

LESSON: On Hens and Needles

Summary: Students read a brief news article about vaccinating poultry as a measure to prevent a pandemic of avian flu, then construct a PMI (plus/minus/implications) table based on the information presented in the article.

EHP Article: "On Hens and Needles," *EHP Student Edition*, September 2005, p. A370
<http://ehp.niehs.nih.gov/docs/2005/113-6/forum.html>

Objectives: By the end of this lesson students should be able to:

1. assess the major factors influencing international public health officials' decision about how to address the health threat of H5N1 avian flu; and
2. construct a PMI table comparing the pluses, minuses, and implications of different control options for preventing the spread of H5N1 avian flu.

Class Time: 45–60 minutes

Grade Level: 9–12

Subjects Addressed: Environmental Health, Biology, Health, Epidemiology, International Studies

►Prepping the Lesson (15 minutes)

INSTRUCTIONS:

1. Obtain a class set of *EHP Student Edition*, September 2005, or download the article at <http://ehp.niehs.nih.gov/docs/2005/113-6/forum.html>.
2. Make copies of the Student Instructions.

MATERIALS (per student):

- 1 copy of *EHP Student Edition*, September 2005, or 1 copy of the article "On Hens and Needles"
- 1 copy of the Student Instructions

VOCABULARY:

- avian
- PMI (plus/minus/implications) table
- influenza
- pandemic
- quarantine
- surveillance
- vaccination
- virulent

BACKGROUND INFORMATION:

Every year millions of Americans are vaccinated against influenza to protect them against serious illness. Even with this highly successful vaccination program in place, approximately 700 Americans die annually from influenza, mostly elderly adults and young children. Before this highly ambitious international vaccination program was implemented, influenza would occasionally kill huge numbers of people across several continents in what is called a "pandemic." This is different from an epidemic in that an epidemic has a central focus whether in time, place, or both. A pandemic is a widespread and ongoing increase in the normally recorded rate of a given disease. The best-documented influenza pandemic was the one that occurred in 1917–1918 in which approximately 50 million people died, including 500,000 Americans.

In the modern world of rapid travel and mass immigration, epidemiologists have very serious concerns about a reappearance of the influenza pandemic. Global health officials do not talk about if a new influenza pandemic will occur, but when. The H5N1



avian flu is currently the strain that most concerns global health officials. In the past, influenza pandemics have come from strains of influenza that affected animals, then leapt to humans and then through mutation, acquired the ability to spread easily from person to person, the way a cold (“rhinovirus”) does. The H5N1 virus is rapidly fatal for poultry since commercially raised birds live in close contact with each other. Farmers have reported birds dying within 48 hours of first showing symptoms. At least 54 people in Asia who have had contact with sick poultry have died from the avian flu so far.

Given this sense of urgency, public health officials must make decisions about how to monitor the human and animal populations in Southeast Asia and China for the emergence of this and other virulent strains of influenza, while still allowing for normal commerce and travel. Officials must also walk a fine line when requesting that governments take action to control infectious agents, especially when these actions can potentially cost jobs and negatively impact relations between neighboring countries.

The case of H5N1 avian flu illustrates the interrelated nature of an infectious agent (the virus), its host (birds) and the environmental factors that can amplify its effects. It has been hypothesized that growth of commercial animal husbandry, global trade, and world travel, combined with the loss of traditional wildlife habitat, has created opportunities for the development of pandemics that never before existed.

RESOURCES:

Centers for Disease Control and Prevention, Avian Flu, <http://www.cdc.gov/flu/avian/>

World Health Organization, Avian Influenza, http://www.who.int/csr/disease/avian_influenza/en/

▶ Implementing the Lesson

INSTRUCTIONS

1. Have the students read the article “On Hens and Needles.”
2. Hand out the Student Instructions and instruct students to fill out the PMI Table based on what they read in the article.

NOTES & HELPFUL HINTS:

- There are alternative strategies for reaching decisions. You may want to have students investigate the different decision making approaches. For example, there are several good software programs available for brainstorming and “idea-mapping” using computer-generated diagrams with shapes, arrows, and clip art symbols. One of these is called “Inspiration” and a free 30-day trial is available at <http://www.inspiration.com>.
- Another way of doing this quick exercise is to have students write the questions on paper and tape them up so they can be moved and arranged easily.
- Students may note that answering some questions requires more scientific research. Public health officials are often required to make decisions without having a complete scientific grasp of the situation. This is an inherent difficulty in applying science to public policy, and one worthy of more detailed discussion.

▶ Aligning with Standards

SKILLS USED OR DEVELOPED:

- Communication (note taking, oral, written—including summarization)
- Comprehension (listening, reading)
- Critical thinking and response
- Tables (creating)

SPECIFIC CONTENT ADDRESSED:

- Epidemics/pandemics
- Influenza
- Plus/minus/implications tables
- Public policy decisions

NATIONAL SCIENCE EDUCATION STANDARDS MET:**Unifying Concepts and Processes Standard**

- Evidence, models, and explanation
- Form and function



Science As Inquiry Standard

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

Life Science Standard

- The cell
- Molecular basis of heredity
- Biological evolution
- Interdependence of organisms
- Matter, energy, and organization in living systems
- Behavior of organisms

Science in Personal and Social Perspectives Standard

- Personal and community health
- Population growth
- Natural resources
- Environmental quality
- Natural and human-induced hazards
- Science and technology in local, national, and global challenges

Health Problem	A deadly H5N1 avian influenza virus has infected birds in numerous countries and could spread to humans, resulting in a worldwide human pandemic.		
Control Options	Do not vaccinate.	Vaccinate.	Vaccinate in conjunction with other strategies like surveillance, quarantines, escape-proof poultry coops, disinfection of poultry equipment and handlers.
Pluses	1) Sick birds die and no longer pose the threat of spreading the virus.	1) The spread of the virus is decreased by reducing the bird's chances of infection and minimizing the amount of virus shed through nasal secretions and feces.	1) The spread of the virus is reduced even more than with vaccination alone.
Minuses	1) Some farmers may use black-market vaccines, perhaps spurring the evolution of even more dangerous strains. 2) The potential remains for people and large quantities of poultry to die.	1) Sick birds are not easily identified and can still spread the virus. 2) Farmers may not be able to sell their chickens outside of their own country.	1) Sick birds are not easily identified and can still spread the virus. 2) Farmers may not be able to sell their chickens outside of their own country. 3) Additional strategies are not practical because of low budgets, weak infrastructures, and geographically dispersed bird populations.
Implications	Problem could get worse, especially since some countries are reluctant to report the problem.	May not be a complete cure for the problem because the virus is so widespread.	Would be the most effective approach to the problem if barriers to implementing the additional strategies could be overcome.



▶ Assessing the Lesson

PMI Table

Step 3: What other information would you like to have to help you make a decision about which option you would choose?

Answers may vary but could include the impact on farmers if they could not sell their birds to other countries, as well as the costs, resource needs, and effectiveness of some of the additional strategies for controlling the spread of the virus.

Step 4: Which option would you recommend? Explain why.

Answers need to be logical, clearly written, and grammatically correct, and must provide sufficient justification to support their reasoning.

▶ Authors and Reviewers

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STUDENT INSTRUCTIONS: On Hens and Needles

Step 1: Read the article "On Hens and Needles," *EHP Student Edition*, September 2005, p. A370.

Step 2: Complete the plus/minus/implications (PMI) table below.

- a) State the health problem of concern in the article.
- b) List the primary control options suggested in the article for addressing the health problem.
- c) Identify at least one plus and one minus for each control option.
- d) Identify the implications (i.e., possible outcomes) for each control option.

PMI Table

Health Problem			
Control Options			
Pluses			
Minuses			
Implications			

Step 3: What other information would you like to have to help you make a decision about which option you would choose?

Step 4: Which option would you recommend? Explain why.

