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Course name: Pre-Nursing Microbiology (BIOL 1353)

Course specific content:

BIOL 1353 – *Pre-Nursing Microbiology* introduces the student to the fundamental principles of microbiology and the importance of microorganisms in their daily life. At the end of the course, the student will be able to identify and distinguish between a selection of microorganisms that are capable of causing disease in humans; they will learn about host-pathogen interactions and disease prevention.

College and Career Readiness Cross-Disciplinary Standard(s):

I. Key Cognitive Skills
- A. Intellectual Curiosity
  1. Engage in scholarly inquiry and dialogue.
  2. Accept constructive criticism and revise personal views when valid evidence warrants.
- B. Reasoning
  1. Consider arguments and conclusions of self and others.
  2. Construct well-reasoned arguments to explain phenomena, validate conjectures, or support positions.
  3. Gather evidence to support arguments, findings, or lines of reasoning.
  4. Support or modify claims based on the results of inquiry.
- C. Problem Solving
  1. Analyze a situation to identify a problem to be solved.
  2. Develop and apply multiple strategies to solve a problem.
  3. Collect evidence and data systematically and directly relate to solving a problem.

College and Career Readiness Science Standard(s):

I. Nature of Science: scientific ways of learning and thinking
- A. Cognitive Skills in Science
  1. Utilize skepticism, logic, and professional ethics in science.
  2. Use creativity and insight to recognize and describe patterns in natural phenomena.
  3. Formulate appropriate questions to test understanding of natural phenomena.
  4. Rely on reproducible observations of empirical evidence when constructing, analyzing, and evaluating explanations of natural events and processes.
- B. Scientific Inquiry
  1. Design and conduct scientific investigations in which hypotheses are formulated and tested.

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C. Collaborative and safe working practices
   1. Collaborate on joint projects.
   2. Understand and apply safe procedures in the laboratory and field, including chemical, electrical, and fire safety and safe handling of live or preserved organisms.
   3. Demonstrate skill in the safe use of a wide variety of apparatuses, equipment, techniques, and procedures.

D. Current Scientific technology
   1. Demonstrate literacy in computer use.
   2. Use computer models, applications and simulations.
   3. Demonstrate appropriate use of a wide variety of apparatuses, equipment, techniques, and procedures for collecting quantitative and qualitative data.

E. Effective communication of science information
   1. Use several modes of expression to describe or characterize natural patterns and phenomena. These modes of expression include narrative, numerical, graphical, pictorial, symbolic, and kinesthetic.
   2. Use essential vocabulary of the discipline being studied.

The Flu vaccine dilemma: should I get vaccinated this year or not?

In this activity, students are presented with a scenario in which they have to make an informed decision in regards to high risk groups that should be administered with the Flu vaccine (flu shot or flu mist) in a hierarchical order of priority (Std A.1a, A.1b).

They will work in groups and must agree with and articulate a rationale to support their choice of high risk population to be administered the vaccine, as well as the appropriate vaccination method to be used (Stds A.1b,c; A.2).

They will also, as a group, develop a poster advertisement that is attractive, clear and targeted to the entire community, promoting Flu vaccination every year (Stds A.3 and A.4).

1) Instructional Objectives:
   a. Distinguish between a viral and bacterial upper respiratory tract infection (URI)
      i. Understand both types of infection – signs, symptoms, treatment
   b. Understand the importance of preventing infection: the flu vaccine
      i. Building immune response
      ii. Influenza virus - antigenic shift/variability
   c. Be able to educate the general public on the importance of getting vaccinated against the seasonal flu, every year.

2) Assigned study materials
   a. Text book assigned readings on viruses, specifically the flu virus, common cold virus, bacterial URIs – See References, below.
   b. CDC website, general info on Flu virus, info on genetic shift- antigenic variability
   c. Description/definition of high risk populations, immunological responses to vaccine methods
   d. Modified version of a Study Case which inspired this activity.

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Pre-Nursing Microbiology

3) Individual Readiness Assurance Process (i-RAP)

a. Assessment items (multiple choice questions)
b. Answer key

1) The most frequently used portal of entry for pathogens is the
A) Mucous membranes of the respiratory tract.
B) Mucous membranes of the gastrointestinal tract.
C) Skin.
D) Parenteral route.
E) All are used equally.

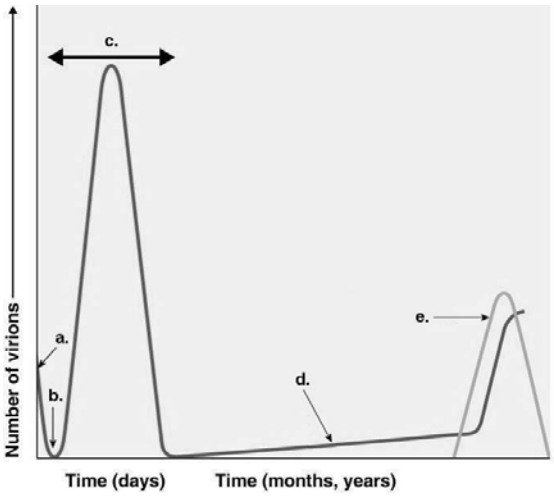
Answer: A

2) Which of the following statements provides the most significant support for the idea that viruses are nonliving?
A) They are not composed of cells.
B) They are filterable.
C) They cannot reproduce themselves outside a host.
D) They cause diseases similar to those caused by chemicals.
E) They are chemically simple.

Answer: C

3) Assume a patient has influenza. During which time (on the graph in Figure) would the patient show the symptoms of the illness?
A) a
B) b
C) c
D) d
E) e

Answer: C



4) What contributes to antigenic shift in influenza viruses?
A) Worldwide distribution
B) Segmented genome
C) Attachment spikes
D) Ease of transmission
E) Different subtypes

Answer: B

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6) The recurrence of influenza epidemics is due to

Points	6	5	4	3	2	1

A) Lack of antiviral drugs.
B) The Guillain-Barré syndrome.
C) Antigenic shift.
D) Lack of naturally acquired active immunity.
E) HA spikes.

Answer: C

4) Team Readiness Assurance Process (t-RAP)

a. Same as i-RAP, answered as a team

5) Instructor led discussion/lecture (not included)

6) Application Exercise

a. Student instructions
   i. Given this:
      1. Assigned readings on text book, internet (CDC website); modified case study scenario
   ii. Decide this:
      1. "It is the flu season and in a small town there is limited budget for providing accessible/low cost flu vaccination in both injectable and mist form. Which would be the highest risk population, where inoculation should begin and which type of vaccine to apply?"
         a. Senior citizens (60 ys & older), flu mist
         b. Infant & toddler population, flu mist
         c. Infant & toddler population, flu shot
         d. Day care and nursing home attendants, flu mist or flu shot
   iii. As a group, decide which option to go for and provide a rationale for your answer.

b. Scoring Rubric

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Content	• Include all the concepts that qualify a risk population as such • Consider vaccination method that is most appropriate for each type of population • consider the possible consequences of not getting vaccinated	• include most of the concepts that qualify a risk population as such • consider appropriate vaccination method for their choice population • mentions possible consequences of not getting vaccinated	• few relevant concepts included that qualify a risk population as such • consider a vaccination method tied to their choice population • do not mention the consequences of not getting vaccinated
Reasoning/Logic Justification	Understand the facts and ties the information in a coherent manner; emphasizes the importance of vaccination method for their risk group; ties the fact of high mortality rate in risk groups as a consequence of non vaccination	Understand the facts but do not clearly relate vaccination method with population type; mention but do not tie the high mortality rate in risk groups as a possible consequence of non vaccination	Understand the facts but lack important ones; mention but not correlate vaccination method to population type; fails to link high mortality rate in risk groups as a possible consequence of non vaccination
Poster Ad Creativity, impact	Neat, clear, legible and grammatically correct Attractive (colors, images/drawings) and reaches the entire community	Neat, clear, legible and grammatically correct Somewhat attractive (not so colorful, includes images/drawings) –may not be directed to entire community	Not so clear, legible and may include grammatical errors Not so attractive (lack color, lacks images/drawings) May not impact the entire community

c. A "good" scenario response

i. In this case, actually, all populations are good candidates for vaccination, but both senior citizens and infant/toddler populations are at highest risk. We expect that Option C is selected as highest priority. Option B is WRONG, since it is actually risky to apply the flu mist to young children. The main purpose of this exercise is for them to understand that there are higher risk populations but even the attendants for either day care or nursing homes that do not fall within a high risk population should also get vaccinated, since they may be involved in spreading the infection to a high risk population.

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ii. They will develop a poster advertisement as part of this activity to promote vaccination for everyone.

7) Peer Assessment

a. There will be a Gallery Walk for peer assessment of their final product among teams – the Poster Ad to promote vaccination.
b. They will fill out a survey to peer assess their fellow team mates.

REFERENCES

Microbiology Text:
Tortora, G. J., B.R. Funke, and C.E. Case. *Microbiology: An Introduction, 10th edition.* Benjamin/ Cummings Publishing Company, Inc.

- Chapter 13; 370-373, including the Clinical Focus box.
- Chapter 15; 430 (table), 433 –antigenic variation.
- Chapter 24, 692-694; Epidemiology, treatment, vaccination

Internet:
Commonly acquired infectious illnesses

- Flu (Influenza)- http://www3.niaid.nih.gov/healthscience/healthtopics/Flu/default.htm
- Is It a Cold or the Flu? - http://www.niaid.nih.gov/Publications/cold/sick.pdf

What You Should Know About the Flu (CDC website)

- http://www.cdc.gov/fl u

Influenza Viruses; How Influenza Viruses Change: Drift and Shift

- http://www.cdc.gov/fl u/avian/gen-info/fl u-viruses.htm

Vaccine Recommendations

- Smith, N.M., J.S. Bresee, D.K. Shay, T.M. Uyeki, N.J. Cox, and R.A. Strikas. Prevention and control of influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP).

MMWR Recommendations and Reports July 09, 0//2 / ..(RR+/):+–60.

- http://www.cdc.gov/mmwr/preview/mmwrhtml/rr..+/a+.htm

Flu Activity—Reports and Surveillance Methods in the United States

- http://www.cdc.gov/fl u/weekly/fl uactivity.htm

Morbidity and Mortality Weekly Report (MMWR)

- http://www.cdc.gov/mmwr/

Questions and Answers—Influenza (Flu) Antiviral Drugs

- http://www.cdc.gov/fl u/about/qa/antiviral.htm

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