A PILOT DVD PROJECT

CONTAGION: THE SPREAD OF DISEASE

MARK GOTTFRIED

BARBARA ROTHSTEIN

NORTH MIAMI BEACH
SENIOR HIGH SCHOOL

Activity: Contact Tracing

Time Frame: 45 minutes including discussion time

Materials: test tubes (1/student), 0.1 M NaOH, phenolphthalein solution, eye droppers or plastic transfer pipettes, 2 decks of playing cards for the alternate mode of controlling simulated fluid transfer

Teacher Directions:

In advance of class prepare a set of test tubes one for each student in your class. You can use small disposable paper cups or vials as well. Fill each vessel approximately 1/3 full of clean tap water (basically the tubes and water have to not buffer the small amount of base that will end up in the tubes). "Infect" one tube with a dilute solution (<0.1M) of NaOH. This will be patient zero's test tube. The exact concentration isn't as important as safety. You can also use ammonia, however the smell may reveal the "infected" tube.

Prepare a dilute solution of phenolphthalein by dissolving a small very amount of the powder in isopropyl alcohol and then diluting with water. The indicator is very sensitive and exact quantities are not important to this activity.

You may wish to test the reaction of your base with the indicator to make sure that the reaction occurs as expected. In general a good rule of thumb is to take 1 or 2 drops of the dilute solution (<01.M), which you are using to "infect" patient zero, and dilute that with an additional 100 mL of water. If the phenolphthalein turns magenta both your indicator and patient zero solution should work properly.

- Watch Lesson 1 Chapter 17
    - Ask: What are the principal risk factors for becoming infected with HIV?
        - Do not provide answers at this time. Use this as an opportunity to investigate what they already know, or think they know by brainstorming. Indicate that you will come back to this question later.
    - Ask: Historically, how did this understanding of the transmission of HIV develop?
    - Again do not provide answers at this time.
- Activity: Simulated HIV Transmission
    - When you are ready to begin the activity distribute tubes and plastic transfer pipettes. You can use any inexpensive eyedroppers.
    - Outline the procedure with the students before beginning the simulation.
    - If your students are reasonably mature you can just instruct them to wander around the class and "exchange" fluids. If you are concerned about the maturity level of your class see below for a method of controlling the fluid exchange.
    - After about 10 minutes (more if they are shy, less if they are getting out of control) stop the activity and have them line up for "testing."
    - Add a drop of phenolphthalein to each tube, and have those whose tubes turned magenta stand off to the side and allow the rest of the class to sit back down.
    - Ask: For what have we tested?

- Answer: Base
  - Ask: What do the base and the fluid exchange simulate?
- Answer: Virus and its transmission by fluid exchange.
  - Then have the class try and play epidemiologist and through contact tracing establish who in the class was “patient zero” (i.e. the one student whose solution was initially contaminated).
  - On the board have each person who tested positive list all their contacts (fluid exchanges) in chronological order. Based on that information it should be possible to establish who started the epidemic in your classroom. You may wish to draw a branching flow chart or tree diagram to explicate the “viral” pathway through your class.
  - You can highlight each “positive” case with a different color chalk or marker.
  - Return to the questions that began the activity, discussing the spread of the AIDS epidemic and how HIV is transmitted and the evolution of the understanding of HIV transmission.
  - Discuss news stories about the evolution of drug resistance and the development of drug treatment strategies to counteract this problem.

Hints:
It may be necessary to “cheat” and make sure the tube with the NaOH goes to a student whom you know to be sociable. The activity does not succeed if the contaminated tube goes to a shy student who doesn’t readily participate.

If you feel that your students will get too silly, or you have a class that has an unbalanced gender distribution you may need to use an alternative method to arrange fluid exchange as follows.

Before class prepare two decks of cards so that they are in exactly the same order. (Ace to King in suits works well). Then as your students enter class, pass out the cards from one of the decks. After everyone is seated, you take the second deck and remove all those cards from this deck that are left in the first deck (those cards which you did not distribute). You then have in your hand a partial deck that matches only those cards, which you distributed to the class.

When the activity begins, you carefully explain that they are no longer people. No longer male or female. They are “cards” and the “cards” will exchange fluids. Then after shuffling you can draw pairs from the partial deck in your hand instructing them to exchange fluids. If and when someone complains about a particular pairing you can reiterate that they are not exchanging fluids, but it is the seven of diamonds and the two of hearts who are engaging in unprotected sex.

Again at the conclusion of a period of random mating the tubes are tested. Through contact tracing you attempt to identify “patient zero.” This method takes longer than the student directed fluid exchange because each pair has to be called out one at a time by the teacher.

Similar activities can be found on the web, some for more elementary levels using talcum powder/cloudy cornstarch solutions with iodine as the indicator.

Cleanup of phenolphthalein can be a problem. Rinse the test tubes and all glassware with alcohol and it will reduce your aggravation.

Evaluation:

After the discussion and contact tracing, students will write a dialog between a public health official and a patient. The dialog should contain information detailing the transmission of HIV and explaining the purpose and methods of contact tracing.

Extension:

Students can contact the local public heath office for information on disease demographics in their community.

Web Connections:

- http://tc.unl.edu/nerds/preser/sec/98nerds/aids/aids.htm
- http://www.accessexcellence.org/MTC/96PT/Share/latta.html
- http://www.aegis.com/topics/timeline/default.asp
- http://www.thebody.com/cdc/factv.html
- http://www.avert.org/historyi.htm