

## Case Study: Isolation and Quarantine: Avian Influenza

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### Learning Objectives

1. Understand the emergency public health powers available for mandatory isolation and quarantine
2. Understand the emergency public health powers available for mandatory vaccination & treatment
3. Understand the role of public health attorneys and law enforcement during public health outbreaks of infectious disease and emergencies and the relationship between public health attorneys, law enforcement, and public health

### Background

Outbreaks of avian influenza, scientifically known as the “H5N1” strain of influenza, have been carefully monitored in Asia since the late 1990’s, when a person first acquired this deadly form of influenza. To date, most human cases of avian influenza have contracted the illness through direct contact with poultry or contaminated surfaces – the risk of person-to-person transmission is extremely low. Officials worry, however, that the H5N1 strain could mutate into a form of influenza that is not only deadly, but also easily transmitted from person to person, sparking a worldwide pandemic.

Since 1997, Asian countries such as China, Thailand, Cambodia, and Vietnam, have struggled to contain avian influenza among their poultry, even killing millions of birds to prevent spread of the flu to other farms or to other countries. Complicating the situation is the ease with which migratory birds and waterfowl become infected with this strain of influenza, creating the potential for spread of the disease along migratory paths. Outbreaks continued to be sustained in 2003 and 2004. During the summer of 2005, poultry on farms in Russia and Kazakhstan were determined to have been infected with avian influenza by sharing a water source with wild waterfowl. In the United States, Avian flu was added to the list of federally quarantinable diseases in April 2005

### Facts Part I: Day 0

You are the State Director of Health. Within the last two weeks, farmers in Eastern Europe have reported massive poultry die-offs, and tests are currently underway to determine whether H5N1 is the cause. Your health department receives a call from their State Department of Agriculture contact. There has been a sudden die-off of poultry at the state’s largest organic poultry farm.

The Department of Agriculture is worried that it may be avian influenza. Investigations to determine the infectious agent are ongoing, and the environmental health department needs to explore any possible link to avian influenza elsewhere.

Hours later, it is determined that two students at one high school and three college students at the university have become ill with a severe flu-like illness with onset in the last 3 days. Two students may not survive.

### Part I Questions

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1. What control measures would you take at this point?
2. What is the difference between isolation and quarantine?
3. Would you communicate with Law Enforcement or your health department attorney at this point?
4. What would you recommend be done with the poultry at the organic farm, if anything? If you decide on taking action at the farm, do you have the authority to take these measures?

### Facts Part II: Day 1

Environmental investigations so far have determined that influenza is not yet widespread among poultry or wild birds in the state. Infection among poultry seems limited to poultry at the organic farm and local waterfowl inhabiting the farm. It is unclear how the chickens at this farm became infected.

Rapid tests on the ill students reveal that all are infected with Influenza A, the same general type as avian influenza. Cultures to determine the exact strain will take at least 2 weeks. One of the ill college students has died. Active surveillance among the schools the ill students attend reveals 15 more cases of severe flu-like illness: 9 among high schoolers and 6 among college students. These students are put into isolation at the county hospital. In addition, the farmer is beginning to experience symptoms.

### Part II Questions

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5. Who is now considered exposed to the virus?
6. Would you impose isolation/quarantine at this point? If yes, answer the following questions. If no, continue to question 7.
  - Who would you isolate, and for how long?

- Who would you quarantine, and how long would you keep individuals in quarantine?
  - Where and how would isolation and quarantine take place?
  - What measures could be taken to quarantine individuals by the “least restrictive means necessary”?
  - What logistical and practical needs must be considered for quarantined individuals?
  - Which personnel would enforce the quarantine?
7. What other agencies will you collaborate with in the investigation?
  8. Would you declare a Public Health Emergency?
  9. What are the roles of public health and law enforcement at this stage of the investigation?
  10. Under what circumstances might the respective roles of public health and law enforcement change?

### Facts Part III: Day 2

There is still no indication of how chickens at the organic poultry farm became infected with the virus. Criminal activity is one potential way, but there is no evidence to support (or refute) this suspicion.

A complete interview is conducted with the isolated patients (or an appropriate proxy) to investigate any relationship between the students and the poultry farm, and to determine if there are any commonalities between students. Two of the ill college students were conducting a research project on the implementation of organic farming methods. Five days earlier, the students met with the organic farmer, who was to collaborate with them in their research by providing farming facilities and chickens. During this visit, the students and farmer had spent the entire day touring the farm and working on the implementation of several experimental farming techniques.

One of the high school students and one of the ill college students were siblings. Dozens of new cases are being reported from doctors' offices and hospitals, the case-fatality rate is about 40%, and the public is expressing its concern. The possibilities of drug prophylaxis and of using an H5N1 vaccine that is still in human trials have been raised.

### Part III Questions

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11. Are there any additional control measures you would take? (If you now decide to impose isolation or quarantine, please answer the following questions now).
- Who would you isolate, and for how long?
  - Who would you quarantine, and how long would you keep individuals in quarantine?
  - Where and how would isolation and quarantine take place?
  - What measures could be taken to quarantine individuals by the “least restrictive means necessary”?
  - What logistical and practical needs must be considered for quarantined individuals?
  - Which personnel would enforce the quarantine?
12. Would you restrict travel for any individuals or populations, or move to ban poultry exports from your state?
13. Would you begin any individuals on drug or vaccine prophylaxis? If so, for whom?
14. If you have not already, would you declare a public health emergency?

### Facts Part IV: Day 4

Records from the organic farm and interviews with the farmer and hired help have revealed no unexpected visitors or deliveries to the farm in the last 14 days. Chicks delivered to the farm were hatched in facilities where there is currently no evidence of avian influenza among the poultry. However, during operations to destroy infected chickens, about a dozen ill and dead chickens are discovered that are of a breed that the farm does not use. The farm property is bordered on 3 sides by country roads, and security measures are considered inadequate to assure that no trespassing has occurred.

Poultry from farms in Eastern Europe have been definitively diagnosed with H5N1. Active surveillance among humans has found a handful of cases, with no apparent person-to-person transmission.

The CDC has recommended that the virus in question be presumed to be H5N1, until proven otherwise.

## Part IV Questions

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15. Based on the new information and CDC recommendation, what changes in the control measures to you take?
16. Who will lead the investigation at this point?
17. Should the farmer bear the cost of destroying the poultry, or be reimbursed? If reimbursed, by whom?
18. Will you solicit help from other States or jurisdictions?
19. If exposed individuals who are not ill refuse cooperate, how will you enforce the quarantine?

## Epilogue

Further investigation revealed that a European organic farmer the University students had been in contact with sent them a sample of live chickens he farms with; these chicks had apparently been harboring avian flu, despite their 30-day quarantine upon importation to the United States. Upon arrival at the farm, the students had given the chicks to a farm worker, who was in a hurry to leave and did not document their arrival. The students had apparently neglected to mention the new chicks to the farmer himself. The farmhand later realized he did not follow procedure, and was reluctant to admit it until it was obvious the new chicks had caused a problem.

Health officials postulate that the virus infecting the European chicks had combined with a different flu strain present in the American chicks, allowing the virus to be transmitted from person to person. Once the virus gained this ability, the results could have been catastrophic, with experts predicting between 2 and 50 million deaths if the virus spreads unchecked.

Because of the quarantine and isolation procedures undertaken in coordination with the CDC, law enforcement, public health attorneys, and the school district, transmission of the virus decreased. A mass vaccination campaign was initiated in the school district and the University catchment area according to the state's pandemic preparedness plan. Breakthrough cases occurred in neighboring jurisdictions but were quickly detected, with isolation and quarantine procedures strictly enforced. Because of the bold actions of the State Health Officer, this deadly flu outbreak did not become a global pandemic.

## References and Resources

Centers for Disease Control and Prevention, *Avian Flu Homepage* (provides background information about avian influenza, including recent outbreaks, the viruses, and the risk to human health) <http://www.cdc.gov/flu/avian/index.htm>

World Health Organization, *Communicable Disease Surveillance and Response Report: Avian Flu* [http://www.who.int/csr/disease/avian\\_influenza/en/](http://www.who.int/csr/disease/avian_influenza/en/)

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