

Rodent-borne Diseases: Getting the Facts Out There

Candice Autry
Sheridan School
Washington, DC

Jennifer Jordan
McNeil High School
Austin, TX

In collaboration with Abbigail Tumpey,¹ Brian Amman,¹ and Heather Carter²

¹ National Center for Zoonotic, Vector-borne, and Enteric Diseases, Centers for Disease Control and Prevention

² National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Rodent-borne Diseases: Getting the Facts Out There

Candice Autry
Sheridan School
Washington, DC

Jennifer Jordan
McNeil High School
Austin, TX

Summary

In this lesson, students will research one aspect of either hantavirus pulmonary syndrome (HPS) or lymphocytic choriomeningitis (LCMV). Students will use what they learn during their research to produce a public service announcement in the form of a brochure, poster, radio announcement or television commercial. This lesson is for use after students have covered the basics of viruses, viral infection, and immunology. Students should know what a virus is, the basic methods of transmission, and how the human immune system reacts to infection by a virus. This lesson is suitable for students in grades 6–10 and could be used in a science, health, or health science technology course.

Learning Outcomes

- Students will be able to use the Internet to research a rodent-borne disease.
- Students will synthesize information from the Internet and determine which information is most pertinent to public health.
- Students will be able to communicate Internet research findings in the form of a public service announcement (PSA).

Materials

1. Computer with Internet access, projection capabilities, and speakers to show “Power of One” video clip and to present examples of radio PSAs
2. PSAs in print format
3. Computers with Internet access for student use, one per pair of students
4. Art materials (posterboard, butcher paper, colored pencils, markers, scissors, glue or glue sticks, construction paper, legal paper, crayons, etc.)
5. Photocopies of “Rodent-borne Diseases: Getting the Facts Out There” (one per group or individual)
6. Photocopies of “Public Service Announcement Grading Rubric” (one per group or individual)
7. At least one copy of “Rodent-borne Diseases: Getting the Facts Out There Topics”
8. Optional: tape recorders, microphones for recording sound digitally on the computer, video cameras

Total Duration

3 hours, 15 minutes

Procedures

Teacher Preparation

At least 3 weeks before the introduction day, request free print PSAs about folic acid from the Centers for Disease Control and Prevention (CDC). Order materials from the “...Ready, Not” campaign that is targeted towards women not considering pregnancy. Order one brochure per student group or individual (if allowing students to work independently), a poster, and a print ad.

Make one copy each per student pair of “Rodent-borne Diseases: Getting the Facts Out There” and “Public Service Announcement Grading Rubric.” Make one copy of “Rodent-borne Diseases: Getting the Facts Out There Topics” for the class.

For the Introduction step, set up a computer with Internet access, projector, and speakers and ensure that the “Power of One” video clip and at least one radio PSA work appropriately. Use of one of the “...Ready, Not” radio PSAs is recommended. These can be found at the web resource “Folic Acid Downloadable Radio PSAs.” Find (or request) PSAs in print format to use as examples.

For Step 2, ensure that one computer with Internet access is available for each pair of students to conduct research. Test the suggested websites to ensure your school’s firewall does not block them.

For Step 3, organize student materials such as posterboard, colored pencils, markers, scissors, glue, construction paper, etc. for use in creating student PSAs. Materials can either be placed in a central location where students come and get materials as they are needed or placed at student tables in a plastic container to cut down on students being out of their seats.

Become familiar with the basics of rodent-borne diseases such as hantavirus pulmonary syndrome (HPS) and lymphocytic choriomeningitis (LCMV) before starting the lesson. Information can be found at the web resources that follow.

Web Resources

Title: CDC Folic Acid Publications Order Form

URL: www2.cdc.gov/ncbddd/faorder/orderform.htm

Description: The Centers for Disease Control and Prevention’s (CDC) publications and PSAs about folic acid can be ordered free of charge and used as examples of PSAs in print format. Place your order at least 3 weeks in advance.

Title: Folic Acid Downloadable Radio PSAs

URL: www.cdc.gov/ncbddd/folicacid/downloads.htm

Description: Download CDC’s folic acid radio PSAs to ensure they will work on the classroom computer before presenting them to the students.

Title: “Power of One” PSA

URL: www.oneearth.org [Click on Communications, then Campaigns, then 1993]

Description: Produced by the Earth Communications Office, “Power of One” is a 90-second video PSA to be used as an example PSA to engage students in the project and show them the impact that a PSA can have. Try the video on the computer to be used in the classroom before the introduction class period.

Title: Seal Up! Trap Up! Clean Up!

URL: www.cdc.gov/rodents

Description: This website has comprehensive information on several rodent-borne diseases, recommendations to prevent rodent-borne diseases, images of rodents, and educational resources.

Title: All About Hantaviruses

URL: www.cdc.gov/hantavirus

Description: CDC’s hantavirus homepage has general hantavirus information for the teacher. More technical information and resources are also available at this site.

Title: Lymphocytic Choriomeningitis (LCMV)

URL: www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/lcmv.htm

Description: This CDC website has background information on LCMV, prevention measures involving LCMV, and facts about LCMV and pregnancy.

Title: Education and Prevention Materials

URL: www.cdc.gov/ncidod/dvrd/spb/mnpages/teach.htm

Description: This website lists resources available from CDC’s Special Pathogens Branch. These resources provide the teacher with more background information about rodent-borne diseases.

Supplemental Documents

Title: Rodent-borne Diseases: Getting the Facts Out There

Description: This file introduces students to the scope and expectations of the project. It also has questions that guide students during the research and planning phases.

Title: Public Service Announcement Grading Rubric

Description: This document provides a standard grading rubric for the teacher to use in assessing students and gives students an understanding of how they will be assessed.

Title: Rodent-borne Diseases: Getting the Facts Out There Topics

Description: This file provides a list of potential topics for students to research and present a PSA.

Introduction

Duration: 30 minutes

To determine students’ prior knowledge of hantavirus pulmonary syndrome, lymphocytic choriomeningitis, other rodent-borne diseases, and public service announcements, have students complete a Think, Pair, Share activity. Ask students to think about what they know regarding rodent-borne diseases and/or PSAs. Students should brainstorm silently and write what they know on their own paper. Allow 1–2 minutes for students to think and record their knowledge. Give students 2–3 minutes to share what they wrote with the student next to them. Each pair can then share with the whole class one thing they know about rodent-borne diseases and/or PSAs.

Then, to show students what a PSA might look or sound like and the different types of PSAs, play the “Power of One” PSA and a radio PSA such as CDC’s “...Ready, Not,” and show students PSAs in print format. Discuss these PSAs as a class. Lead students in thinking about audiences (children, teenagers, adults, pet store customers, pregnant women, etc.); methods of delivery (poster, brochure, TV commercial, radio commercial, etc.); and ways to have the maximum impact without being offensive or gross. Suggested questions to guide the discussion include:

- Which of the PSAs we just viewed would be most likely to make you seek more information about the topic? (answers will vary)
- What other PSAs have you seen or heard? (answers will vary)
- Which type of PSA would be best used in a doctor’s office? (brochure or poster)
- What are the limitations of using a radio PSA? (no visual media is included)

- What are the benefits of using a radio PSA? (answers will vary but might include, cheaper to produce than video, can reach many people, etc.)
- Which type of PSA is the easiest for you to produce in class? (answers will vary)
- What might make a PSA offensive or hurtful to another person? (answers will vary)

Web Resources

Title: CDC Folic Acid Publications Order Form

URL: www2.cdc.gov/ncbddd/faorder/orderform.htm

Description: CDC's publications and PSAs can be ordered free of charge and used as examples of PSAs in print format. Place your order at least 3 weeks in advance.

Title: Folic Acid Downloadable Radio PSAs

URL: www.cdc.gov/ncbddd/folicacid/downloads.htm

Description: Download CDC's folic acid radio PSAs to ensure they will work on the classroom computer before presenting them to the students.

Title: "Power of One" PSA

URL: www.oneearth.org [Click on Communications, then Campaigns, then 1993]

Description: Produced by the Earth Communications Office, "Power of One" is a 90-second video PSA to be used as an example PSA to engage students in the project and show them the impact that a PSA can have. Try the video on the computer to be used in the classroom before the introduction class period.

Step 2

Duration: 1 hour, 15 minutes

Now that students are familiar with what a PSA might look and sound like, explain to students that they will be producing a PSA about either hantavirus or LCMV. Hand out photocopies of "Rodent-borne Diseases: Getting the Facts Out There" and the "Public Service Announcement Grading Rubric." Call on various students to read each question or section. Clarify any questions the students have, especially about the purpose and scope of the project. Explain any limitations you are placing on students in terms of how they can produce their PSA. For example, can students use a video camera and produce a TV ad? Is there a limited amount of construction paper so each group only gets two pages? You may choose to have students work individually or in groups. Groups, if used, should be established at this time through teacher assignment or student choice.

Once groups have been established, assign students or allow them to choose one of the topics listed in the "Rodent-borne Diseases: Getting the Facts Out There Topics" document. Record assigned topics by writing the name of the student(s) next to the topic. Use a different copy of the "Rodent-borne Diseases: Getting the Facts Out There Topics" document per period to record this information. Allow students to research their topic on the Internet and record their findings on the "Rodent-borne Diseases: Getting the Facts Out There" document. Suggested web resources for student research follow.

Web Resources

Title: Seal Up! Trap Up! Clean Up!

URL: www.cdc.gov/rodents

Description: This website has comprehensive information on several rodent-borne diseases, recommendations to prevent rodent-borne diseases, images of rodents, and educational resources.

Title: All About Hantaviruses

URL: www.cdc.gov/hantavirus

Description: CDC's hantavirus homepage has general hantavirus information for the student. More technical information and resources are also available at this site.

Title: Hantavirus

URL: www.doh.wa.gov/topics/hanta.htm

Description: This website from the Washington State Department of Health has basic hantavirus information at a level appropriate for middle school students. The site requires little navigation to access information.

Title: Hantavirus: What is it and what can be done about it?

URL: www.montana.edu/wwwpb/pubs/mt9404.html

Description: This website from the Montana State University Extension Service has information about the causes and prevention of hantavirus.

Title: Lymphocytic Choriomeningitis Virus (LCMV)

URL: www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/lcmv.htm

Description: This CDC website provides students with background information on LCMV, prevention measures involving LCMV, and facts about LCMV and pregnancy.

Title: Lymphocytic Choriomeningitis Virus (LCMV) from Pet Rodents

URL: www.cdc.gov/healthypets/lcmv_rodents.htm

Description: This website from CDC's Healthy Pets, Healthy People has information about LCMV from wild and pet rodents.

Title: Lymphocytic Choriomeningitis Virus (LCMV) and Pregnancy

URL: <http://otispregnancy.org/pdf/LCMV.pdf>

Description: This website from the Organization of Teratology Information Services provides students with information about LCMV and pregnancy.

Title: Lymphocytic Choriomeningitis Virus (LCMV) Fact Sheet

URL: <http://dhfs.wisconsin.gov/communicable/factsheets/LCMV.htm>

Description: This fact sheet from the Wisconsin Department of Health and Family Services provides students with general information about LCMV.

Supplemental Documents

Title: Rodent-borne Diseases: Getting the Facts Out There Topics

Description: This file has a list of potential topics for students to research and then develop a PSA.

Title: Rodent-borne Diseases: Getting the Facts Out There

Description: This file introduces students to the scope and expectations of the project. It also has questions that guide students during the research and planning phases.

Title: Rodent-borne Diseases: Getting the Facts Out There Answer Key

Description: This document is the answer key to the questions listed in "Rodent-borne Diseases: Getting the Facts Out There."

Title: Public Service Announcement Grading Rubric

Description: This document provides a standard grading rubric for the teacher to use in assessing students and gives students an understanding of how they will be assessed.

Step 3**Duration: 45 minutes**

Once students have had enough time to conduct research, instruct them to start working on their PSA. Students should work individually or with their group to design and produce a PSA that addresses their assigned topic. Remind students to refer to the “Rodent-borne Diseases: Getting the Facts Out There” document or “Public Service Announcement Grading Rubric” if they have questions about what to include in their PSA or how they will be assessed. Monitor students and offer help if they are unsure of what direction they want their project to take. Encourage students who are struggling or discouraged and act as a mediator if disagreements arise within groups. Ensure that the proposed PSA is feasible within the time allowed. For example, producing a 10-minute commercial is likely not a viable option within one 45-minute class period. If audio or video recording equipment is available, students might opt to make a 1- to 2-minute PSA. Allow enough time for students to clean up and return all art materials to the proper location before the end of class.

Conclusion**Duration: 45 minutes**

Have students present their PSAs to the class and answer any questions. Ask students to share what they learned about designing and producing a PSA and about hantavirus and LCMV during the course of the project. While the PSA produced by each group serves as the formal assessment, you might want to redo the Think, Pair, Share activity to see what knowledge students have gained as a result of this project.

Assessment

Students’ prior knowledge will be informally assessed during the Introduction using a Think, Pair, Share activity. Students will be formally evaluated using the “Public Service Announcement Grading Rubric.” A Think, Pair, Share exercise can also be completed during the Conclusion to assess the impact of the activity on student knowledge.

Modifications**Extensions**

Students could present their PSAs to other classes. PSAs that were produced in an audio or video format could be presented to the school via the public announcement system or video feed if available. Students could also be encouraged to take posters discussing the dangers of pet rodents and pregnancy to a local doctor’s office or clinic.

Following the Conclusion, you could present professional PSAs to the class so students could judge the quality of their own work. This step should be taken only if it will validate student work, not if it could have a negative impact. PSAs about rodent-borne diseases are available at the web resources listed below. If requesting resources by mail, allow enough time for materials to arrive.

Web Resources

Title: Education and Prevention Materials

URL: www.cdc.gov/ncidod/dvrd/spb/mnpages/teach.htm

Description: This website lists resources available from CDC’s Special Pathogens Branch (SPB). PSAs created by the SPB are available for download and by mail to validate student work.

Other Modifications

This lesson was designed to be suitable for grades 6–10. Depending on the level of the students, the teacher should expect more technical information to be included and a more professional PSA to be produced.

If Internet access for each group of students is not available, some of the resources available could be printed out and made available as a hard copy. See the web resources that follow for information better suited to printing and for resources that can be requested by mail. Allow enough time for materials to arrive.

Web Resources

Title: All About Hantaviruses: General Information

URL: www.cdc.gov/ncidod/diseases/hanta/hps/noframes/printgenlsection.htm

Description: Provided by CDC, this site has general information about hantaviruses in a format suitable for printing if Internet access is not available for student research.

Title: Lymphocytic Choriomeningitis Fact Sheet

URL:

www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/Fact_Sheets/Lymphocytic_Choriomeningitis_Fact_Sheet.pdf

Description: This PDF document has basic information in a format suitable for printing if Internet access is not available for student research.

Education Standards

National Science Education Standards

LIFE SCIENCE, CONTENT STANDARD C:

As a result of their activities in grades 5–8, all students should develop understanding of

- **Structure and function in living systems**
- Reproduction and heredity
- Regulation and behavior
- Populations and ecosystems
- Diversity and adaptations of organisms

SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES, CONTENT STANDARD F:

As a result of activities in grades 5–8, all students should develop understanding of

- **Personal health**
- Populations, resources, and environments
- **Natural hazards**
- **Risks and benefits**
- **Science and technology in society**

LIFE SCIENCE, CONTENT STANDARD C:

As a result of their activities in grades 9–12, all students should develop understanding of

- The cell
- Molecular basis of heredity
- Biological evolution
- **Interdependence of organisms**

- Matter, energy, and organization in living systems
- **Behavior of organisms**

SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES, CONTENT STANDARD F:

As a result of activities in grades 9–12, all students should develop understanding of

- **Personal and community health**
- Population growth
- Natural resources
- Environmental quality
- **Natural and human-induced hazards**
- **Science and technology in local, national, and global challenges**

State Standards

Texas

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS, 112.43.c.4:

The student knows that cells are the basic structures of all living things and have specialized parts that perform specific functions, and that **viruses are different from cells and have different properties and functions.**

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS, 112.43.c.4.C:

The student is expected to compare the structures and functions of viruses to cells and describe the role of viruses in causing diseases and conditions such as acquired immune deficiency syndrome, common colds, smallpox, influenza, and warts.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS, 115.22.b.6.8.B:

The student is expected to explain the relationship between health needs and technology development such as the development of a Human Immunodeficiency Virus (HIV) vaccine.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS, 115.7.b.5.4.D:

The student is expected to list the effects of harmful viruses on the body such as polio, Human Immunodeficiency Virus (HIV), and the common cold.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS, 119.62.5.A:

The student is expected to list the role of bacteria, fungi, viruses, genetics, and nutrition in disease.

Websites to use for your research

Rodent Control: "Seal Up! Trap Up! Clean Up!"

www.cdc.gov/rodents

Hantavirus

www.cdc.gov/hantavirus

www.doh.wa.gov/ehsphi/factsheet/hanta.htm

www.montana.edu/wwwpb/pubs/mt9404.html

LCMV

www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/lcmv.htm

www.cdc.gov/healthypets/lcmv_rodents.htm

<http://otispregnancy.org/pdf/LCMV.pdf>

<http://dhfs.wisconsin.gov/communicable/factsheets/LCMV.htm>

Complete questions 6–8 after you have completed your research.

6. List three things you learned as a result of your research that you need to ensure are part of your PSA.

7. What questions do you still have as a result of your research?

8. How did your target audience or type of PSA change as you conducted your research? If your target audience or type of PSA did not change, why not?

Complete questions 9–10 as you are working on your PSA.

9. What materials will you need to create your PSA?

10. What aspects of your PSA make it effective for your target audience?

Rodent-borne Diseases: Getting the Facts Out There Answer Key

Rodent-borne Diseases: Getting the Facts Out There
Candice Autry and Jennifer Jordan, CDC's 2006 Science Ambassador Program

Name _____ Date _____

Public service announcements (PSAs) are created by organizations to inform the public about a variety of topics. You will be researching and creating a PSA about a topic related to public health, more specifically hantavirus or lymphocytic choriomeningitis virus (LCMV).

Topic _____

1. What are some things about your topic you will need to research to create a PSA? List at least three things you need to research.

Answers will vary, but sample responses might include:

- What is hantavirus pulmonary syndrome (or LCMV)?
- Who gets this disease?
- What are the symptoms?
- What do rodents have to do with a virus?
- What can people do to prevent getting sick?
- Does this virus kill people?
- How common is this virus?

2. Who will be the primary audience for the PSA you create?

Answers will vary, but sample responses might include:

- Children
- Rodent pet owners
- Pregnant women
- Adults
- Doctors
- Pet store owners/workers

3. What type of PSA will you create to reach that audience?

Answers will vary, but sample responses might include:

- Poster
- Brochure
- Radio commercial
- Television commercial

4. Why do you think that is an effective PSA for your audience? Give at least three reasons.

Answers will vary, but sample responses might include:

- Teenagers are likely to watch television.
- Pregnant women all go to the doctor and will see the poster there.
- Pet store owners can pass out the brochure to their customers.
- Brochures can be mailed.
- Many people listen to the radio on their way to work in the morning.

5. Conduct research about your assigned topic. Take notes on your own paper as you research. You will need to document all sources of information.

Complete questions 6–8 after you have completed your research.

6. List three things you learned as a result of your research that you need to ensure are part of your PSA.

Answers will vary; accept all reasonable answers.

7. What questions do you still have as a result of your research?

Answers will vary; accept all reasonable answers. If you cannot answer a question after researching online, and if time allows, CDC's Special Pathogens Branch has an e-mail address and may be able to help. Their e-mail address is dvd1spath@cdc.gov.

8. How did your target audience or type of PSA change as you conducted your research? If your target audience or type of PSA did not change, why not?

Answers will vary; accept all reasonable answers.

Complete questions 9–10 as you are working on your PSA.

9. What materials will you need to create your PSA?

Answers will vary; accept all reasonable answers.

10. What aspects of your PSA make it effective for your target audience?

Answers will vary; accept all reasonable answers.

Public Service Announcement Grading Rubric

Rodent-borne Diseases: Getting the Facts Out There
Candice Autry and Jennifer Jordan, CDC's 2006 Science Ambassador Program

Your public service announcement will be graded based on the following:

CATEGORY	4	3	2	1
Content - Accuracy	All facts in the PSA are accurate.	90%–99% of the facts in the PSA are accurate.	80%–89% of the facts in the PSA are accurate.	Fewer than 80% of the facts in the PSA are accurate.
Attractiveness & Organization	The PSA has exceptionally attractive formatting and well-organized information.	The PSA has attractive formatting and well-organized information.	The PSA has well-organized information.	The PSA's formatting and organization are confusing to the reader, listener, or viewer.
Sources	Careful and accurate records are kept to document the source of 95%–100% of the facts and graphics in the PSA.	Careful and accurate records are kept to document the source of 85%–94% of the facts and graphics in the PSA.	Careful and accurate records are kept to document the source of 75%–84% of the facts and graphics in the PSA.	Sources are not documented accurately or are not kept on many facts and graphics.
Knowledge Gained	All students in the group (or individuals if not working in groups) can answer accurately all questions related to facts in the PSA.	All students in the group (or individuals if not working in groups) can answer accurately most questions related to facts in the PSA.	Most students in the group (or individuals if not working in groups) can answer accurately most questions related to facts in the PSA.	Several students in the group (or individuals if not working in groups) appear to have little knowledge about the facts in the PSA.
Impact	100% of the PSA is designed to have maximum impact with the target audience.	More than 50% of the PSA was designed to have impact with the target audience.	Less than 50% of the PSA was designed to have impact with the target audience.	Little or no attempt was made to have impact with the target audience.

A portion of this rubric was created using Rubistar, available at <http://rubistar.4teachers.org/index.php>.

Rodent-borne Diseases: Getting the Facts Out There Topics

Rodent-borne Diseases: Getting the Facts Out There
Candice Autry and Jennifer Jordan, CDC's 2006 Science Ambassador Program

Following are suggested topics for public service announcements:

What is hantavirus pulmonary syndrome?

Transmission of hantavirus

Symptoms of hantavirus

Who is at risk of getting hantavirus?

Prevention of hantavirus

- Seal up
- Trap up
- Clean up
- Indoor prevention
- Outdoor prevention around the home
- Outdoor prevention for hikers and campers

What is lymphocytic choriomeningitis?

Transmission of lymphocytic choriomeningitis virus

Symptoms of lymphocytic choriomeningitis

Who is at risk of getting lymphocytic choriomeningitis?

Prevention of lymphocytic choriomeningitis

- Prevention regarding pet rodents
- Prevention regarding household pests
- Seal up
- Trap up
- Clean up

Pregnancy and lymphocytic choriomeningitis