



# New NBRC Exam

## Adult Critical Care Specialist

- Context Matrix @ [www.NBRC.org](http://www.NBRC.org)
- Advanced Assessment:
- Rescue Techniques: NO, Heliox, RM, HFOV
- Anticipate Care: Lab, Imaging, Meds, Nutrition, Sepsis
- End of Life, VAP, Sepsis, Disasters, Shock, Ethics
- Available in Late 2010 or 2011

# H1N1, IMPLICATIONS FOR RESPIRATORY THERAPISTS

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# Pandemic Hx

- 542 AD, Byzantine Empire: Black Plague
- 1348-1485, Western Europe: Black Plague

- Sass, E, Wiegman, S, The Mental Floss History of the World, 2008, pgs 145,181,297, 321



# Spanish flu 1918

- Probably started at Kansas Military facility
- 1/3 of planet infected
- 25-50 million deaths worldwide
- 1/2 million deaths in US
- 6 million deaths in Europe





# Spanish flu 1918


- Attacked young people
  - Death within 24 hours
  - Hemorrhagic lungs
  - Bleeding from mouth, nose, eyes
  - Pandemic over by Summer of 1919
- 

Photo # NH 41731-A Influenza precaution sign at the Naval Aircraft Factory, Philadelphia,



**Spanish Influenza**  
has endangered the prosecution  
of the **WAR** in Europe.

There are 1500 cases in the Navy Yard  
30 deaths have already resulted

**SPITTING SPREADS SPANISH  
INFLUENZA DONT SPIT**


# Recent Pandemics

- SARS
- H5N1 Avian “Bird” flu
- 1976 Swine Flu: Fort Dix, NJ
- 1968 Pandemic






# H1N1

- Novel Influenza A flu strain
  - Mexico, Spring 2009
    - 95% MV and 44% Mortality (JAMA, Oct 12, 2009)
  - 208 Countries reporting confirmed cases
  - Severe cases resulting in deaths are reported
- 



# H1N1 Criteria

- Acute illness with fever  $> 38$  C or 100 F
  - Cough
  - Sore Throat
  - Myalgia or influenza like illness
  - Could lead to Acute Respiratory Failure
- 

# High Risk Groups

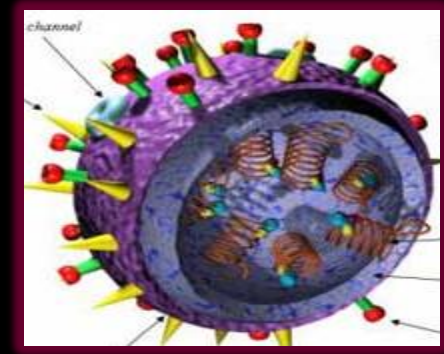
- Young Children
- Young Adults
- Pregnant Women
- Diabetes
- Severe Obesity
- **ASTHMA!**
  - COPD also



# Why is H1N1 Different?

- Flu strain that majority of population has no immunity
- Seasonal Flu typically effects elderly
- Most H1N1 flu cases are mild
- WHO: Pandemic June 11, 2009

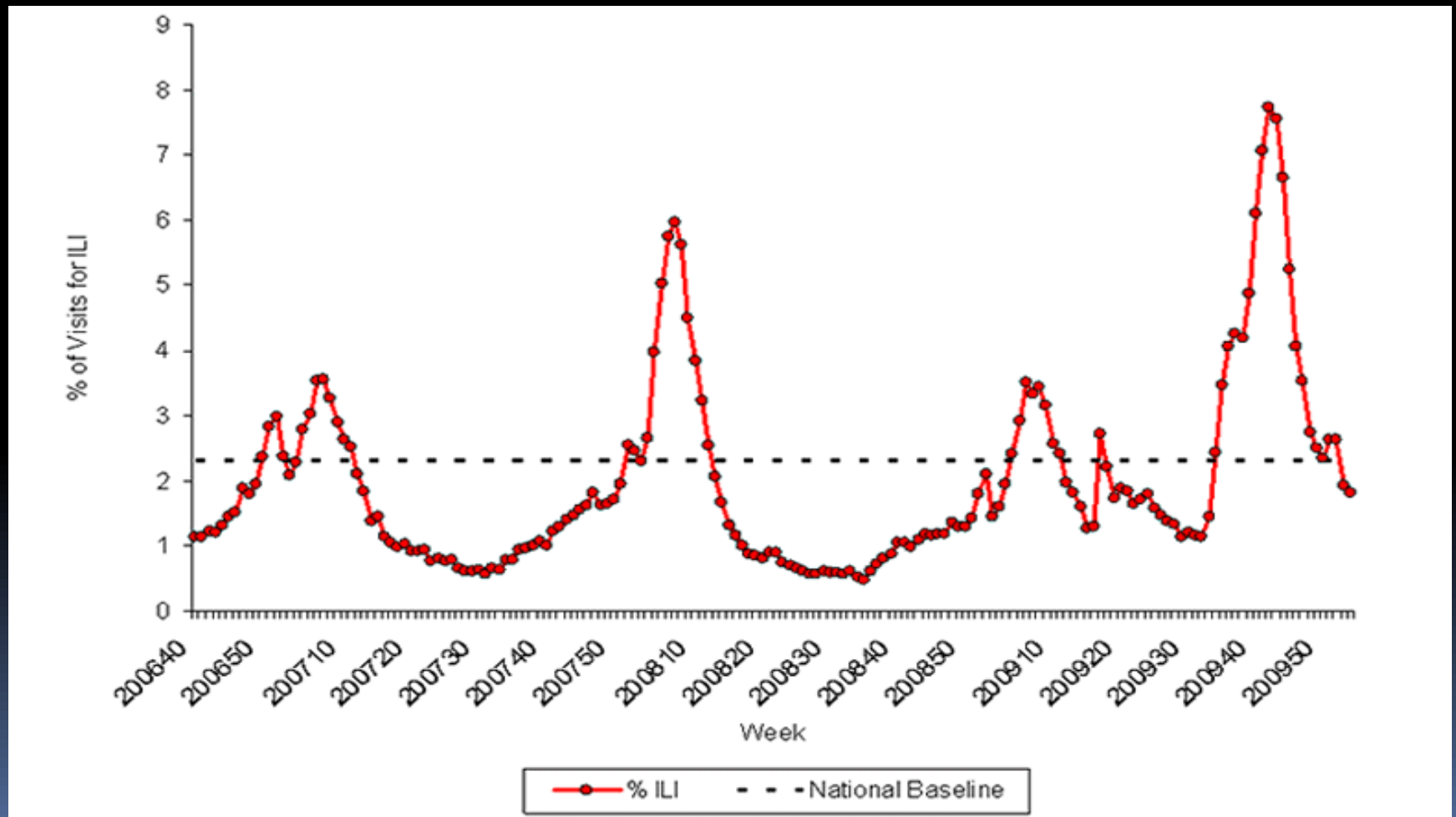
# Why is H1N1 So *Scary*?



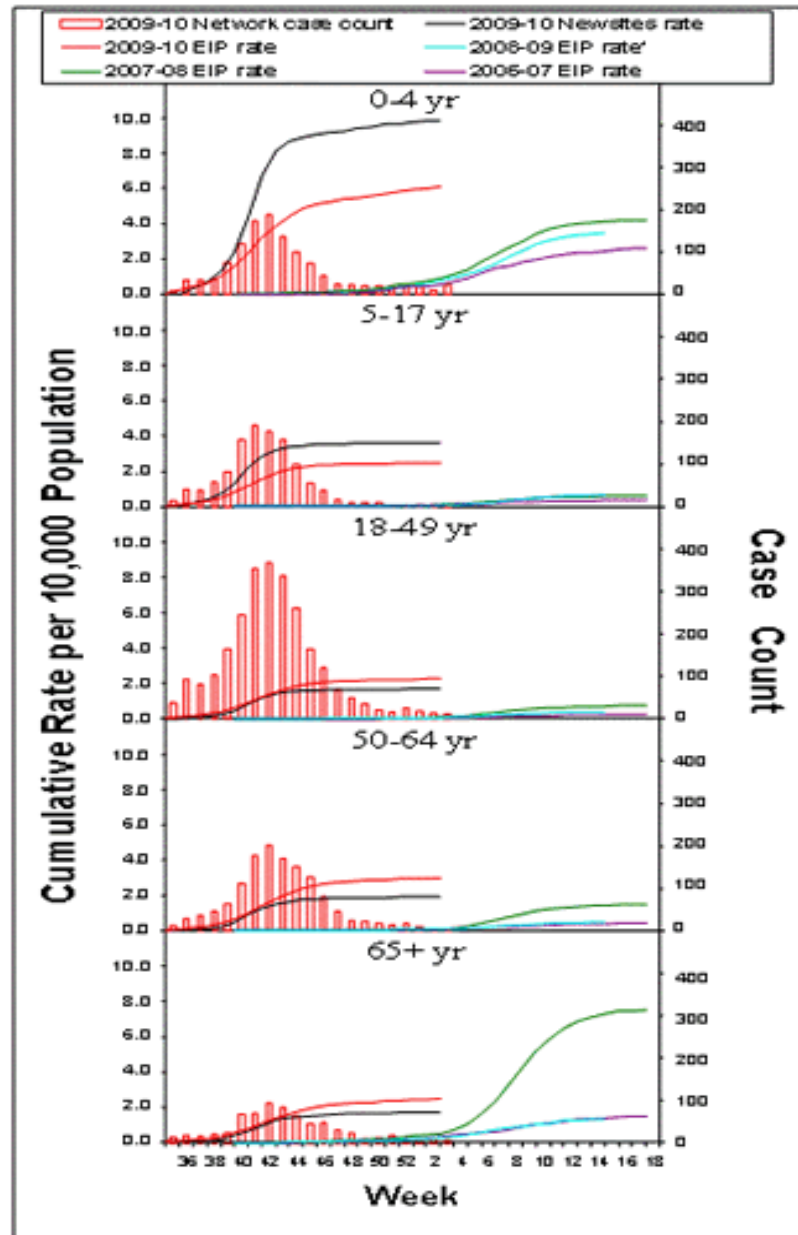
- Fast Widespread Global Pandemic
- Rapid Onset
  - initial symptoms to death: 3-10 days
- Severe ARDS
  - Potential to strain ICUs and Hospitals
- Children & Young Adults
- 33% Death Rate
- US and the world are not well prepared

# Outpatient Influenza-like Illness

Week Ending January 16, 2010

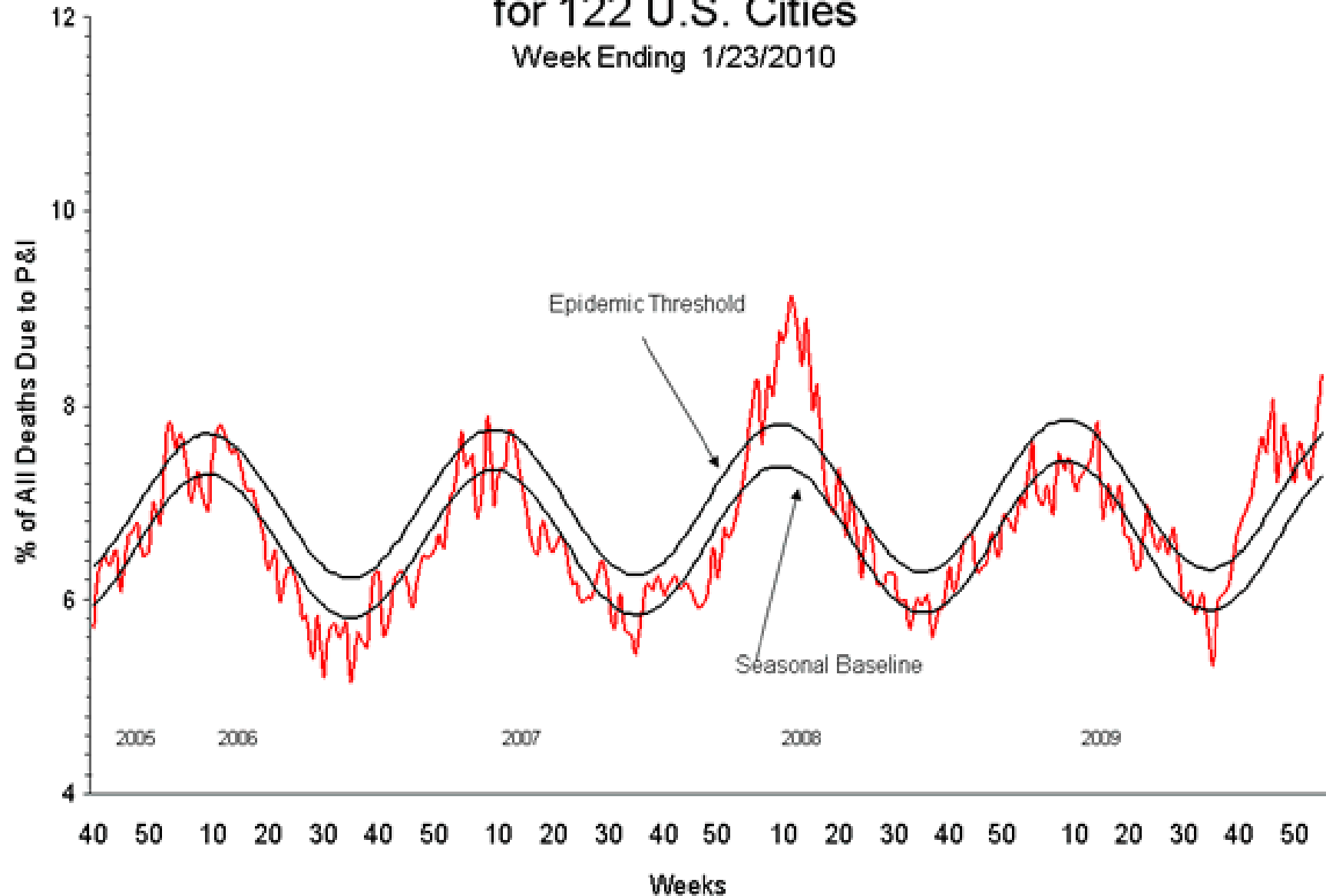


# EIP Influenza Laboratory-Confirmed Cumulative Hospitalization Rates, 2009-10 and Previous Three Seasons\*



# Pneumonia and Influenza Mortality for 122 U.S. Cities

Week Ending 1/23/2010





# Oregon H1N1 Flu Statistics

September 1, 2009 - January 25, 2010

source: [www.flu.oregon.gov](http://www.flu.oregon.gov)

<u>County</u>	<u>H1N1 Cases</u>	<u>Deaths</u>
Clackamas	112	2
Douglas	43	4
Klamath	24	1
Jackson	107	2
Jefferson	17	0
Josephine	51	4
Lane	198	12
Multnomah	260	16
<b>TOTALS</b>	<b>1306</b>	<b>66</b>

# Why is H1N1 NOT So Scary?

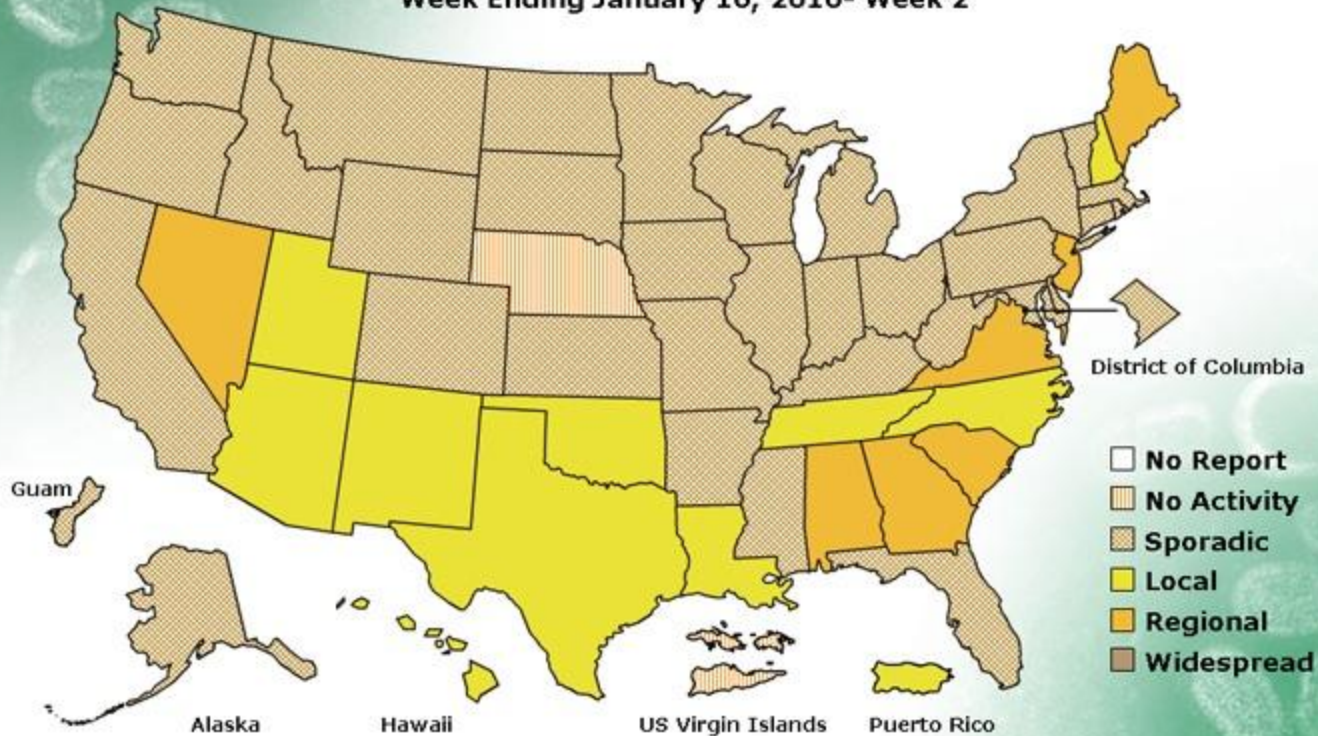
- Most cases are just the mild flu
- Not particularly virulent
- Not the massive number of ICU pts
- Healthcare System not overwhelmed
- Health Care Workers remain healthy
- H<sub>1</sub>N<sub>1</sub> vaccine now widely available

# FLUVIEW



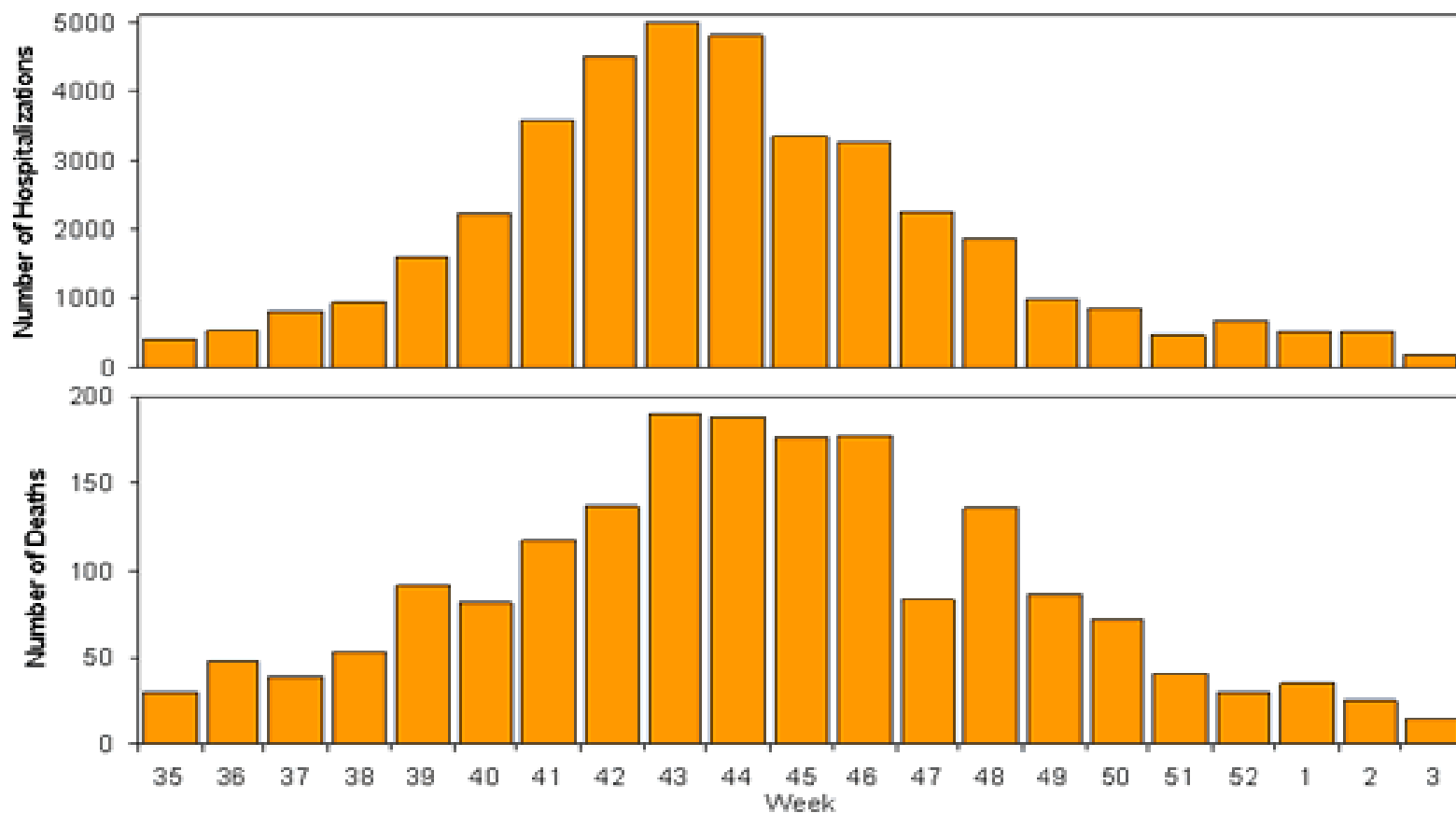
**A Weekly Influenza Surveillance Report Prepared by the Influenza Division**  
**Weekly Influenza Activity Estimates Reported by State and Territorial Epidemiologists\***

**Week Ending January 16, 2010- Week 2**



\*This map indicates geographic spread and does not measure the severity of influenza activity.

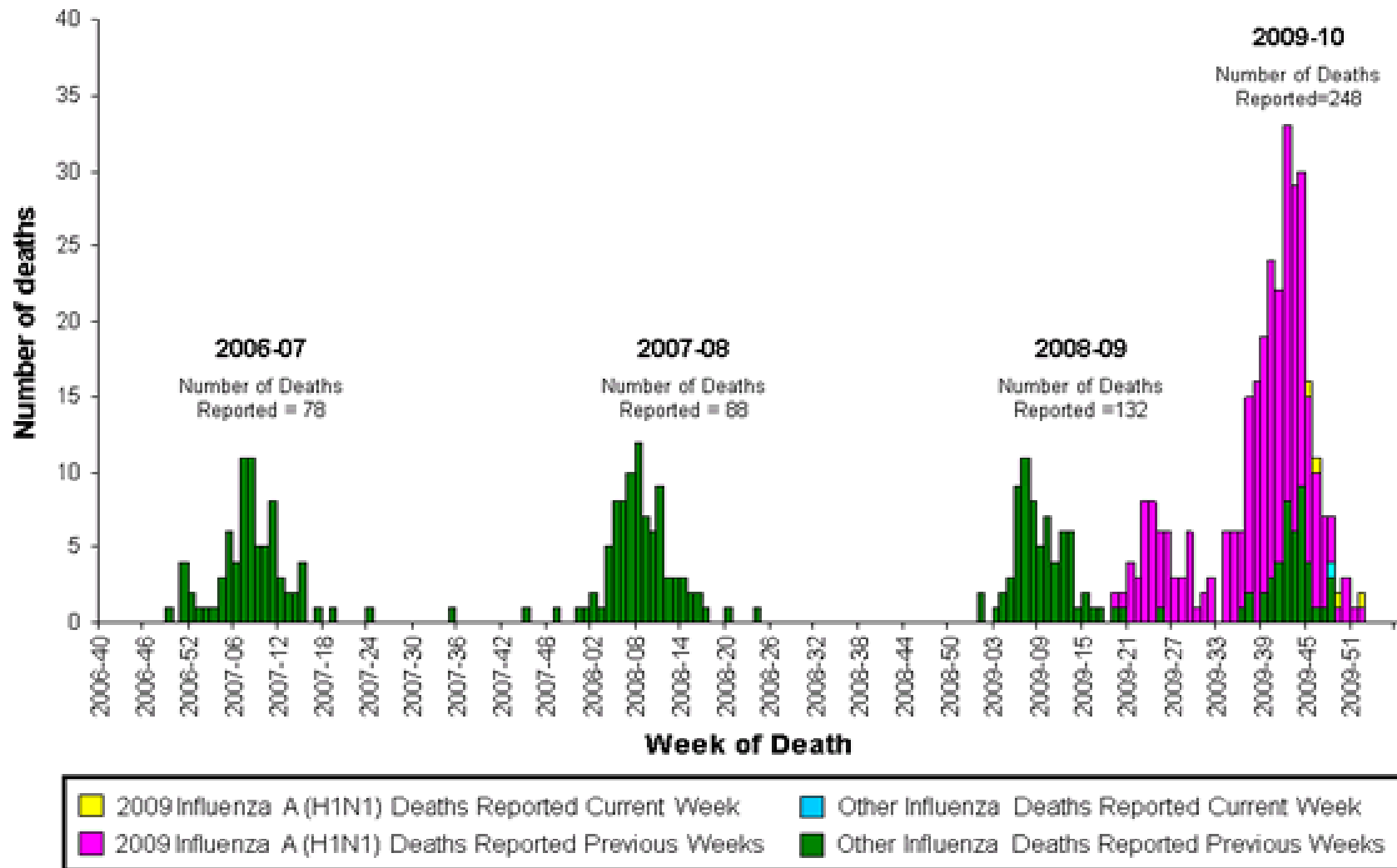
# Weekly Laboratory-Confirmed Influenza-Associated Hospitalizations and Deaths Reported to AHDRA, National Summary, August 30, 2009 – January 23, 2010



# H1N1 Began in March 2009

- First reported cases Mexico City
- Reports from Australia's winter flu
- May-June, University of Michigan
  - 30 pts on vents in 45 days
  - 10 deaths = 33%
  - CDC. Intensive Care Patients with severe novel influenza A (H1N1) virus infection- Michigan, June 2009, MMWR Morb Moral Wkly Rep 2009; 58: July 10

# Number of Influenza-Associated Pediatric Deaths by Week of Death: 2006-07 season to present



# Clinical & Epidemiological Study in Spain

- 32 Patients in 38 days
- Median age: 36
- 32% Obese (BMI >30)
- 6% Pregnant
- 50% comorbidities
- 28% Mortality
  - Rello, J, Intensive care adult pts with severe respiratory failure caused by Influenza A(H1N1) in Spain, Critical Care 2009, Sept 2009, 13:R148

# 735 cases confirmed in Spain by July 31<sup>st</sup>

- Admitted to ICU (18%)
  - 48 children <18 yo
  - 83 adults >18 yo
    - Only 1 > 65 yo
- required critical care
  - 75% of pts > 14yo
  - 25% of pts < 14yo
- 14% required mechanical ventilation

# Spain...

- 33% received NIV
  - 75% of NIV required mechanical ventilation
  - 33% of NIV pts died
- Vent Length of Stay ranged 1-50 days
  - VLOS median of 10 days

# New York City

## July 8, 2009

- 909 confirmed H<sub>1</sub>N<sub>1</sub> cases
- 25% required ICU
- 14% required mechanical ventilation
- 59 deaths
  - CDC MMWR Morb Mortal Wkly Rep 2009;58:July 10

# Australia Study


Hewagama, et al, CID, 2010:50

- 43 Pregnant women hospitalized w/ H1N1
- 30% in Second Trimester
- 65% in Third Trimester
- 20% required ICU care
- 6/15 delivered preterm <37 weeks
  - 3/6 infants died



# WHO

## World Health Organization

- Recognizes Pregnancy a high risk condition for severe outcomes in H1N1
  - Recommends early tx of pregnant women
    - Tamiflu or
    - Relenza
- 

# ECMO

N = 201

- 133 pts MV with no ECMO
- 68 pts with ECMO
- 21% Mortality
  - 23% with ECMO
  - 13% with MV
- 10% Barotrauma
  - Extracorporeal Membrane Oxygenation for 2009 Influenza A (H1N1) Acute Respiratory Distress Syndrome, JAMA, Oct 12, 2009

# Therapies for Oxygenation Failure

- Neuromuscular Blockade 28%
- Inhaled Nitric Oxide 14%
- High Frequency Oscillatory ventilation 12%
- Extracorporeal Membrane Oxygenation 4%
- Prone Positioning 3%
- Barotrauma noted in 8%

# Rescue Therapies


- Recruitment maneuvers 67%
- Prone Position 20%
- High Frequency Oscillation 5%
- Inhaled Nitric Oxide 32%
- Prostacyclin 22%
- ECMO 34%
  - Extracorporeal Membrane Oxygenation for 2009 Influenza A (H1N1) Acute Respiratory Distress Syndrome, JAMA, Oct 12, 2009

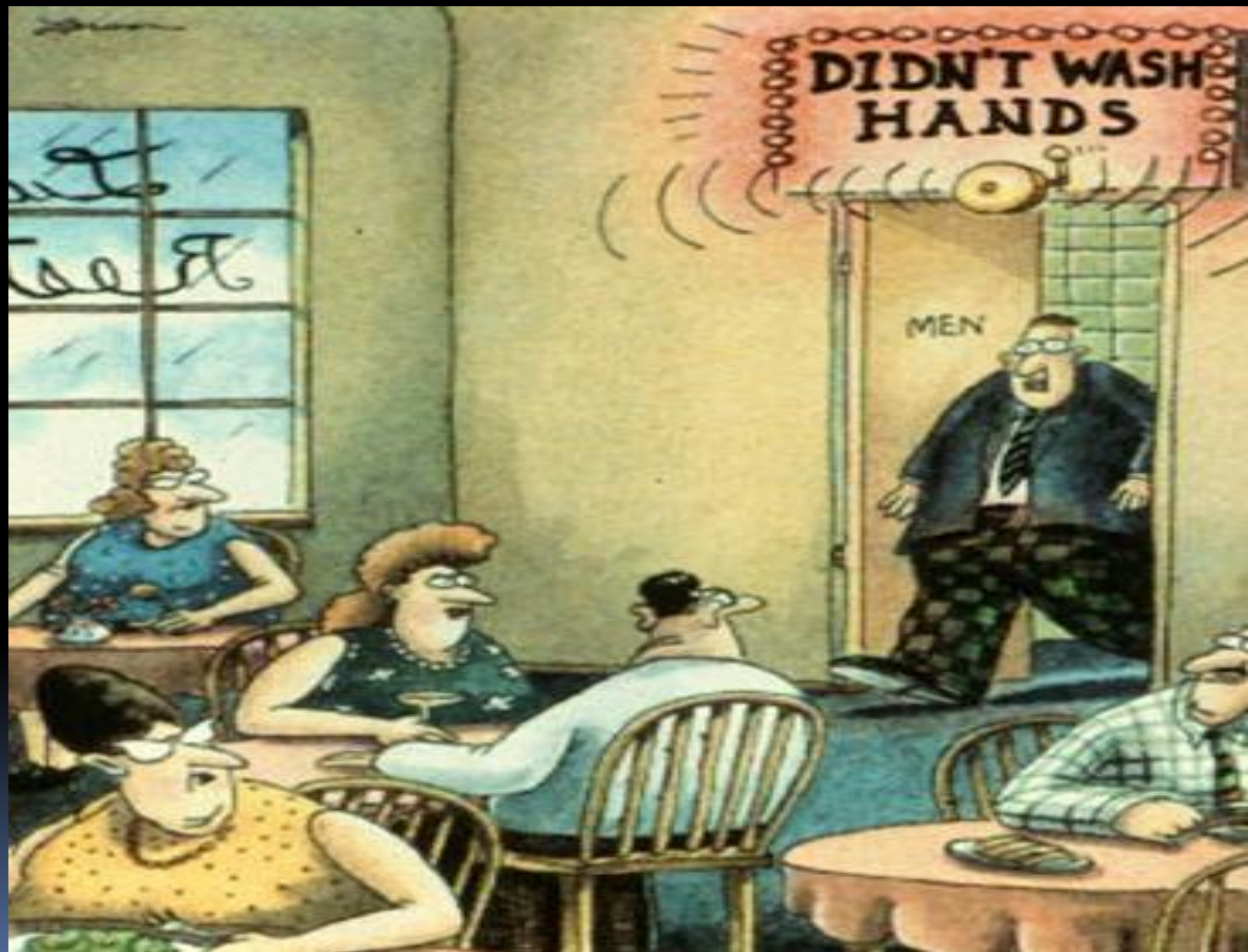
# H1N1 Vaccine Problems





# World Health Organization Droplet Transmission

- Influenza viruses in large droplets  $>5\text{mcm}$
  - Droplets by coughing, sneezing
    - Usually  $< 3$  feet
    - $<5\text{mcm}$  can travel  $>3$  feet
  - Droplet contact with Oral, Nasal & Ocular mucosa
- 



WHO

## Indirect Contact Transmission

- Skin to Skin contact
- Flu viruses live 24-48 hrs non-porous surface
- Can live <12 hrs on
- porous surface




# Aerosol Generating Procedures

- Theoretically can disseminate H<sub>1</sub>N<sub>1</sub> virus
- Nebulizer Treatments
- Intubations
- Bronchoscopy
- Open suctioning technique




# Centers for Disease Control CDC Recommendations

- Confirmed, probably, suspected H<sub>1</sub>N<sub>1</sub>
    - Pt placed directly into private room w/door closed
  - Procedures that generate Aerosols
    - Negative Pressure Room, “whenever feasible”
- 



# CDC Recommendations

- Pts transported to Radiology, etc.
    - Pt should wear surgical mask,
    - Pt should wash hands frequently,
    - Pt practice respiratory hygiene/cough etiquette
- 

# CDC Isolation Precautions for H1N1

- Standard & Contact Precautions PLUS eye protection
  - For all pt care activities for pts being evaluated or in Isolation for H<sub>1</sub>N<sub>1</sub>
  - Hand Hygiene immediately after removing gloves & equipment after any contact with respiratory secretions
- Fit Tested N<sub>95</sub> mask or PAPR for H<sub>1</sub>N<sub>1</sub> Isolation pts


# Powered Air Purifying Respirator





# Healthcare Facilities want to:

CDC

- Keep Sick Workers Home
  - Enforce respiratory hygiene & cough etiquette
  - Enhance Hand Hygiene Compliance
  - Establish facility access control & triage measures
  - Manage Visitor access
  - Control pt placement & transportation
  - Apply Isolation Precautions
  - Vaccinate Workforce
- 



# H1N1 Treatment

- Antiviral drug
  - Tamiflu = Oseltamirvir
  - Relenza = Zanamivir
- Manage ARDS with ARDSNet Protocols
- Not the time to start new techniques
  - HFOV, APRV, Recruitment Maneuvers, ECMO
- Best ICU Care
- Refractory Hypoxemia: Consider transferring

# PREVENT DISEASE



**CARELESS  
SPITTING, COUGHING, SNEEZING,  
SPREAD INFLUENZA  
and TUBERCULOSIS**



RENSSELAER COUNTY TUBERCULOSIS ASSOCIATION, TROY, N. Y.



# ARDSNet common sense


- Tidal Volumes 4-6 ml/Kg
- Plateau Pressures <30 cm H<sub>2</sub>O
- Titrate PEEP to keep the lung open
- Mortality dropped 22%
- Lung Protective Strategy!
  - ARDSNet, NEJM, May 2000, 342:1301

# Governments Strategic National Stockpile

- 6500 mechanical ventilators available for US
  - 2000 LP 10
  - 2000 Eagle Impact
  - 2500 LTV 1200
- Governor Declared Emergency
- Go Packs sent within 48-72 hours
- Regional vs National disasters
  - Everyone wants same resource
  - Including supplies from vendors



# Pandemic Prep

- Protect Healthcare Workers
  - Stockpile Additional Supplies
  - Maximize all staff's ARDS management skills
    - AARC Webcast, Fall 2009
    - Part 1, Treating ARDS
    - Part 2, Treating Refractory Hypoxia that is Unresponsive to Traditional Mechanical Ventilation
- 

# What's All This Mean?

- Unusual Pts targeted
- Pts crash & burn Quickly
- 15-20% hospitalized pts on vents
- Best care ARDS
- NIV doesn't work in 80%
- Refractory hypoxemia=transfer early
- Hospitals have 30% mortality
- H<sub>1</sub>N<sub>1</sub> hospitalizations are dropping

# Whats next?



- H<sub>1</sub>N<sub>1</sub> may NOT be over yet
- Anticipate more global pandemics
- Expect RTs to be at the forefront
- Universal Precautions: Protect Yourself & Pts
- Recognize multiple disinformation

# Great Resources

- [www.CDC.gov](http://www.CDC.gov)
- <http://flu.gov>
- [www.aarc.org](http://www.aarc.org)
  - Has links to both
- AARC Webcast Central
  - H<sub>1</sub>N<sub>1</sub>, Infec Control, Strategic National Stockpile lectures
  - AARC Members can review old webcasts
- [www.flu.oregon.gov](http://www.flu.oregon.gov)
  - Lists flu cases & deaths by county
  - State resources



