CASE TEACHING NOTES
for
"To Vaccinate, or Not to Vaccinate: That is the Question"

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INTRODUCTION / BACKGROUND

The issues surrounding the necessity and consequences of vaccination have been the subject of articles in the popular press (e.g., *Newsweek*) as well as television news reports on programs such as "60 Minutes." This particular case study was prompted by an article in the *Buffalo News* about a couple who did not want to have their son vaccinated so that he would be allowed to attend public school. They stated that their refusal to vaccinate their son was for religious reasons although there was some doubt about the validity of the claim.

This particular case study is suitable for both non-majors and allied health biology courses. Depending on the course, the type of assignment and the depth of coverage of the particular diseases and vaccines would vary.

Objectives

- To understand the difference between infection and disease.
- To understand the consequences of the (vaccine-preventable) microbial diseases.
- To understand the purposes of different vaccines (e.g., lowering the risk of serious disease versus prevention of infection).
- To understand that vaccines differ in their efficacy.
- To understand the side-effects of vaccines.
- To understand how infections are transmitted as well as the risks associated with infection transmission from and to unvaccinated individuals.
- To gain an understanding of the notion of risk vs. benefit in decision making about being vaccinated (in general and for particular vaccines).
- To become acquainted with the various sources of information available about vaccine efficacy, side-effects, etc.

CLASSROOM MANAGEMENT

CLASS 1

At the beginning of the class period (15-20 minutes):

- Hand out the case study and have the students read it.
- If time permits, have the students generate the list of general questions/issues rather than providing the list.
- Give a "mini-lecture" explaining the different types of microorganisms. (For this assignment one could concentrate on distinguishing between viruses and bacteria.) The distinction between infection and disease and also between virulent and attenuated organisms should be made.

In order to address the general questions posed by the case study, assign each student a microorganism and its vaccine to research. The specific questions to be answered for each vaccine and microbe are:

1. (a) Describe the typical symptoms of the disease(s) caused by the agent.
   (b) What are the serious sequelae (complications) caused by the agent and how common are they?
   (c) Is serious disease primarily a problem only in certain individuals? Explain.

2. (a) What kind of vaccine preparation is used (live attenuated; killed or inactivated; toxoid)?
   (b) Are there different kinds of vaccine preparations available?
   (c) How long has the current vaccine been available?

3. (a) What side-effects are associated with the vaccine and what is the reported frequency for these side-effects?
   (b) What is the reported efficacy of the vaccine?
   - What proportion of vaccinated persons are protected from infection (or disease)?
   - What proportion of vaccinated persons are protected from serious disease?

   (c) What is the duration of immunity? Are booster shots necessary?
   (d) How does the latest number of reported cases compare with the number before the vaccine was available?

4. (a) Does the vaccine prevent infection?
   (b) Does the vaccine prevent the usual symptoms of disease or primarily the more serious complications of infection?

Microbe/Vaccine Assignments:

1. Measles virus
2. Rubella virus
3. Bordetalla pertussis
4. *Haemophilus influenzae* type B
5. Polio virus, oral vaccine
6. Polio virus, inactivated vaccine
7. Varicella zoster virus

CLASS 2—1 TO 2 WEEKS LATER

Each student turns in a copy of the answers to the questions for their specific microbe/vaccine. (They should keep a copy of their answers to compare with other students.)

Allow the students with the same assignment approximately 15 minutes to compare answers and fill in any gaps in their information. Have each group designate a spokesperson to provide information to the class during the discussion.

The instructor lists the assignment questions on the board and leads a class discussion on each of the question topics. Students volunteer information from their specific research, which is then summarized on the board.

Topics (Questions) for Discussion:

1. Consequences of natural infection
2. Types of vaccines
3. (a) Vaccine advantages
   (b) Vaccine disadvantages
4. Purpose of vaccine
5. Other issues

ALTERNATIVE FORMAT FOR ALLIED HEALTH STUDENTS

Have each student (group) give an oral presentation on their microbe/vaccine during the appropriate class period when a particular microbial agent (e.g., measles virus) or type of infections (e.g., skin rashes) is being considered.

ADDITIONAL ASSIGNMENTS (OPTIONAL)

1. For my writing intensive course I had each student write an essay on "The Safety, Efficacy, and Necessity of Vaccinations." They were told to use primarily material from their own research but also the information from the class discussion to substantiate their opinions. Having the students who researched the same organism provide a summary of the key information would be a helpful supplement to the class discussion.

2. Have each group prepare a brochure for the public which addresses the key issues surrounding the use of the vaccine they were assigned. This would also be appropriate for the health science students since they would need to address their patients' concerns relating to vaccines.

3. Have each group prepare a website with appropriate links for the microbe/vaccine they have been assigned.

BLOCKS OF ANALYSIS

Detailed case analysis is provided in a separate file that is password-protected. To access this information, go to the **detailed case analysis**. 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**.

SOURCES OF INFORMATION

- Textbook (any general text with an allied health perspective is appropriate; suggest students researching the same vaccine use different texts).

- Centers for Disease Control (CDC). *Epidemiology and Prevention of Vaccine-Preventable Diseases*, 6th ed. The Pink Book. **http://www.cdc.gov/nip/publications/pink/**.

- CDC. Impact of Vaccines Universally Recommended for Children-United States, 1990-1998. *MMWR* 1999; 48:243-248. **http://www.cdc.gov/mmwr/PDF/wk/mm4812.pdf**.

- CDC. Update: Vaccine Side Effects, Adverse Reactions, Contraindications, and Precautions Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 1996; 45(RR-12):1-35. **http://www.cdc.gov/mmwr/preview/mmwrhtml/00046738.htm**. (Also check later issues of *Recommendations and Reports* for further updates on individual vaccines.)

- CDC. Summary of Notifiable Diseases, United States 1999. *MMWR* 2001: 48(53):1-101. **http://www.cdc.gov/mmwr/pdf/wk/mm4853.pdf**.

- National Network for Immunization Information. **http://www.immunizationinfo.org**.

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