Avian Influenza: Worker Health and Safety

AIHce Session 242
Respiratory Protection Against SARS, Avian Influenza and Other Infectious Aerosols
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National Institute for Occupational Safety and Health
Avian, Pandemic, and Seasonal Influenza

- Avian (bird) flu is different than pandemic or seasonal influenza.
  - Avian flu: Primarily affect the birds, not usually humans
  - Pandemic flu: Caused by new viruses, usually zoonotic, that have adapted to, and have spread widely among, humans
  - Seasonal flu: “Normal flu” that occurs annually, resulting in substantial morbidity and mortality
Influenza A Viruses

- Naturally infect several animal species
  - Birds
  - Mammals including people

- Virus has expanded host range
  - Black swans
  - Turtledoves
  - Clouded leopards
  - Mice
  - Pigs
  - Domestic cats
  - Captive Bengal tigers
Avian Influenza A Viruses

- **Infect respiratory and gastrointestinal tracts of birds**
  - Can cause morbidity and mortality in domestic poultry
  - Does not always cause disease in wild waterfowl
  - Waterfowl are a natural reservoir

- **Birds infected with avian influenza viruses can shed virus in**
  - Saliva
  - Nasal secretions
  - Feces
Avian Influenza A Viruses

- Can survive at low temperatures and low humidity for days to weeks
- Can survive in water
- Can survive on surfaces
- Disinfection of the environment is needed
Avian Influenza A Viruses

- Subtypes based on surface glycoproteins proteins
  - Hemagglutinin (HA)
    - 16 subtypes
  - Neuraminidase (NA)
    - 9 subtypes
- Example: H5N1, H7N7
Avian Influenza A Viruses

- **Low Pathogenic vs. Highly Pathogenic**
  - Based on specific molecular genetic and pathogenesis criteria
  - Determined based on degree of disease caused in poultry
  - Low path causes few clinical signs in infected birds
  - High path causes severe illness and death in poultry
“Don’t worry about it. It’s probably just a head cold.”
Modes of Transmission

**Seasonal Influenza**

- **Droplet Transmission**
  - Large particle droplets require close contact with source

- **Contact Transmission**
  - Direct contact and physical transfer of virus

- **Airborne Transmission**
  - Airborne droplet nuclei or respirable size particles
Modes of Transmission
Avian Influenza

- Majority through **direct contact** with infected poultry or surfaces infected with feces or respiratory secretions
- Virus may also be aerosolized and land on the mouth, nose, or eyes or be inhaled
Transmission to Humans

- Symptoms in Humans:
  - Fever
  - Cough
  - Sore Throat
  - Conjunctivitis (eye infections)
  - Muscle Aches
  - Pneumonia

- Signs and symptoms may differ by age
Past Outbreaks

- **Hong Kong, 1997**
  - H5N1 virus, highly pathogenic
  - Infections occurred in both poultry and humans
  - 18 human cases / 6 fatalities
  - Exposure to sick poultry and butchering poultry

- **Netherlands, 2003**
  - H7N7 virus, highly pathogenic
  - 89 human cases / 1 fatality
  - Poultry farmers, veterinarians and cullers had the highest attack rates
Past and Current Outbreaks

- **Texas, 2004**
  - Poultry outbreak of highly pathogenic H5N2
  - First outbreak in USA in over 20 years
  - Flock depopulated (approximately 7,000 chickens)
  - No known transmission to humans

- **Southeast Asia, 2003 – 2006**
  - Poultry and human outbreaks of H5N1
  - Circulating strains more pathogenic than early outbreak strains
  - Ongoing cases
Avian Influenza A (H5N1): Why is Concern So High?

Direct Impact on Humans

- Caused severe disease in humans who have become infected
- Limited human-to-human transmission in Southeast Asia
- Could evolve to become readily transmissible in humans
- No human H5N1 vaccine commercially available
- Limited supply of expensive antiviral medicines
# Human Cases of H5N1*

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Cases</th>
<th>Deaths</th>
<th>% Fatality</th>
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<tbody>
<tr>
<td>Azerbaijan</td>
<td>8</td>
<td>5</td>
<td>63%</td>
</tr>
<tr>
<td>Cambodia</td>
<td>6</td>
<td>6</td>
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<tr>
<td>China</td>
<td>18</td>
<td>12</td>
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<tr>
<td>Egypt</td>
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<td>4</td>
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<tr>
<td>Iraq</td>
<td>2</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>Thailand</td>
<td>22</td>
<td>14</td>
<td>64%</td>
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<tr>
<td>Turkey</td>
<td>12</td>
<td>4</td>
<td>33%</td>
</tr>
<tr>
<td>Vietnam</td>
<td>93</td>
<td>42</td>
<td>45%</td>
</tr>
<tr>
<td>Total</td>
<td>205</td>
<td>113</td>
<td>55%</td>
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</table>

*As of April 27, 2006*
Occupations at Risk
Small Scale Poultry Farmers
Larger Scale Poultry Farmers
Bird Cullers
Veterinarians
Bird Handlers at Markets
Food Handlers
Healthcare Workers
Other High Risk Occupations

- Medical Care Support Staff
  - Nurses, Paramedics, Respiratory Therapists
  - Lab workers
  - Transport personnel
  - Medical Waste disposal personnel

- Laboratory Workers involved with Avian flu vaccine production

- Airline Flight Crews
Guidance Documents

- CDC Responder Recommendations: *Interim Guidance for Protection of Persons Involved in US Avian Influenza Outbreak Disease Control and Eradication Activities*
- *Avian Influenza: Protecting Poultry Workers at Risk*
- *DHHS Pandemic Flu Plan*
- *Interim Recommendations for Infection Control in Health-Care Facilities Caring for Patients with Known or Suspected Avian Influenza*** Currently under revision
CDC Responder Recommendations:
Interim Guidance for Protection of Persons Involved in US Avian Influenza Outbreak Disease Control and Eradication Activities

- CDC Web posting on February 17, 2004

- Joint CDC and USDA guidance
  - Individuals involved in activities to control and eradicate avian influenza outbreaks in poultry
  - Activities: euthanasia, carcass disposal, cleaning and disinfection of premises on poultry farms or live bird markets
  - High pathogenic and (possibly) low pathogenic strains
Responder Recommendations

**Basic Infection control**

- Hand washing with soap and water for 15-20 seconds or the use of hand disinfection procedures
- Access to PPE
Responder Recommendations

- **Personal Protective Equipment**
  - Disposable gloves
    - Nitrile
    - Vinyl
    - Heavy duty rubber
  - Protective clothing
    - Disposable outer garments or coveralls
    - Impermeable aprons
  - Disposable protective shoe cover or boots that can be disinfected
Responder Recommendations

- Personal Protective Equipment
  - Safety goggles
    - Nonvented preferred
    - Indirectly vented with antifog coating
  - Respiratory Protection
    - Disposable filtering facepiece respirators (e.g. N-95) at a minimum
    - Full facepiece, hood, helmet, or loose-fitting facepiece respirators will protect eyes from exposure and provide additional protection
Responder Recommendations Minimum Protection Respirators

**Advantages**
- Lightweight
- Low maintenance
- No effect on mobility

**Disadvantages**
- Minimum protection level
- No protection against gases (ammonia)
- No eye protection
- Variability of fit by model
Responder Recommendations More Protective Respirators

Advantages
- more protective
  - NIOSH APF: Hooded: 25, Tight-fitting: 50
  - ANSI APF: 1000 for both
- Cooling
- Eye protection

Disadvantages
- cost
- weight
- battery dependence
- noise
Responder Recommendations

- **Surveillance and Monitoring**
  - Watch for symptoms
  - Seek medical care for illness
  - Stay home until 24 hours after resolution of fever
  - Practice good respiratory and hand hygiene to lower transmission risk to contacts

- **Training and Education**
Responder Recommendations

- **Vaccination with current season’s influenza vaccine**
- **Administration of antiviral drugs for prophylaxis**
  - Daily for the duration of the time responders have direct contact with infected poultry or contaminated surfaces
  - Oseltamavir (Tamiflu)
Avian Influenza
Protecting Poultry Workers at Risk

- Joint NIOSH and OSHA collaboration
- Intended audience: Poultry workers who could be at risk of prolonged exposure to infected poultry or avian influenza virus
- Posted on OSHA website
- Provides table listing advantages and disadvantages of various respirators
CDC Guidance for Protecting Healthcare Workers Caring for AI Patients **

- **Standard Precautions**
  - Hand hygiene
- **Droplet Precautions**
  - Gloves and gown
- **Eye Protection**
  - Goggles or faceshield within 3 feet of patient
- **Airborne Precautions**
  - Isolation Rooms
  - Respiratory protection

**Under revision**
CDC Guidance for Protecting Healthcare Workers Caring for AI Patients **

- Vaccination with seasonal influenza vaccine

- Surveillance and Monitoring
  - Recognize signs and symptoms
  - Return to work 24 hours after resolution of symptoms

** under revision
DHHS requested IOM to conduct a 90-day assessment of:

- What measures can be taken that would permit the reuse of disposable N95 respirators in healthcare settings and
- What is known about the need for, and development of, reusable face masks for healthcare providers and the general public
IOM Committee Findings

- No simple modifications to permit N95 reuse without increasing likelihood of infection
- No method for decontaminating an N95
- No modification that would obviate the need for fit testing
- Reusable, elastomeric respirators are an alternative form of respiratory protection
IOM Committee Recommendations

- **If Reuse by Same Person is Necessary**
  - Avoid Contamination
    - Protect from external surface contamination by shielding with mask or faceshield
    - Use and store properly
    - Practice hand-hygiene before and after removal

- **Determine Routes of Transmission and Risk of Disease**

- **Research Opportunities**
**IOM Committee Recommendations (continued)**

- **Short-Term Research Opportunities**
  - Assess decontamination techniques for filtering facepieces
  - Examine various forms of respiratory protection and their effectiveness under simulated conditions
  - Determine risks associated with handling respirators used against a viral threat
IOM Committee Recommendations (continued)

- Long-Term Research Opportunities
  - Evaluate alternative respirator material use
  - Investigate engineering design of cloth masks
  - Consider improving electrostatic charge retention of filters
  - Conduct research on issues related to public education and compliance with guidelines
NIOSH Efforts

- AI Work Group (CDC, USDA, OSHA, FDA) developing worker protection recommendations
- Developed AI topic page on NIOSH website
- Developing NIOSH Alert on AI
- NIOSH researchers presenting at several poultry industry conferences and meetings
For Additional Information

- **NIOSH**
  - 1-800-35-NIOSH (1-800-356-4674)
  - Outside the U.S. 513-533-8328
  - [http://www.cdc.gov/niosh/homepage.html](http://www.cdc.gov/niosh/homepage.html)
  - [http://www.cdc.gov/niosh/topics/avianflu](http://www.cdc.gov/niosh/topics/avianflu)

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