Swine-Origin Influenza Virus (SOIV) in Louisiana, 2009

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Since the new flu strain — named A(H1N1) or Swine Origin Influenza Virus (SOIV) to differentiate it from the seasonal H1N1 — first emerged in Mexico and the United States in April, it has spread to 74 countries around the globe. The objectives of this article are to describe the initial stages of the epidemic in Louisiana and to draw some epidemiologic lessons for the future, which could be particularly useful if the pandemic continues during the winter season 2009-2010.

Between April 22, 2009 (date when the first specimen was collected) to May 31, 2009, a six week period, there were 133 cases of SOIV infection detected in Louisiana. Cases were diagnosed in late April in several regions of the state, showing that when the first cases had been identified in Mexico and California, the infection was already widespread in Louisiana. The most affected age group was between the ages of five and 25.

INTRODUCTION

By mid-April 2009, cases of febrile respiratory illness in Mexico and California had been diagnosed as influenza type A (H1N1). The viruses in these cases were closely related genetically and contained a new unique combination of gene segments from human, avian and swine influenza virus. Because of the novel swine influenza genetic component, it was named "swine origin influenza virus" (SOIV).[1,2] As awareness of the novel strain spread and laboratory confirmatory tests became available, more cases were diagnosed in Mexico, the United States and soon after throughout the world. On June 11, the World Health Organization (WHO) raised the pandemic alert level from phase 5 to 6 and thus declared a swine flu pandemic, the first global flu epidemic in 41 years. The last pandemic — the Hong Kong flu of 1968 — killed about 1 million people. Ordinary flu kills about 250,000 to 500,000 people each year throughout the world.

Since the new flu strain first emerged in Mexico and the United States in April, it has spread to 74 countries around the globe. On June 11, WHO reported 27,737 cases including 141 deaths. The agency has stressed that most cases are mild and require no treatment, but the fear is that a rash of new infections could overwhelm hospitals and health authorities — especially in poorer countries.[3]

The objectives of this article are to describe the initial stages of the SOIV epidemic in Louisiana and draw some epidemiologic lessons for the future, which could be particularly useful if the pandemic continues during the winter season 2009-2010.

MATERIALS & POPULATION

Specimens: Specimens to be tested were nasopharyngeal swabs (preferred to throat swabs or throat washings) preserved in a viral transportation medium under refrigeration.[1]

A Swine Influenza RT-PCR Detection Panel (RT-PCR Swine Flu Panel) was used to test for the presence of swine-origin influenza virus in clinical specimens under an Emergency Use Authorization (EUA) by the Food and Drug Administration (FDA). The test had been developed by the Center for Disease Control (CDC) and sent to states' public health laboratories for use.[4]

Criteria for sampling suspected cases evolved rapidly to respond to the needs of the epidemiologic evaluation. A case of Influenza-Like Illness (ILI) was defined as a person with fever > 37.8° C [100° F] and a cough or sore throat. Also of interest were the acute respiratory illnesses (recent onset of at least two of the following: 1-rhinorrhea or nasal congestion, 2-sore throat, 3-cough, 4-fever or feverishness).

Describing the severity of disease is as important as describing the epidemiologic patterns. For this purpose additional criteria were used when profiling SOIV. Testing was also recommended for patients hospitalized for acute lower respiratory tract infection and for no other cause for this infection.

The surveillance methods had to be adapted to the changing epidemiologic picture. At first surveillance is focused on detecting new imported cases. As foci are identified in the state, surveillance shifts to identifying these

Table 1. Testing results by week.

From	To	Week #	#Tested	SOIV	SOIV %	H1 Seasonal	H3 Seasonal	B
4/19/2009	4/25/2009	16	4	0	0.0	0	0	0
4/26/2009	5/2/2009	17	900	39	4.3	13	6	20
5/3/2009	5/9/2009	18	1493	66	4.4	5	1	51
5/10/2009	5/16/2009	19	398	19	4.8	0	1	16
5/17/2009	5/23/2009	20	69	7	10.1	0	0	3
5/24/2009	5/30/2009	21	13	2	15.4	0	0	0
		Total	2877	133	4.6	18	8	90

newly developed foci and to describing the extent of the epidemic in the state.

This study is limited to the period April 22, 2009 (date when the first specimen was collected) to May 31, 2009, a six week period, that covered CDC weeks 18 to 23.

RESULTS

The results of testing are presented in Table 1 and Figure 1. There were 133 positive tests for SOIV, 18 for the seasonal H1 virus, eight for the H3 virus and 90 for the type B virus.

The results by regions are presented in Figure 2.

The gender and age group distribution for the whole state, for the Lafayette region and other regions combined are presented in Table 2.

The gender distribution was unremarkable, 72 cases in females and 61 in males. The proportion of positive tests/total tested were respectively 5.1% and 4.3%, a non significant difference ($\chi 2$=1.03, p=0.31).

The age group distribution shows a higher proportion of positives among the 5-24 years of age (10.9% versus 1.6% in those 25-64, 1.7% in those 0-4 and 0.0% in those 65 and over). The difference between age groups is only significant for the 5-24 group. Odds ratios comparing age groups using the group 25-64 as a reference were for 5-24 OR=7.65 (CI=4.56-12.98, p=0.000), for 0-4 OR=1.08 (CI=0.43-2.13, p=0.85) and for 65 and over no OR can be calculated (null cell), Fisher exact test =0.15.

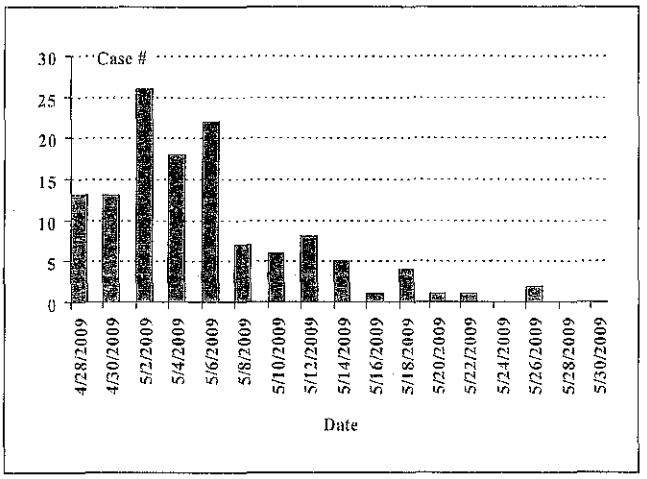

Figure 1. Epidemiologic curve of the SOIV infection in Louisiana by date of onset.

The same higher proportion of SOIV in the 5-24 age group appears in both the Lafayette region and the other regions.

Of the 133 cases, the clinical presentation was a typical influenza-like illness for 132 cases (99.2%) and one case with lower respiratory tract infection (pneumonia-like). In addition to ILI, eleven cases (8.3%) also experienced nausea, vomiting and diarrhea. An eight and a 10 year old were the only two hospitalizations, both of short duration (two days); they were discharged with no complications. There were no deaths in Louisiana due to SOIV.

Table 2. Age and gender distribution of cases.

Gender	Test	SOIV	%Pos	A*	%Pos	B	%Pos	Reg 4	SOIV	%Pos	Reg *	SOIV	%Pos
F	1,671	72	4.3	16	1.0	49	2.9	435	45	10.3	1,090	27	2.5
M	1,192	61	5.1	10	0.8	40	3.4	302	30	9.9	787	31	3.9
Age Group	Test	SOIV	%Pos	A*	%Pos	B	%Pos	Reg 4	SOIV	%Pos	Reg *	SOIV	%Pos
0-4	470	8	1.7	6	1.3	14	3.0	151	5	3.3	319	3	0.9
5-24	973	106	10.9	7	0.7	49	5.0	314	62	19.7	659	44	6.7
25-64	1,208	19	1.6	11	0.9	24	2.0	231	8	3.5	968	11	1.1
65 & over	225	0	0.0	2	0.9	3	1.3	47	0	0.0	178	0	0.0
Total	2,876	133	4.6	26	0.9	90	3.1	743	75	10.1	2124	58	2.7

A*= Type A, H1N1 seasonal and H3N1; Reg*= All other regions

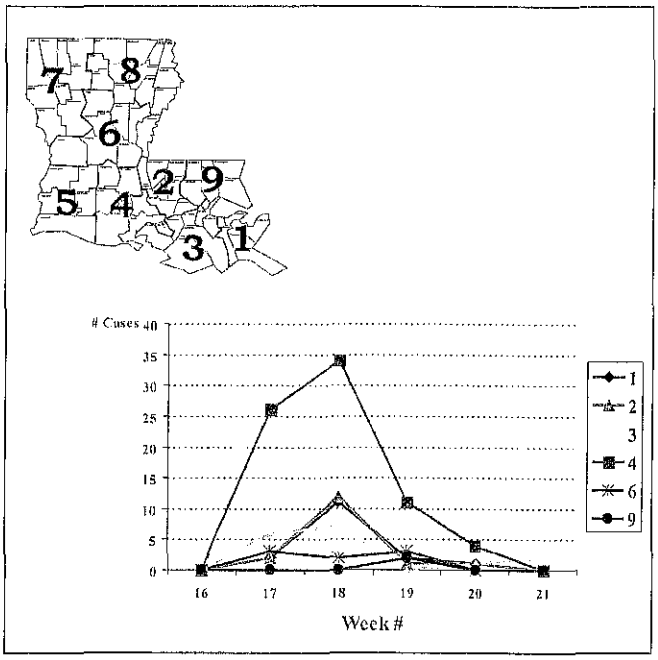

Figure 2. Distribution of cases by region.

A rapid test for influenza A was performed on 86 of the 133 cases. There were eight negative results and 78 positive (a positivity rate of 91%).

There were 12 clusters involving 82 cases. Cluster sizes ranged from three to 23 cases. The cluster of 23 cases occurred in a Lafayette parochial school. The first cases in this cluster were among school children that had gone on a trip to Mexico. It then appears that there was transmission among school mates and family members.

Thirty-eight cases had no household contacts. There were 382 household contacts for the 95 cases with contact, an average of four contacts per case. Among the 382 household contacts, 80 were reported to be symptomatic with ILI. This represents an attack rate of 21% among household contacts and an average of 0.85 secondary case/primary case.

DISCUSSION

The first cases of SOIV infections were detected in early to mid April in Mexico then in California, giving the impression that the infection was just starting to spread. In fact by the end of April (week # 17) when the testing was well underway in Louisiana, 39 cases were already detected. It appears that the infection was already wide spread in the state but went undetected. Detection of the earliest cases works best when the surveillance system is targeted at a novel strain. Everyone was expecting a novel avian influenza strain coming from Asia and not a SOIV strain coming from, or more precisely first detected in, Mexico.

The seasonal influenza viruses were circulating throughout this period but at a slow pace. The peak of seasonal A H1N1 was in December (Figure 3). It appears that seasonal type B influenza was circulating at higher rates than seasonal type A. Circulation of SOIV appears to have been more intense than that of seasonal influenza strains. However, the relative importance of SOIV is biased by the few contact and cluster screenings that was going on.

When intensive SOIV surveillance in Louisiana began, cases were diagnosed in six of the nine regions of the state, confirming that the novel virus had time to spread before it was detected by the surveillance system. The numbers observed are much higher in the Lafayette area. This is in part due to the presence of several large clusters of cases in schools, leading the physicians to perform more intense screening among contacts and associates of cases.

The study period was from April 22nd to May 31st which is a very short period to describe the entire epidemic in Louisiana. This short period was chosen in order to provide a timely report on the beginnings of the epidemic.

As early as week 17, when testing was fully implemented, cases were found in Region 1 (Orleans), 2 (Baton Rouge), 3 (Houma/Thibodaux), 4 (Lafayette, particularly in Lafayette Parish), 6 (Alexandria, particularly military cases in Vernon Parish) and 9 (North of Lake Pontchartrain). The numbers in Lafayette dwarf those in the other regions because of the more intensive testing in the school clusters. Regions 5 (Lake Charles), 7 (Shreveport) and 8 (Monroe) did not seem to be affected at first.

The higher proportion of positives among the 5-24 age group may be due to a selection bias. Many cases were among school children and testing was biased toward testing contacts and associates of already known cases. The same age group was observed in other regions where there were only sporadic cases. With a reproductive rate of 0.85 among household contacts (number of secondary cases per primary case), it would be expected that the transmission could not be sustained for numerous generations. There are serious limitations in the quality of the data collected on household contacts. There is some concern about the ability of this virus to be transmitted during the summer months. It is expected that during the winter, transmission will occur at a higher rate and we shall see a second epidemic wave.

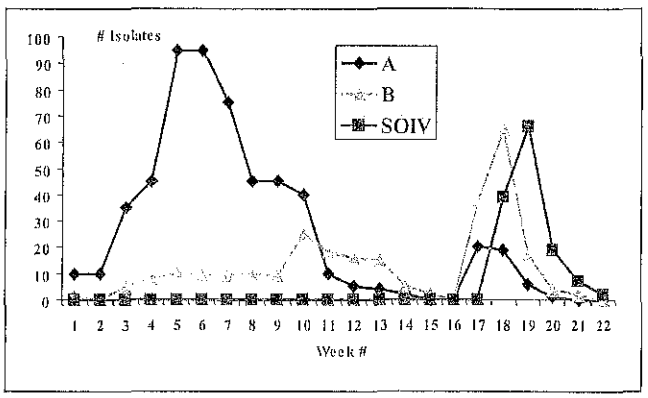

Figure 3. World Health Organization (WHO) isolates from Louisiana, 2008-2009 season by WHO/National Respiratory and Enteric Virus Surveillance System (NREVSS) collaborating laboratories.

In conclusion there are a few important lessons to learn for this winter season:

1. Attempting to confirm every single case through RT-PCR is time consuming and results in creating congestion in the few laboratories able to perform testing for a novel virus. The delays created are so long that the results are obtained too late to be of any clinical use. Medical decisions and management of cases must be based on clinical criteria only.
2. Laboratory testing is only useful to obtain an epidemiologic picture of the spread of the novel strain. Once the novel strain has been identified in a specific setting (school, institution, cluster, or other specific population group) there is no need to continue testing.
3. Contacts do not need to be tested. If they meet clinical criteria and have a clear history of exposure to a novel strain case, they should be considered a probable case.
4. Any quarantine measure at any borders would inconvenience people and achieve nothing in preventing spread of disease.
5. Isolation of cases (confirmed or probable), on the other hand is useful in decreasing the sources of spread. Isolation usually will be voluntary since there are no facilities large enough to isolate large numbers of people.
6. Hospitals are for people who need hospitalizations for their medical conditions. Hospitals should not be used as isolation wards for people that could be isolated at home.
7. Strict infection control practices will be necessary to prevent hospitals and other health care facilities from becoming the epicenters of transmission.
8. Social distancing measures such as school or event closure, are difficult to enforce. They are met with resistance from the population involved. Their use has to be measured and carefully applied.
9. All preventive measures (enhanced surveillance, isolation, social distancing, treatment or prophylaxis, except vaccinations) are not expected to stop the spread of the virus, simply delay the spread.

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