Be Aware!
An Influenza Update

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Influenza A and B are ribonucleic acid (RNA) *Orthomyxoviridae* viruses causing most human disease. Influenza A strains are identifiable by hemagglutinin (H) and neuraminidase (N) proteins and have the capacity to undergo genetic reassortment with major changes in the H or N protein, referred to as antigenic shift. Antigenic drift, due to minor antigenic changes in protein molecules, occurs in both influenza A and B strains. A population's pre-existing antibody levels determine the size of community disease burden in any year.

Theresa's case

Theresa, 86, lives in a nursing home which provides an annual influenza vaccine to all its residents and staff.

Theresa's 23-year-old grandson, Scott, has just returned from Southeast Asia and wants to visit Theresa for her upcoming birthday. Scott's parents are concerned that his cough and runny nose may be avian infuenza, which could then be transmitted to Theresa.

For a follow up to this case, look to page 85.

Hosts

The natural hosts of influenza A viruses are birds with some strains that are able to replicate in:

- pigs,
- ducks,
- horses and
- humans.

Pandemics

Pandemics occur when human and animal strains recombine with a substitution of the H or N protein components to produce a novel virus to which there is little or no immune cross recognition with many susceptible human hosts.

In temperate climates, annual winter outbreaks occur. The virus is usually spread by respiratory droplets and/or hands that are contaminated by respiratory secretions.

Characteristic of influenza A

Usually a self-limited respiratory illness occurs, manifested by:

- a dry non-productive cough,
- high fever,
- headache,
- myalgia,
- malaise and
- prostration.

Potentially life-threatening complications can also occur, usually at the extremes of age. Complications include:

- croup,
- primary viral pneumonia,
- secondary bacterial pneumonia,

- exacerbations of chronic obstructive pulmonary disease and congestive heart failure,
- myositis,
- myocarditis,
- encephalitis and
- Reye's syndrome.

Diagnosis

The diagnosis of influenza can be confirmed by:

- viral culture,
- serology, or
- direct fluorescent antibody testing of nasopharyngeal swabs.

Why the panic?

The pandemic Spanish influenza (H1N1) of 1918 was associated with an exceedingly high fatality rate in previously healthy young adults and demonstrated the potential severity of a common respiratory illness. Millions more died with the Asian Flu (H2N2) of 1957 and the Hong Kong Flu (H3N2) of 1968.

In 1997, 18 cases of influenza, due to a new influenza A (H5N1) strain, were reported in Hong Kong with an associated mortality rate of 33%.[1] The disease coincided with an avian epidemic and most human cases had close contact with infected poultry. Millions of domestic poultry were subsequently destroyed. This H5N1 avian strain of influenza A was isolated from a pig in 2003 and, in 2004, 45 young people in Thailand and Vietnam were diagnosed with "bird flu." Mortality rates were again very high (up to approximately 70%) and cases were usually linked to bird contact.[2,3]

Theresa's case cont'd...

Though all residents and staff received an annual influenza vaccine, Theresa's nursing home was affected by seasonal endemic influenza.

Treatment

Oseltamivir was used both for the treatment and prophylaxis by patients and staff for one week after the last reported case.

For an update on Scott, go to page 86.

Who and what is affected by avian (H5N1) influenza?

Clinical experience suggests that young, previously healthy individuals can be affected. Lower respiratory tract involvement is frequent, non-pulmonary symptoms involving the GI tract or central nervous system may predominate. Incubation periods are longer with more prolonged viral replication.[2,4]

As of July 2006, the World Health Organization (WHO) confirmed human avian influenza A (H5N1) in 232 individuals, of whom 134 have since died. The majority of cases occurred in:

- Vietnam,
- Indonesia,
- Thailand,
- China,
- Egypt and
- Turkey.

No cases were reported from Europe or North America.[5]

Update on Scott

A direct fluorescent antibody test revealed that Scott's cough and runny nose were due to an upper respiratory infection (parainfluenza).

With fluids and bed rest, Scott made an uneventful recovery and shared a birthday cake with his grandmother.

Pandemic requirements

The following are necessary for influenza to evolve into pandemic proportions:

1. A novel pathogen and a susceptible population with no pre-existing immunity to the major H or N proteins. In the case of avian (H5N1) influenza, H5 strains have not previously circulated in humans
2. High pathogenic potential. Mortality rates must range between 30% and 70%. This is the case for H5N1 influenza
3. Efficient human-to-human transmission. Although possible human-to-human transmission of H5N1 avian influenza was reported in 2005,[3] there is no clear evidence of such sustained/significant transmission. However, gene mutation or reassortment could transform the existing H5N1 virus into one that is more easily transmissible

Prevention strategies

The following outlines some preventive strategies for influenza A, including avian (H5N1):

- Avoidance of exposure/infection control:
  - Covering mouth when coughing or sneezing; using tissues or masks
  - Handwashing
  - Staying home when unwell
  - In institutions, isolating symptomatic individuals
- Vaccines:
  - When well-matched to the circulating strain, a vaccine can prevent illness in 70% to 90% of healthy adults, reducing illness, hospitalization and deaths[5]
  - Be aware that presently there is no "effective" H5N1 vaccine
  - Long manufacturing times create long time lines in seasonal vaccine availability
  - Limited manufacturers and global capacity for vaccine development
- Antivirals:
  - Amantadine is useful only for influenza A. Side-effects and renal excretion complicate its use. Recent reports show that > 90% of the strains circulating in the 2005 flu season were resistant.[7] H5N1 is resistant to amantadine in cell culture
  - Oseltamivir and zanamivir are neuraminidase inhibitors (NIs) which confer protection against endemic influenza A and B[8,9]

Treatment with NIs

Endemic influenza

For clinical benefit in endemic inlfuenza, NIs should be initiated within 48 hours of symptom onset.

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Overall, NIs reduce:

- the duration of illness, on average, by one day,
- antibiotic utilization by 5% and
- hospitalizations for complications by 1%.[8]

Avian H5N1 influenza

Data from animal and limited human studies suggest that the early use of NIs, within hours after illness onset, may be beneficial.

Eighteen per cent of children treated for endemic influenza with oseltamivir developed resistance to the agent within four days.[10] Oseltamivir resistance has been demonstrated in two patients out of eight patients with the H5N1 infection.[11] Zanamivir sensitivity appears to remain in oseltamivir-resistant H5N1 strains.[7] Dx

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