

# What's In The Air?

*Something new to deal with @ work -  
Infectious Diseases!*

# Agenda

- Definitions
- Diseases to “worry about” and plan for:
  - Histoplasmosis
  - West Nile
  - Hantavirus
  - Legionnaires Disease
  - Influenza
- Disease outbreak & response



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# Definitions

# Infectious Disease

- Any disease caused by
  - entrance, growth, and multiplication of bacteria, viruses or protozoans in the body.
  - It may not be contagious.
- Common examples now are:
  - Hepatitis
  - Sexually Transmitted Diseases (STDs)
  - Tuberculosis
  - Malaria
  - HIV/AIDS

# Contagious Disease

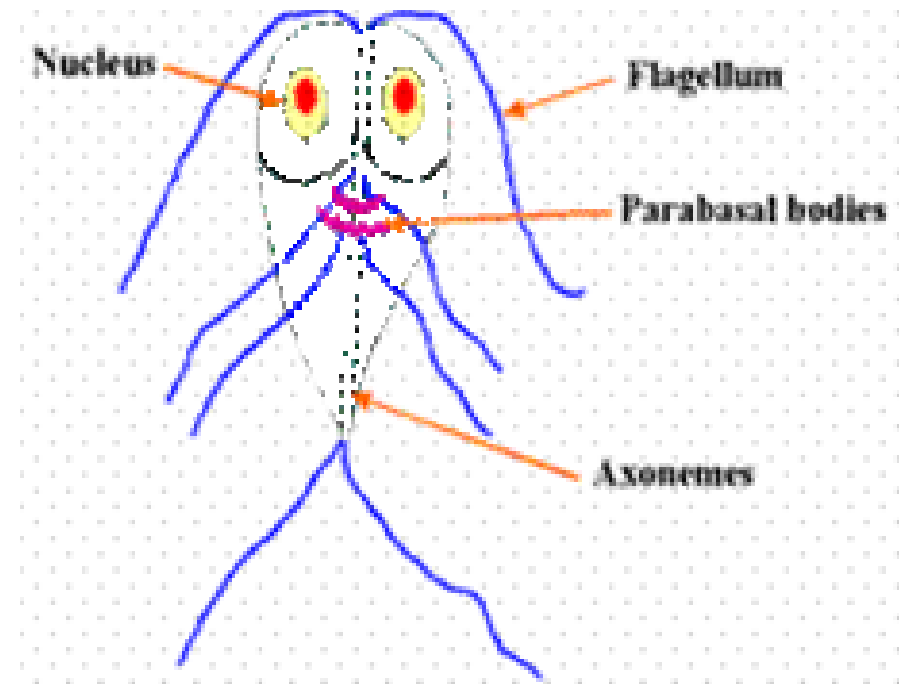
- An infectious disease transmissible by:
  - direct contact
    - infected person
  - indirect contact
    - secretion of an infected person
    - object touched by an infected person
- Used synonymously with communicable disease

# “Bug” Definitions

- Vector
  - An organism, such as a mosquito or tick, that carries disease-causing microorganisms from one host to another.
- Germ
  - A microorganism, especially a pathogen
- Pathogen
  - An agent that causes disease, especially a living microorganism such as a bacterium, virus, or fungus.

# “Bug” Definitions

- Protozoan
  - Any of a large group of single-celled, usually microscopic, eukaryotic organisms, such as amoebas, ciliates, flagellates, and sporozoans. *Giardia and Entamoeba histolytica are good examples of parasitic protozoans.*



# “Bug” Definitions

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

- Bacteria
  - Any of the unicellular prokaryotic microorganisms of the class Schizomycetes, which vary in terms of morphology, oxygen and nutritional requirements, and motility, and may be free-living, saprophytic, or pathogenic in plants or animals.

Salmonellosis



# “Bug” Definitions

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- Viruses
  - Any of various simple submicroscopic parasites of plants, animals, and bacteria that often cause disease and that consist essentially of a core of RNA or DNA surrounded by a protein coat.
  - Unable to replicate without a host cell, viruses are typically not considered living organisms.

Herpes Simplex

# Pandemic & Epidemic

- A **pandemic** is a disease that affects people
  - occurring over a wide geographic area and affecting an exceptionally high proportion of the population (from Greek *pan+demos*, all+people).
- An epidemic is an outbreak of a disease that
  - *spreads more quickly*
  - *more extensively* among a group of people than would normally be expected



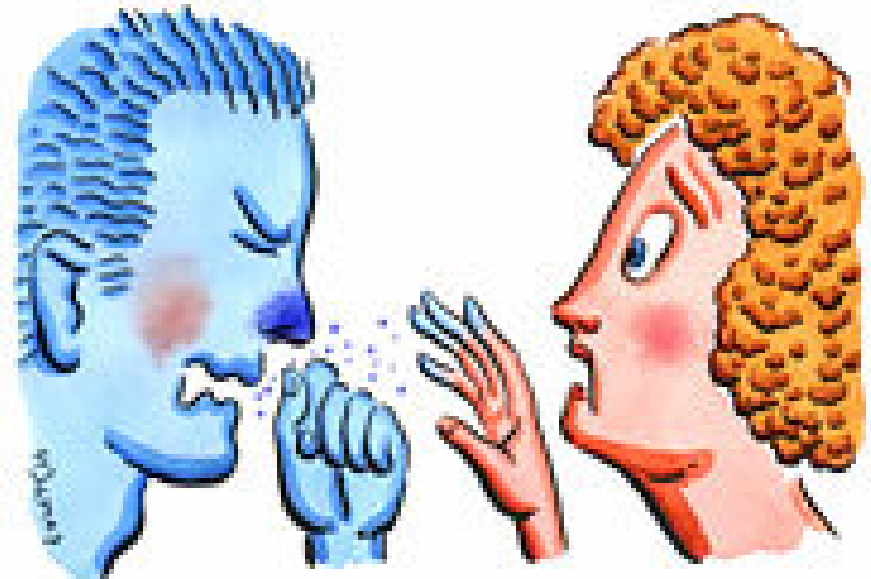
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# Health Screening

**Don't worry, its just allergies!**

# Diseases

- Histoplasmosis
- West Nile
- Hantavirus
- Legionnaires Disease
- Influenza





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# Histoplasmosis

# Histoplasmosis

- Histoplasmosis - *infectious disease* caused by inhaling the spores of a fungus, *Histoplasma capsulatum*.
- Histoplasmosis is ***not contagious***; it cannot be transmitted from an infected person or animal to someone else.
- Histoplasmosis fungus lives in soil, especially soil that is enriched with bat or bird droppings.



# Histoplasmosis

- Most infected persons have no symptoms. They vary widely, depending on the form of the disease.
- Lung infections can be acute (short-term) and relatively mild **or** chronic (long-term) and serious.
  - Symptoms include tiredness, fever, chills, chest pains, and a dry cough. The chronic lung infection is like tuberculosis and occurs in persons who already have lung disease, progressing over time scarring the lungs.
- The disseminated disease can involve all body organs. Liver and spleen usually become enlarged; sores in the mouth or GI tract can develop; and can be fatal.

# Histoplasmosis - Prevention

- Avoid exposure to dust in a contaminated environment.
- Before cleaning chicken coops or other contaminated soil, spray with water to reduce dust.
- PPE in contaminated areas includes gloves, coveralls, respirator equipped with a high efficiency particulate air (HEPA) filter that is capable of filtering particles down to two microns in size.
- For major clean up operations of prolonged exposure, a powered air purifying or supplied air respirator may be necessary.



# Histoplasmosis - Treatment

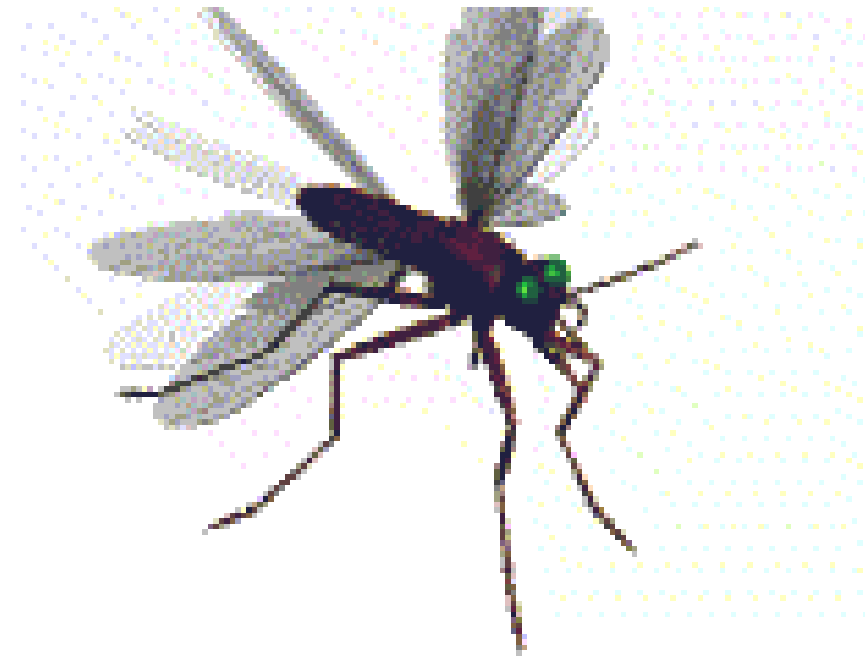
- Infection with histoplasmosis is common, but the disease is rare.
  - Up to 80% of persons living in U.S. areas where the fungus is common have a positive skin test.
  - On the rise, mainly because of the growing number of persons with weakened immune systems.
- Mild disease usually get better on their own.
- Severe cases and all cases of chronic and disseminated disease are treated with fungus-killing medicines.



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# West Nile

# West Nile



- West Nile virus spread from Africa and other countries to the New York City area in September 1999 and soon migrated to other states.
- The disease rarely causes serious symptoms. But for about one percent of the population, it behaves like a potentially fatal encephalitis or meningitis.

# West Nile Symptoms

- 80% (about 4 out of 5) will show no symptoms.
- About 20% will display symptoms which can include fever, headache, and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach and back.
  - Symptoms can last for as short as a few days up to several weeks.
- About 1 in 150 people will develop severe illness. Symptoms include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis.
  - May last several weeks, and neurological effects may be permanent.

# Avoid Mosquito Bites

- When you are outdoors, use insect repellents containing DEET
- Many mosquitoes are most active at dusk and dawn. Be sure to use insect repellent and wear long sleeves and pants at these times or consider staying indoors during these hours.
- Light-colored clothing can help you see mosquitoes that land on you.

# Avoid Mosquito Bites

- Make sure you have good screens on your windows and doors to keep mosquitoes out.
- Get rid of mosquito breeding sites by emptying standing water from flower pots, buckets and barrels. Change the water in pet dishes and replace the water in bird baths weekly.
- Keep children's wading pools empty and on their sides when they aren't being used.



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# Hantavirus

# Hantavirus



- Hantavirus causes Hantavirus pulmonary syndrome (HPS) is a deadly disease transmitted by infected rodents (deer mouse primarily) through urine, droppings, or saliva.
- Humans can contract the disease when they breathe in aerosolized virus.
- HPS in the United States **cannot** be transmitted from one person to another.



# Hantavirus Pulmonary Syndrome

- Symptoms usually begin one to three weeks after exposure to infected deer mice.
- HPS is characterized by fever, chills and muscle aches, followed by the abrupt onset of respiratory distress and shortness of breath. The muscle aches are severe, involving the thighs, hips, back and sometimes the shoulder.
- Other symptoms include nausea, vomiting, and abdominal pain.

# Hantavirus Pulmonary Syndrome

- HPS was first recognized in 1993 and has since been identified throughout the United States.
  - Although rare, HPS is potentially deadly.
  - As of September 2004, 379 confirmed cases in US; 36% of all reported cases resulted in deaths
- Rodent control in and around the home remains the primary strategy for preventing hantavirus infection.
- HPS in the United States is not known to be transmitted by farm animals, dogs, or cats or from rodents purchased from a pet store.

# Hantavirus Pulmonary Syndrome

- This year CDC is predicting a “better than average” HPS season due to the wet spring.
- Nebraska
  - A western Nebraska man in his early 50s died last month [April 2005] He worked in a rural agricultural setting.
  - The man is the 4th person in Nebraska to die of the disease.
  - Nine cases have been confirmed since the virus was first reported in the state in 1998, according to state records. 2 possible cases have not been resolved.
- This year HPS has already surfaced in Canada, Colorado, New Mexico and Arizona.
  - New Mexico has recorded a total of 63 cases of hantavirus. 27 of those cases have been fatal, according to numbers released by the state in December 2004,

# Clean Up Rodent-infested Areas

- Latex or rubber gloves: a mask may be appropriate
- Solution of 1-cup bleach to 10 cups water (or use a household disinfectant) that kills viruses.
- Do not vacuum, sweep, or dust. This may spread the virus through the air. Use rags, sponges, and mops that have been soaked in the disinfectant solution.
- Thoroughly spray or soak any dead mice, traps, droppings, or nesting areas with bleach solution.
- To dispose of contaminated items put them in a plastic bag. Double bag in another plastic bag.



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# Legionnaires Disease

# Legionnaires Disease



- Was first identified in 1977 by the CDC as the cause of an outbreak of pneumonia that caused 34 deaths at a 1976 American Legion Convention in Philadelphia.
- It had undoubtedly caused previous pneumonia outbreaks, but the organism's slow growth and special growth requirements prevented earlier discovery.

# Legionnaires Disease

- Legionnaires' disease (Legionellosis) is a bacterial disease commonly associated with water-based aerosols.
- It is often the result of poorly maintained air conditioning cooling towers and potable water systems.
- There are between 10,000 and 50,000 cases of Legionnaires' disease each year. (*OSHA*)

# Legionnaires Disease

- Incubation period of two to ten days. Severity ranges from a mild cough and low fever to rapidly progressive pneumonia and coma.
- Early symptoms include malaise, muscle aches, and slight headache. Later symptoms include high fever (up to 105°F), a dry cough, and shortness of breath. Gastrointestinal symptoms including vomiting, diarrhea, nausea, and abdominal pain are common.
- The disease is treated with erythromycin or a combination of erythromycin and rifampin.





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# Influenza

# The Big One - Influenza

- Influenza is a highly contagious respiratory disease.
- Historical accounts go back to the 16th century in Italy
  - Influenza attributed to the “influence of the stars”
- Three types:
  - Influenza A- moderate to severe illness, affects people of all ages
  - Influenza B- mild to moderate illness, usually affects children
  - Influenza C- Mild illness, sporadic cases, minor outbreaks

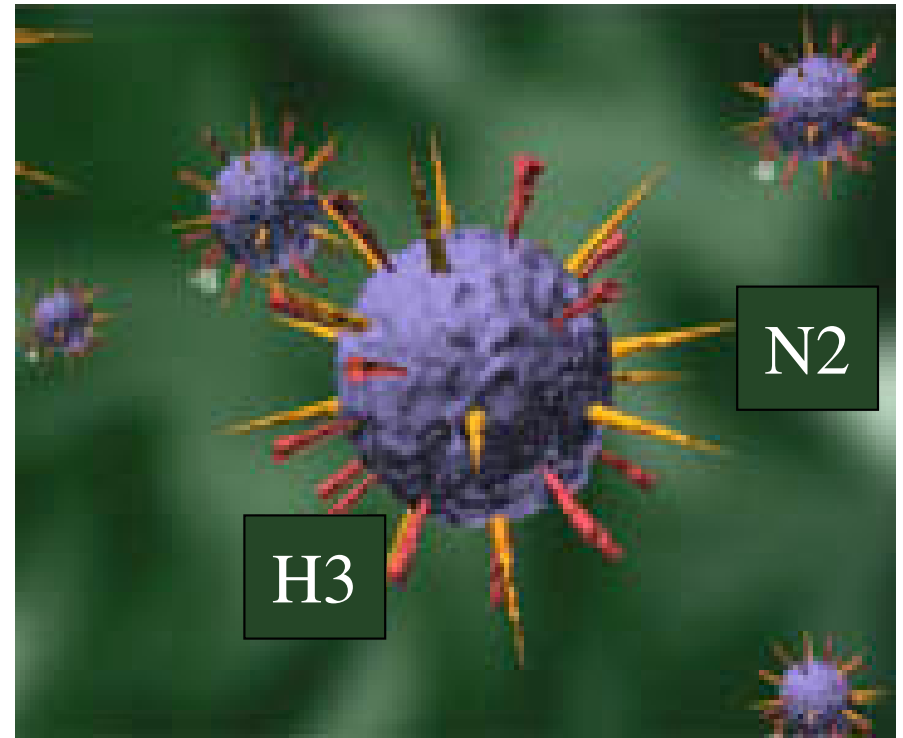
# Influenza Statistics

- During any given year, 10-20% of the world's population gets influenza.
- Influenza is associated with 500,000 to 1,000,000 deaths worldwide each year.
- In 2002 in the US, influenza resulted in 36,000 deaths and 114,000 hospitalizations.
- In unpredictable years 25% of the population get it.

*Source- UCLA*

# Influenza A - A Tutorial

- Influenza A has two subtypes determined by proteins on the outer surface of the virus
  - Hemagglutinin (H) – helps virus attach to respiratory cells
  - Neuraminidase (N) – helps virus penetrate into the cells once it is attached.
- Influenza A is sub-typed by the H and N they possess,
  - An example a description of a subtype would be the H3N2 virus



# Course of Influenza in Adults



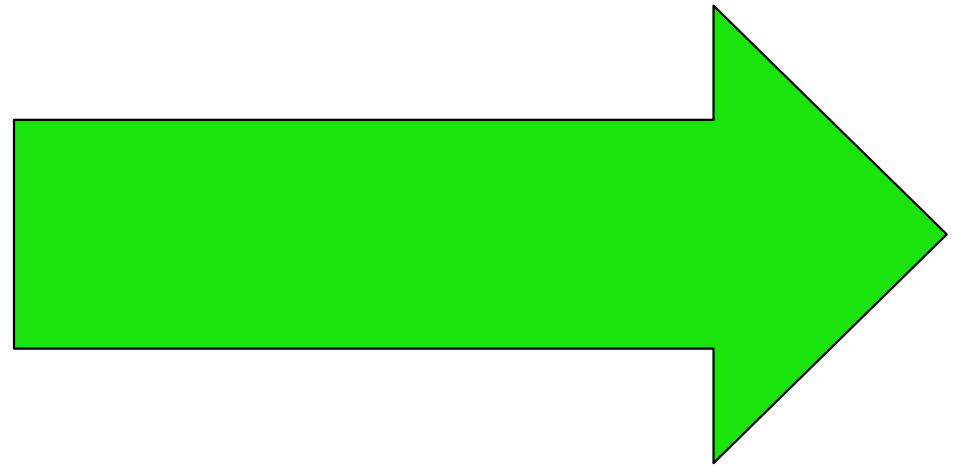
Day 0	Infected
Day 1 - 4	Incubation (average 2 days)
Day 1 - 6	Contagious (one day before symptoms to 5 days after symptom onset)
Day 2 - 9	Symptomatic (usual 2 - 5 days)
Day 4 to ?	Decreased energy (one week or more)

# Influenza- A Microbial Chameleon

- Influenza has thrived over the millennia by adhering to one simple principal- **adapt or die**.
- If this constant process of genetic shuffling didn't frequently result in new types of H or N, eventually many humans would become immune and the virus would die out.
- Therefore most of us will experience repeated Influenza infections in our lifetime.
  - Or, why you got the flu shot and still got the flu (it could also be another strain too!).

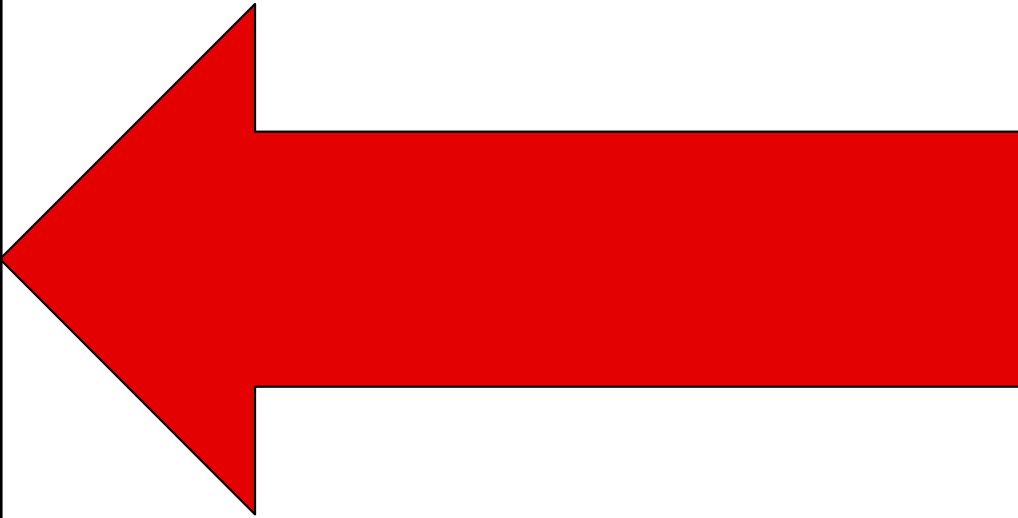
# Antigenic **Drift**

- A subtle mutation within the **same** subtype.
- Can be associated with epidemics.
- These changes or drifts occur continually even within the same “flu season.”



# Antigenic Shift

- An entirely new subtype of virus emerges through recombination of human and animal antigens (often swine and avian).
- Associated with a pandemic because the **entire world** population is suddenly susceptible to the new virus.
- They are impossible to predict and can happen anytime.





# Three Great Influenza Pandemics in the 20th Century

1. 1918-1919 - Spanish Flu
2. 1957-58 - Asian Influenza
3. 1968 - Hong Kong Influenza

# Spanish Flu March 10, 1918



- The virus first manifested on March 10 at Camp Riley, Kansas, after it underwent a genetic "shift".
- With WWI in progress it moved around the globe with ease.
- It affected young people in the prime of their life, often killing them within a day.
  - Average age - 20-25 years old

# Spanish Flu 1918-1919



- The three hardest hit large cities all experienced:
  - City quarantines
  - Required masks while on the street
  - Severe shortage of nurses (up to 75%) and caskets
  - Panic and widespread fear

# The Toll of Spanish Influenza

- 20 to 40 million deaths worldwide (17 million in India alone)
- 500,000 deaths in the US
  - Total death toll in Philadelphia was 150,000
- Scientists still do not know why it was so lethal or why it preferred young people.



# Asian Influenza - 1957-58

- In May 1957 the World Health Organization (WHO) reported a new H2N2 subtype from Singapore.
- By May 1958 the virus had spread throughout the globe.
- Infection rates were reported to range from 20% to 70%.
  - Case fatality rates were low, ranging from 1 in 2,000 to 1 in 10,000 infections.
  - Death toll 70,000 excess mortality.

# Hong Kong Influenza - 1968-69

- In mid July 1968 a new subtype, H3N2 emerged in Hong Kong.
- Mortality rates were similar in magnitude to those caused by Asian influenza.
- Age-specific mortality rates peaked in 1970 and were highest for those over the age of 65 years.
- Serological studies in blood donors suggested that infection rates were in the order of 25% to 30%.
- Death toll 31,00 excess mortality.

# Why less deaths in 1957 & 1968?



- Less virulent viruses.
- Antibiotic treatment for secondary infections.
- Improved supportive care.



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# Current Threat



# Avian Flu - Current Death Toll

- These deaths have occurred in as of May 14, 2005 from H5N1
  - Vietnam 36 deaths
  - Thailand 12 deaths
  - Cambodia 4 death
  - Authorities believe the death toll should be higher as some individuals were not tested and are reporting the deaths as 47 (**at least**)
  - 75% fatality!!!
- Nine bird flu cases amongst family members - transmission unsure.



# The Clock is Ticking

- Sentinel site surveillance around the world serves as an early warning system.
- WHO has 112 labs in 83 countries looking out for the Big One.
- Influenza pandemics have historically occurred at 25-year intervals.
- Global jet travel and urban overcrowding increase the risk.



# WHO is Sounding the Alarm

- February 2005 conference in Vietnam - “It is now just a matter of time. The world is in grave danger.” *Shigeru Omi, WHO Western Pacific Regional Director*



# Circulating Viruses



- “The longer the virus is circulating in animals, including chickens and ducks, the greater the risk of human cases and consequently, the higher the risk of a pandemic virus emerging through genetic changes in the virus,” Omi said.



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# Pandemic Planning

# Why Should We Prepare for a Pandemic?

- It **will** happen again. Experts believe another pandemic is inevitable – just don't know when it will happen.
- There will be **very little warning**. Most believe there would be 1-6 months between the time a new Influenza strain is identified before outbreaks would occur in the US.
- Vaccines will **likely not be available for 6 - 12 months** (if at all) from the time the organism is identified and it will likely take two doses, 30 days apart.

# Why Should We Prepare for a Pandemic?

- Will likely **occur simultaneously** throughout the US, preventing shifts of resources that normally occur with natural disasters.
- There will be a **prolonged effect on communities**-lasting months, maybe as long as a year.
- United States estimates
  - 89,000-207,000 deaths
  - 314,000-734,00 hospitalized
  - 18 - 42 million doctor visits
  - 20 - 47 million who are ill but do not seek care

CDC Statistics 2002

# Why Should We Prepare for a Pandemic?

- Biologics will be in short supply (vaccinations, antibiotics and antivirals)
- Health care workers and first responders will be at high risk for exposure and illness
- Shortage of personnel in important sectors- military, police, fire, utility workers, etc.
- CDC estimates US economic losses may range from \$71 to \$166 billion.



# Why Should We Prepare for a Pandemic?

- WHO has issued the following new estimates for a H5N1 outbreak:
  - The potential death toll of an H5N1 pandemic
    - Low of 2 million
    - High of 100 million if it keeps up its current highly lethal behavior.
  - Four months to circulate the globe.
- Due to limited supply of antivirals the only way to limit the spread of the disease is non-medical interventions.

# What should you be planning for?

- Probable average absenteeism of 30% (that includes your vendors and customers too!) for months.
- May have less than six weeks of warning.
- Could have three waves in six month intervals.
  - Each wave could last six weeks to six months.
- No remedy immediately available.

# Surveillance At Your Company

- How do you know that anyone is sick?
- How can you begin to detect trends or patterns?
- Initially it may just be anecdotal - pay attention. If the cafeteria is less crowded, the parking lot lighter than usual or security notices less people coming in to work.
- Combine your observations with news.

# Assessment

- Check vulnerabilities; look at the pandemic scenario.
- Revisit your Business Impact Analysis
  - Maximum tolerable downtime/recovery time objectives
  - Single-points-of-failure
  - Dependence on vendors
- Failure scenarios -For example, what if you lost your entire call center for two weeks?

# Preparedness

- Staff policies regarding flexible work schedules, work-from-home options and stay home if sick.
- Staff cross-training that includes task checklists and good documentation on how to do the job.
- Stockpiling supplies- N-95 masks, nitrile gloves, antiseptic wipes.
- Work from home - do you really have in place what is necessary for people to work from home? Have you tested that theory?

# Vaccination Programs

- Offer annual flu shots at your firm.
- Why?
  - Lessens chance of “routine flu” at your place of work.
  - You already have a mechanism and relationships in place.
  - Chance to educate your employees about the flu, epidemics and pandemics and good health practices such as effective hand washing.

# Emergency Response

- Once an confirmed outbreak occurs - think about your daily business activities completely differently:
  - Dispense with all unnecessary “face time”. Do you need face-to-face meetings or will conference calls or web-casting work? Work cafeterias, on-site gyms and day care should be reconsidered immediately.
  - Hygiene concerns - No shaking hands. Use your own phone when possible. Distribute antiseptic wipes.
  - Develop and enact worker quarantine as necessary. Staff who are ill and have symptoms need to stay home!
  - Have janitorial clean all phones and hard surfaces with approved disinfectant nightly (1 part bleach to 9 parts water).

# Emergency Response

- Reorganize your work and workforce immediately.
  - Can you split up mission critical activities to minimize potential downtime? For example if work is normally done by 20 people split them up into two or three groups to prevent cross contamination. If possible split across different locations too.
- Immediately offer mental health assistance- EAP programs.
- Once a pandemic has been announced, determine how you might treat a person who gets suddenly seriously ill at work. Isolate and mask till transported? Clean their area? Who and how?
- Have a supply of N-95 face masks and nitrile gloves on-site.



# Communications

- This is the essential key to the plan. You cannot communicate too much.
  - 800 employee number
  - Your company intra-net and internet site
  - Email - sharing health information; the company response plan; what you are doing; policies regarding pay, time off, benefits, etc.
  - Daily broadcast voicemails using a notification system (great for keeping people that are home informed). Have the CEO record them.
  - Remember **all** of your stakeholders: employees, vendors, customers, investors, government (DPH, EMS, County EOC)

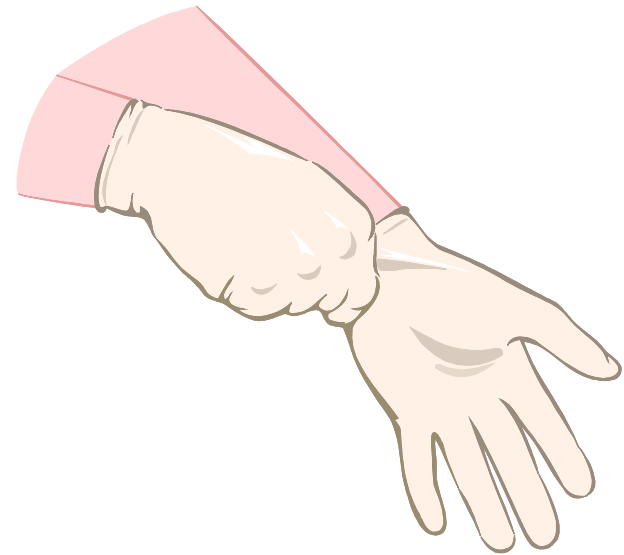


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# Guidelines for Infection Control

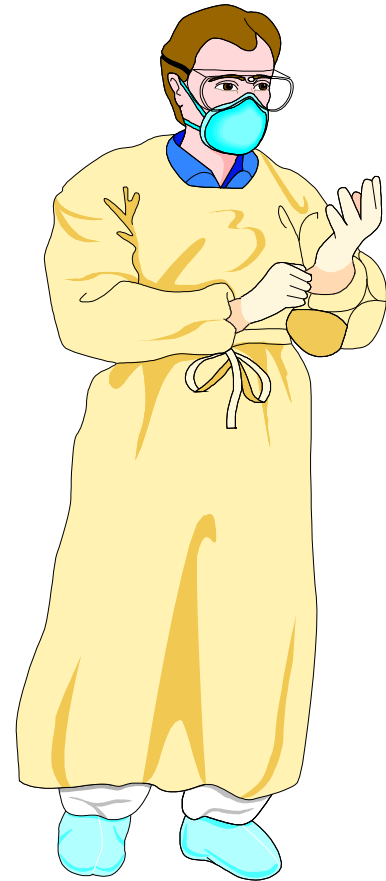
# Infection Control Guidelines

- Follow Universal Precautions: Treat all body fluids as potentially hazardous
- Apply a barrier dressing to all wounds--add more gauze if blood seeps through
- Minimize direct contact with body fluids--use approved gloves, CPR barrier



# Infection control

- Wear appropriate protective clothing (Gloves/Mask/Gown)
- Avoid handling other equipment/objects with contaminated gloves
- Dispose of needles properly
- Wash hands after any exposure



Hand washing is one of the  
single most important means  
of preventing the spread of  
infection

# “How To” Hand Washing

1. Wet hands with **warm water**.
2. Apply a generous amount of **soap** & lather hands well.
3. Rub hands together for **20 seconds**, paying special attention to the areas between fingers & under nails.
4. Rinse hands thoroughly with warm water.
5. Dry hands with a disposable towel
6. Use the disposable towel to turn off the faucet & open the door.



# What is 20 seconds?

- Songs suggested by the CDC or “approved” to sing while washing for 20 seconds include...
  - Twinkle, Twinkle Little Star
  - Happy Birthday

- Twinkle, twinkle, little star,
- How I wonder what you are.
- Up above the world so high,
- Like a diamond in the sky.
- Twinkle, twinkle, little star,
- How I wonder what you are!

# Personal Protection

- Universal precautions - always!
- Clean surfaces with 9 parts water, 1 part bleach.
- When dealing with the public (high risk individuals), if someone has *significant productive* cough - ask them to wear a mask. If they refuse, mask yourself.





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# Your Homework Assignment

# Check These Out!

- ProMED-mail (wonderful list serve!)  
<http://www.promedmail.org>
- Excellent CDC publications on WNV, Hantavirus & Histoplasmosis [www.cdc.gov](http://www.cdc.gov)
- OSHA Technical Manual Section III, Chapter 7 has detailed protocols.
  - [http://www.osha.gov/dts/osta/otm/otm\\_iii/otm\\_iii\\_7.html#2](http://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_7.html#2)

# WHO New Publication

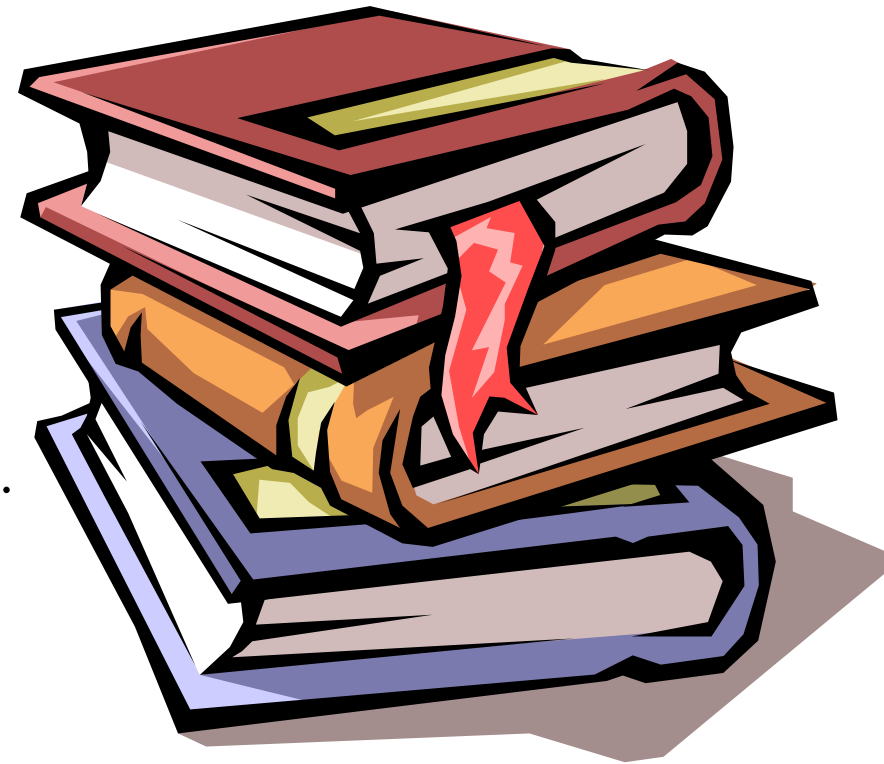
- **WHO checklist for influenza pandemic preparedness planning**

[http://www.who.int/csr/resources/publications/influenza/WHO\\_CDS\\_CSR\\_GIP\\_2005\\_4/en/](http://www.who.int/csr/resources/publications/influenza/WHO_CDS_CSR_GIP_2005_4/en/)

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# Do A Little Reading...

- The Great Influenza: The Epic Story of the Deadliest Plague In History, John Barry 2004
- The Coming Plague, Laurie Garrett
- Influenza 1918- The Worse Epidemic in American History, Lynette Iezzoni
- Epidemic and Peace, Alfred Crosby
- Man And Microbes: Disease and Plagues in History and Modern Times, Arno Karlen
- Viruses, Plagues, and History, Michael B. A. Oldstone
- Flu, Gina Kolata
- Plagues and Peoples, William H. McNeill
- Influenza 1918: The American Experience, Andrea Kalin VHS





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**Thank You!**

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