

Unit 5

Emerging Infectious Diseases

Description

New diseases arise and old diseases, such as malaria and influenza, return with renewed vigor. Among the causes of emerging infectious diseases are increased travel by humans; misuse of antibiotics; and habitat changes, including those brought on by global climate change, which expand the ranges of some disease vectors.

Menu of Unit Activities

Note: All activities, handouts, solutions, and tips can be found in the Appendix of this guide.

Activity 1: Emerging Diseases: Causes and Effects (15 minutes + 30 minutes of video)

A discussion about what causes a disease to be emerging or re-emerging, and what diseases fall into these categories.

Activity 2: Lifecycles of the Infectious and Famous (30 minutes)

Groups make diagrams of the infection cycles of four diseases using pre-copied diagram pieces. The diagrams are used to discuss strategies to treat and contain the diseases.

Activity 3: Koch's Postulates (30 minutes)

Application of the criteria used to establish that an infectious agent is the cause of a disease, using SCV (SARS-associated coronavirus) and SARS as an example.

Activity 4: Shifting Antigens (30 minutes)

The ability of influenza to evade the immune system is analyzed by piecing together clues about the components of the virus and the vaccine against the virus.

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(Menu of Unit Activities, continued)

Choose either Activity 5 or Activity 6:

Activity 5: Wrapping It Up (15 minutes)

A discussion that includes a review of the lists of diseases and causes that were generated in Activity 1.

Activity 6: A Picture's Worth a Thousand Words (15 minutes)

A game in which participants get their partners to say the names of emerging diseases by drawing clues, such as the type of infectious agent or the means of transmission.

Before the Session

Facilitator: Copy and assemble the following activity materials. (See the Activities section in the Appendix of this guide for master copies of transparencies and handouts, plus Tips and Suggested Answers.)

Activity 1: Emerging Diseases: Causes and Effects requires:

- One copy of the Instructions per person (master copy provided)
- Tips and Suggested Answers

Activity 2: Lifecycles of the Infectious and Famous requires:

- One set of Replication Cycle Steps and Arrows per two people (master copy provided; to make a set, cut out the arrows to separate them, cut on the dotted lines of the lifecycle steps and scramble them)
- One set of Discussion Questions per person (master copy provided)
- One copy of the Emerging Infectious Diseases online text chapter per two people (available online at <http://www.learner.org/channel/courses/biology>)
- Tips and Suggested Answers

Activity 3: Koch's Postulates requires:

- One copy of the Instructions and Discussion Questions per person (master copy provided)
- One transparency of Koch's and Rivers's Postulates (master copy provided)
- One transparency of Experimental Results for SARS and SCV (master copy provided)
- Tips and Suggested Answers

Activity 4: Shifting Antigens requires:

- One set of Clues to distribute to the group (master copy provided; after copying, cut to separate the clues)
- One transparency of the List of Questions to start the discussion of how influenza pandemics occur (master copy provided)

Before the Session, cont'd.

Choose either Activity 5 or Activity 6:

Activity 5: Wrapping It Up requires:

- The lists made by the group in Activity 1 (List 1: Diseases that might be considered emerging or re-emerging infectious diseases; List 2: Factors that affect the emergence or re-emergence of a disease)
- One transparency of the Factors That Affect the Emergence of Disease (master copy provided)
- One copy of the Discussion Questions per person (master copy provided)

Activity 6: A Picture's Worth a Thousand Words requires:

- Clock with second hand *or* stopwatch
- One set of the List of Items to Draw (master copy provided; to make a set, cut on the dotted lines after copying)

Facilitator: Make sure that the room has these supplies:

- pens or pencils and paper
- overhead projector and markers
- VCR and TV
- black/white board with chalk or markers

Session Activities and Video

Activity 1a: Emerging Diseases: Causes and Effects— Pre-Video Discussion (10 minutes)

- Read the Setup.
- Spend 1–2 minutes as a group making a list of diseases that might be emerging or re-emerging.

Facilitator: Emphasize that this is a brainstorming session. Write down all ideas.

- Spend about 3 minutes as a group reviewing the diseases in the list, eliminating any that all agree are not really emerging or re-emerging diseases and putting question marks next to ones that are in dispute.
- Spend 1–2 minutes making a list of factors or conditions that contribute to the emergence and re-emergence of diseases.

Facilitator: This is another brainstorming session. Write down all ideas.

- Spend about 3 minutes discussing how the list of diseases and factors match.
- Consult the Tips and Suggested Answers section to see if there are other answers your group did not think of, or if your group thought of additional possibilities.

Facilitator: If you chose Activity 5: Wrapping It Up, *keep a copy of the group's lists of diseases and factors.* Activity 5 uses these lists, so don't throw them away!

Video (30 minutes)

- Watch the Emerging Infectious Diseases video.

Activity 1b: Emerging Diseases: Causes and Effects— Post-Video Discussion (5 minutes)

- Spend a few minutes comparing the information just discussed in the video with the class lists of diseases and factors generated in Activity 1.

Facilitator: If you chose Activity 5: Wrapping It Up, a brief review is all that is needed, because Activity 5 is a longer discussion on this topic.

Activity 2: Lifecycles of the Infectious and Famous (30 minutes)

- Read the Setup.
- Arrange into pairs.

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Session Activities and Video, cont'd.

(Activity 2, continued)

- Have each pair take one set of the Replication Cycle Steps and about 20 arrows, and a copy of the Emerging Infectious Diseases online text.
- Have each person take a copy of the Discussion Questions.
- Spend 10 minutes working in pairs arranging the replication steps.
- Compare the diagrams as a group. See the Tips and Suggested Answers section for the diagram answers.
- Discuss the Discussion Questions as a group, referring to the diagrams made from the scrambled replication cycle steps. Answers are in the Tips and Suggested Answers section.
- Variation: Divide into four groups. Each group is assigned one of the diseases and gives a brief, informal presentation that answers the discussion questions for that disease.

Activity 3: Koch's Postulates (30 minutes)

- Read the Setup and have each person take a copy of the Instructions and Discussion Questions.
- Spend 5 minutes working individually, writing down criteria for assigning a disease to a virus.
- Working as a group, compile from the individual lists a collective list of the criteria for assigning a disease to a virus.
- View the transparency of Koch's and Rivers's Postulates and compare it to the group list.
- View the transparency of Experimental Results for SARS and SCV that fulfilled Koch's and Rivers's postulates, and assign each result to a postulate.
- Go over the Discussion Questions as a group. Potential answers are in the Tips and Suggested Answers section.

Activity 4: Shifting Antigens (30 minutes)

- Read the Setup.
- Pass around the clues, each person taking one at a time until they are all distributed.
- One at a time, view the questions on the List of Questions transparency.
- After reading each question, if anyone has a clue that relates to the question, have that person read their clue. After all relevant clues have been read, come up with a group answer to the question.

If you chose Activity 5: Wrapping It Up (15 minutes)

- Read the Setup and have each person take a copy of the Discussion Questions.
- Look again at the list of diseases and factors from Activity 1.
- Discuss the provided questions while viewing the transparency of Factors That Affect the Emergence of Disease.

Session Activities and Video, cont'd.

If you chose Activity 6: A Picture's Worth a Thousand Words (15 minutes)

- Read the Setup.
- Arrange into pairs, with each pair taking pens or pencils and several pieces of paper.
- Have each team choose the person who will draw first and the person who will guess first.

Facilitator: Choose one of the items from the List of Items To Draw. Show the word to the person in each team who will be drawing. When all teams are ready, say "Go" and start the timer.

- When the first (non-drawing) member of a team names the item, all teams stop drawing. If no team names the item after 3 minutes, stop all teams and reveal the item.
- Have the teams switch drawers and guessers and play again.
- Variation: To emphasize the factual, rather than the fun aspect, add rules such as:
 - drawing must include means of transmission
 - drawing must include a picture that indicates if the cause is viral, bacterial, or eukaryotic.

Summary (5 minutes)

- If time permits, as a group or in pairs, define the major ideas or "take home" lessons of this unit and its applications.