Novel Influenza A H1N1 Update





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Where I Spend My Time

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Objectives

- Provide background information

 influenza viruses
 pandemics

 Describe the initial detection of novel H1N1
 Provide an update of current status
- Discuss implications for upcoming season





Influenza Virus

Hemagglutinin Allows the flu virus to adhere to the respiratory tract

Neuraminidase Allows the flu virus to escape from respiratory cells after replication







Eight Gene Segments Allows the flu virus to easily exchange genes with other flu viruses









Influenza A Subtypes







CDC

Pandemic Influenza in the Past

- Past Pandemics
 - 1918 (H1N1)
 - 40-50 million deaths, 500K in US
 - 1957 (H2N2)
 - 2 million deaths, 70K in US
 - 1968 (H3N2)
 - 1-4 million deaths, 34K in US



















Detection









Swine Influenza A (H1N1) Infection in Two Children — Southern California, March–April 2009

On April 21, this report was posted as an MMWR Early Release on the MMWR website (http://www.cdc.gov/mmwr).

Novel Influenza Detected

- Increasing numbers of swine influenza cases being detected over past five years from improved surveillance – Shinde, NEJM 2009
- Increasing efforts at states, CDC, and USDA to investigate human cases of swine influenza
- Southern California, 2009 MMWR 58(15);400-02
 - April 13 10 yo boy, recovered



• April 17 – 9 yo girl, recovered





Detection of First Case

- Mesoscale device used to diagnose influenza in 10 year old boy during clinical trial in San Diego on April 1, 2009
- Result is influenza A positive, however, H1, H3, H5 negative



Detection of First Case



- San Diego public health notified
- Recommends sending specimen on to designated reference laboratory in Wisconsin as part of the clinical trial



 "Unsubtypable" confirmed by reference laboratory and by designated State Public Health Laboratory using FDA-cleared 5 Target PCR





Date of Onset Novel Swine-Origin Influenza A (H1N1) Virus Investigation Team. N Engl J Med 2009;10.1056/NEJMoa0903810

- 1. Patient 1
- 2. Patient 2
- 3. Recognition of potential match between Mexico and US viruses
- 4. US declares a public health emergency
- 5. WHO raises to Pandemic Phase 4
- 6. WHO raises to Pandemic Phase 5
 - www.cdc.gov/H1N1flu





U.S. Military Laboratory-Based Influenza Surveillance

Sentinel Site Surveillance
Through USAFSAM, Brooks City Base TX
Hospital & Clinic-Based
Recruit Training Surveillance
Through NHRC, San Diego CA
Overseas Surveillance
Through NAMRUs, other labs





H5N1 Avian Influenza (Risk Factors: Urban Migration & Crowding)















Origin of "Swine-Origin" H1N1 Garten et al Science, 2009



Response to H1N1

- Strategic National Stockpile
 - Distributed 25% pro rata supply
- Enhanced Surveillance Initiated
- PCR panH1N1 kits for testing



- Development at CDC, EUA at FDA, manufacture at ATCC, and ready to ship in ~ 2.5 weeks
- Distributed Kits, so far:
 - Domestic: 95 labs
 - DOD: 15 labs
 - International: >250 labs in 140 countries
- Virus Characterization
 - >1000 genes sequenced from >260 viruses
 - Submitted to GenBank





H1N1 "Current" Status

- Lab-Confirmed Cases
 - 44,317 total cases when reporting stopped in July
 - 8,842 hospitalized
 - 555 deaths
- Represents approximately 3 M cases
- Overall activity has declined since schools closed, but focal areas of activity have increased
- Viruses in US and Internationally show no evidence of significant genetic/antigenic change





Epidemiology/Surveillance

Percentage of Visits for Influenza-like Illness (ILI) Reported by the US Outpatient -Influenza-like Illness Surveillance Network (ILINet), National Summary 2008-09 and novel 2009-H1N1 – 01 SEP 2009





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Epidemiology/Surveillance Current Influenza Surveillance – *ILINet Regions IV-VI* novel 2009-H1N1 – 01 SEP 2009



Epidemiology/Surveillance novel 2009-H1N1 –1 SEPT 2009



Epidemiology/Surveillance novel 2009-H1N1 –1 SEPT 2009

Percentage of Influenza-Like Illness from Emergency Department Chief Complaints, Florida ESSENCE Participating Hospitals (N=114), 2006-2009





Data are provisional and will not be officially released by the CDC until 1100 EDT Internal Use Only (FIUO)---For Official Use Only (FOUO) -Sensitive But Unclassified (SBU) NOT FOR FURTHER DISTRIBUTION



*Excludes 3,324 cases with missing ages.

Rate / 100,000 by Single Year Age Groups: Denominator source: 2008 Census Estimates, U.S. Census Bureau at: http://www.census.gov/popest/national/asrh/files/NC-EST2007-ALLDATA-R-File24.csv

Teens and young adults disproportionately affected Few cases among elderly









Hospitalization Rate per 100,000 Population by Age Group (n=5,207*) novel 2009-H1N1 – 30 JUL 2009



*Hospitalizations with unknown ages are not included (n=307)

*Rate / 100,000 by Single Year Age Groups: Denominator source: 2008 Census Estimates, U.S. Census Bureau at:

http://www.census.gov/popest/national/asrh/files/NC-EST2007-ALLDATA-R-File24.csv



Pandemic H1N1 Hospitalizations Reported to CDC Underlying Conditions as of 19 JUN 2009 (n=268)





*Excludes hypertension









Epidemiology/Surveillance Deaths by Age Group novel 2009-H1N1 – 30 JUL 2009 (n=353)





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Mortalitites

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International Reported Cumulative Cases by Country novel 2009-H1N1 – 21 JUL 2009



Reported cumulative number of confirmed cases of influenza A(H1N1)v by country, as of 18 July 2009, 17:00 hours CEST



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Rapid Influenza Diagnostic Tests

- Nine FDA-Approved Rapid Influenza Diagnostic Tests
- Evaluated seven RIDTs compared to PCR
 - Sensitivity ranged 18-69%
- Interpretation
 - Positive results = flu likely in specimen
 - Negative results = can not rule out flu
 Caution with cohorting or return to settings where transmission is a concern





Infection Control







Infection Control

- Current recommendations
 - Standard and Contact precautions
 - Eye protection
 - N95
 - Administrative, Source Controls
- Institute of Medicine convened on 8-12 to discuss PPE for novel H1N1, Report out 9-03
 - Attempt to address appropriate PPE to achieve healthcare worker protection





Vaccine Issues



Vaccine for Novel H1N1

- ACIP met July 29 to discuss recommendations
- Novel H1N1 will be considered a strain change under routine licenses and not under an Emergency Use Authorization
- The committee recommended the vaccination efforts focus on five key populations.
- Vaccination efforts are designed to help reduce the impact and spread of novel H1N1.
- The key populations include:
 - those who are at higher risk of disease or complications,
 - those who are likely to come in contact with novel H1N1,
 - those who could infect young infants.





Vaccine for Novel H1N1

- When vaccine is first available, the committee recommended that programs and providers try to vaccinate:
 - pregnant women,
 - people who live with or care for children younger than 6 months of age,
 - health care and emergency services personnel,
 - persons between the ages of 6 months through 24 years of age, and
 - people from ages 25 through 64 years who are at higher risk for novel H1N1 because of chronic health disorders or compromised immune systems.
- The groups listed above total approximately 159 million people in the United States.



Vaccine distribution approach is under discussion



Antiviral Treatment

- Treatment is recommended for:
 - All hospitalized patients with confirmed, probable or suspected novel influenza (H1N1).
 - Patients who are at higher risk for seasonal influenza complications (see above).
- Post exposure antiviral chemoprophylaxis can be considered for the following:
 - Close contacts of cases (confirmed, probable, or suspected) who are at high-risk for complications of influenza
 - Health care personnel, public health workers, or first responders who have had a recognized, unprotected close contact exposure to a person with novel (H1N1) influenza virus infection (confirmed, probable, or suspected) during that person's infectious period.





Antiviral Resistance

- Oseltamivir Resistance
 - H1N1 seasonal 99.6% (1123/1128)
 - H3N2 0% (0/222)
 - B 0% (0/635)
 - H1N1 novel 0.6% (7/1117)
- Zanamivir Resistance
 - None reported for all subtypes/types







- Disease likely persists through summer in US, possible surge in late August when school returns
- Monitor closely for genetic and antigenic virus changes
- Expected higher attack rate (20-30%) than in spring (6-15%), notably affecting younger individuals
- Vaccine availability possibly mid October, Federal funds for distribution and administration are available
- Healthcare facility support in part from HPP grants
- SNS Antiviral stocks likely to be distributed
- Drifted H3N2 may co-circulate with novel H1N1





The End Questions?

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Antiviral Treatment

Agent, group		Treatment	Chemoprophylaxis
Oseltamivir			
Adults		75-mg capsule twice per day for 5 days	75-mg capsule once per day
Children ≥ 12 months	15 kg or less	60 mg per day divided into 2 doses	30 mg once per day
	16-23 kg	90 mg per day divided into 2 doses	45 mg once per day
	24-40 kg	120 mg per day divided into 2 doses	60 mg once per day
	>40 kg	150 mg per day divided into 2 doses	75 mg once per day
Zanamivir			
Adults		Two 5-mg inhalations (10 mg total) twice per day	Two 5-mg inhalations (10 mg total) once per day
Children		Two 5-mg inhalations (10 mg total) twice per day (age, 7 years or older)	Two 5-mg inhalations (10 mg total) once per day (age, 5 years or older)



