Case Teaching Notes

for

"A Case Study Involving Influenza and the Influenza Vaccine"

by

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Introduction / Background

This case study was designed for entry level microbiology for nursing students or for a first year biology course for biology majors for use during a discussion of either viruses or immunity. The case presents a dialogue between two coworkers at a grocery store. Mary, a nursing student, tries to convince her older coworker, Karen, about the benefits of the influenza vaccine. Karen presents several common rationalizations for not getting the vaccine. Students work in small groups to evaluate the arguments that each person contributes to this discussion. Students need to evaluate the general biology of viral infections, treatment of infections, and immunity as they address the case study questions.

Students and the public in general, are reasonably accepting of the idea of vaccination for diseases like measles, mumps, rubella, and for rabies in pets. However, there is a striking reluctance to get an influenza vaccination, usually due to misunderstandings about the nature of the disease influenza. Many people use the phrase "cold and flu" as though the common cold and flu are interchangeable. This issue is further confused by the phrase "stomach flu," which can refer to any syndrome of gastroenteritis.

By clearly identifying the infectious disease of influenza, students will appreciate the role of the "flu shot" and the effect of the influenza virus in society.

Objectives

Upon completion of this case study, students should be able:

- To identify the symptoms associated with influenza.
- To distinguish influenza from other infectious diseases and to recognize that the influenza vaccine does not protect against all illnesses that might be commonly identified as "flu."
- To recognize that the flu vaccine is not recommended for all people while others are considered "high risk" individuals.
- To recognize that antibiotics are for bacterial, not viral infections—and that secondary bacterial infections (which can be treated with antibiotics) sometimes follow a primary viral infection.
- (For nursing students) To address the misinformation that they will encounter among people who choose not to get vaccinated for influenza.

Classroom Management

This interrupted case study can be completed in about a 50-minute class period, but the preparation and discussion may cause the exercise to last longer. The following outline gives suggested time frames.

- Allow 15 minutes for Part I: 5 minutes to read, 5 minutes to work in small groups and develop answers to the questions, and 5 minutes for discussion of the answers.
- Allow 15 minutes for Part II (read, develop answers, discuss).
- Allow 15 minutes for Parts III and IV (read, develop answers, discuss).

The instructor will need to describe the mechanism of antigenic drift and antigenic shift as it relates to the constantly changing influenza virus genome. The CDC offers information regarding the recombination events that cause genetic shift and lead to pandemic influenza (see "How Influenza Viruses Change: Drift and Shift," http://www.cdc.gov/flu/avian/gen-info/flu-viruses.htm).

Also, this case study provides no specific information with regard to which people should get the influenza vaccine. I ask the students to find the CDC site on their own in order to address the questions in "Part IV—Who Should Get Vaccinated?" during the following class period. In addition to discussing the question, I ask students to identify the "most interesting" subject that they read on the web site. This question often leads to a very broad discussion and very random questions about diseases.

Blocks of Analysis

The mechanism of immune stimulation via vaccination is well described in any college level biology book and microbiology book. The anamnestic response allows individuals to receive a dose of antigen that will stimulate the immune system to remember the antigen when it is introduced at a later date. This response will prevent the development of infection.

Additional major issues include:

- The distinction between influenza and other infectious diseases.
- The importance of the influenza vaccine—the subject of the immune system and the mechanisms behind vaccine-induced immunity should be part of an entire class period. However, that subject may be discussed either before or after this case study.
- Vaccines help prevent specific infections, antibiotics help treat bacterial infections.

In addition, this case study can be coupled with an introduction to antigenic shift in order to provide a foundation for the continued discussion of the emerging avian influenza and the threat of a devastating pandemic.

Answer Key

Answers to the questions posed in the case study are provided in a separate answer key to the case. Those answers are password-protected. To access the answers for this case, go to the key. You will be prompted for a username and password. If you have not yet registered with us, you can see whether you are eligible for an account by reviewing our password policy and then apply online or write to answerkey@sciencecases.org.

References

Microbiology Text

Tortora, G. J., B.R. Funke, and C.E. Case. 2006. *Microbiology: An Introduction, 9th edition.* Benjamin/ Cummings Publishing Company, Inc.

Internet

(The first three sites provide information about commonly acquired infectious illnesses.)

Flu (Influenza)
http://www3.niaid.nih.gov/healthscience/healthtopics/Flu/default.htm
This site provides a good analysis of the symptoms, causes, treatments and preventatives for infectious illnesses that are commonly acquired.

Is It a Cold or the Flu? From the NIAID
http://www.niaid.nih.gov/Publications/cold/sick.pdf

Norovirus Q&A
http://www.cdc.gov/ncidod/dvrd/revb/gastro/norovirus-qa.htm

What You Should Know About the Flu (CDC website)
http://www.cdc.gov/flu
This is an excellent site with too many links to describe for this single case study. It can provide students with a tremendous source of introductory information and links to peer reviewed publications.

Influenza Viruses. How Influenza Viruses Change: Drift and Shift
http://www.cdc.gov/flu/avian/gen-info/flu-viruses.htm

Vaccine Recommendations
Smith, N.M., J.S. Bresee, D.K. Shay, T.M. Uyeki, N.J. Cox, and R.A. Strikas. 2006. Prevention and control of influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recommendations and Reports* July 28, 2006 / 55(RR10):1–42.
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5510a1.htm

Flu Activity—Reports and Surveillance Methods in the United States
http://www.cdc.gov/flu/weekly/fluactivity.htm
This site is updated weekly and will help instructors and students alike find the most up to date studies regarding influenza surveillance.

Morbidity and Mortality Weekly Report (MMWR)
http://www.cdc.gov/mmwr/
A free, online resource linked to the CDC website. Go to the MMWR site, and use the local search engine to find "influenza."

Questions and Answers—Influenza (Flu) Antiviral Drugs
http://www.cdc.gov/flu/about/qa/antiviral.htm
This site is designed for clinical determination of proper dosage of antiviral drugs in the treatment of influenza, but it is particularly helpful in describing the fundamental properties of the antiviral drugs Tamiflu® (oseltamivir) and Relenza® (zanamivir).

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