ages)	79	48	295	275
Streptococcus pneumoniae (invasive, all ages)	110	89	591	621
Streptococcus pneumoniae (invasive, drug resistant)	34	25	187	166
Streptococcus pneumoniae (invasive, <5 years of age)	8	6	44	31
Syphilis (Primary and Secondary)	27	30	136	140
Tuberculosis	7	8	65	80
Vibriosis	1	0	6	2
Varicella	25	14	160	93
Yersiniosis	2	0	8	10
Animal Rabies	12 (Bats)	17 (Bats)	18 (Bats)	21 (Bats)

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
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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

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