

Camp-Idemic!

INSTRUCTOR'S GUIDE

OVERVIEW:

A children's nature camp is facing a serious health crisis. It is up to your team to use the epidemiological methods in your toolbox in order to provide recommendations to the camp, parents, and the local community.

GOALS:

- Calculate and explain the relative risk to show the relationship between an exposure and outcome.
- Provide data-supported public health recommendations.

ROLE:

You are a team of epidemiologists, from a variety of levels--including the local and state health departments and the Centers for Disease Control & Prevention.

OBJECTIVE:

9.11: Apply relative risk analysis to make public health recommendations for an at-risk community.

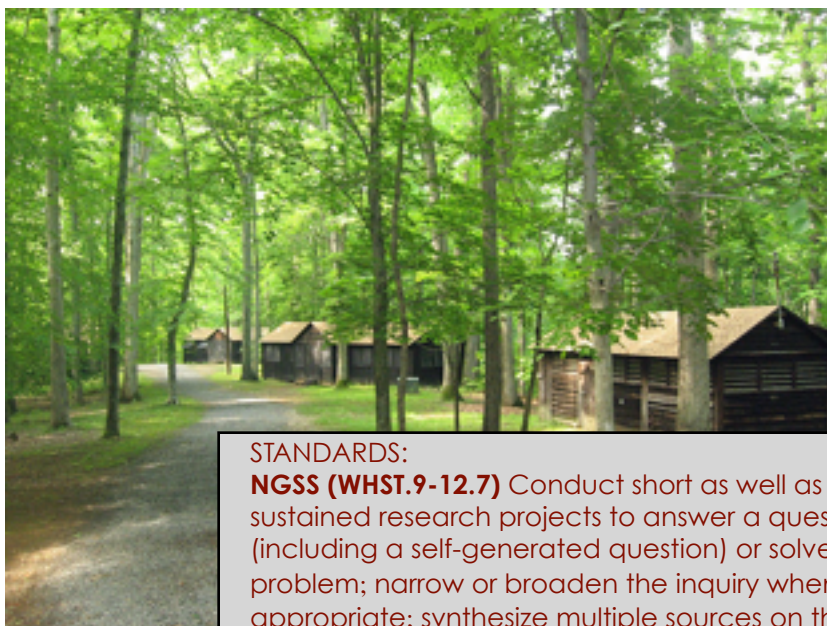
DELIVERABLES:

- 1) Camp-Idemic Recommendations
- 2) Presentation

ASSESSMENT:

All deliverables will be evaluated on a rubric.

PLANNING NOTES: Teams: 4 students; Length: 3 classes; Resources Needed: Computers, copies of student workbook and supplemental handouts



STANDARDS:

NGSS (WHST.9-12.7) Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject demonstrating understanding of the subject under investigation. (HSL13)

NHES 2.12.6: Evaluate the impact of technology on personal, family, and community health.

CASE INTRODUCTION:

Camp Idemic is a children's natural sciences summer camp dedicated to providing children with a first-class education during their summer months. The camp serves students ages 5-9 that are interested in learning about the natural sciences and have a passion for being outdoors. The camp takes children of any race, religion, and/ or socio-economic status. In fact, a government grant has made it possible to offer scholarships to many of the students choosing to attend the camp. This year, if successful, will mark the largest and most educational year for this camp, and thus ensure government funding for the next 3 decades!

According to the regulations established by the governmental grant, Camp Idemic must take place in New York State each year. This allows students to study the unique plants and animals that exist in the northeastern United States, an area that is in danger of losing many of its parks due to urban expansion. Children will be attending the camp during the months of June, July, and August. They will spend the majority of time working outside collecting samples in heavily forested areas, rural streams, and high, open grasslands.

This year everything seems to be going as planned and Camp Idemic is on track to break record enrollment when disaster strikes!

WATCH: CBS News "Lyme Disease Warning from the CDC"

<http://www.cbsnews.com/news/a-lyme-disease-warning-from-the-cdc/>

Needless to say, parents and guardians around the country begin to panic. An emergency meeting is called. And, your group, with its expert knowledge in epidemiology, is expected to make a recommendation that will save this educational program!

Ask students:

1. If your child had the opportunity to attend a camp to receive an excellent education, but you knew there was a chance they would get very sick at the camp, would you still send them? Explain your answers!
2. Should doctors be required to tell their patients everything about their health? Why/Why not?
3. Should epidemiologists be required to tell a population everything about health risks? Why/Why not?

Background: Lyme Disease

More info on Lyme Disease can be found on the CDC website, WebMD, etc.

Lyme disease is a bacterial infection that is spread through the bite of one of several types of ticks.

Lyme disease is caused by bacteria called *Borrelia burgdorferi* (B. burgdorferi). Blacklegged ticks and other species of ticks can carry these bacteria. The ticks pick up the bacteria when they bite mice or deer that are infected with B. burgdorferi. You can get the disease if you are bitten by an infected tick.

Lyme disease was first reported in the United States in the town of Old Lyme, Connecticut, in 1977.

There are 3 stages of Lyme disease.

- Stage 1 is called early localized Lyme disease. The infection has not yet spread throughout the body.
- Stage 2 is called early disseminated Lyme disease. The bacteria have begun to spread throughout the body.
- Stage 3 is called late disseminated Lyme disease. The bacteria have spread throughout the body.

Risk factors for Lyme disease include:

- Doing outside activities that increase tick exposure (for example, gardening, hunting, or hiking) in an area where Lyme disease is known to occur
- Having a pet that may carry ticks home
- Walking in high grasses

Important facts about tick bites and Lyme disease:

- In most cases in the U.S., a tick must be attached to your body for 24 - 36 hours to spread the bacteria to your blood. Ticks that cause Lyme disease in Europe transmit the bacteria more quickly, within 24 hours.
- Blacklegged ticks can be so small that they are almost impossible to see. Many people with Lyme disease never even see or feel a tick on their body.
- Most people who are bitten by a tick do not get Lyme disease.

For more information on Symptoms, Exams & Tests, Treatment, Outlook (Prognosis), Possible Complications, When to Contact a Medical Professional & Prevention, see additional handout, "**MedLine Lyme Disease.**"

Recommendations

Your team is expected to prepare and present your recommendation to the camp and a panel of parents/guardians next week. All recommendations **MUST BE SUPPORTED WITH DATA** in order to obtain credit.

Rec. 1: Where in New York State will the camp be held? Why?

Rec. 2: What behaviors should kids be required to do? Why?

Rec. 3: Should kids be vaccinated before camp? If, so which vaccine should they be required to receive? Why?

Research

Assign one person on the team to be in charge of addressing each question below. By next class period, the "owner" of each question must have their **section** completed along with an answer and quick explanation.

Learning Questions	Owner(s)	Answer and Quick Explanation
Rec. 1 (section 1) Where in New York State will the camp be held?		
Rec. 2 (section 2) What behaviors should camp kids be required to do?		
Rec. 3A (section 3A) Which vaccine is most effective at protecting against Lyme Disease?		
Rec. 3B (section 3B) Which vaccine is least likely to cause anaphylactic shock?		

Section 1: Determining Location

Directions: Use the websites below to answer each of the questions. **Data must be used to back up all your answers!**

1. Which states in the United States are most at risk of Lyme disease? Why?

RESOURCE 1: <http://www.cdc.gov/ncidod/dvbid/lyme/epi.htm>.

2. Camp Idemic will be held somewhere in New York State, which county will you recommend for the camp location? Why? (There are over 60 counties in New York)

RESOURCE 2: <http://www.health.ny.gov/statistics/chip/>



3. Did you use primary or secondary data make your decision? Explain your answer.

Section 2: Determining Behaviors

Directions: Use the data from each study to decide which behaviors students at the camp should be required to practice while they are in attendance. Make sure not to choose behaviors that will waste valuable learning time. **Data must be used to back up all your answers!**

Since humans contract Lyme disease from ticks, a recent case-control study looked at several different risk factors associated with getting ticks. Participants in the study were workers who spent the majority of their time in locations where wood ticks are commonly found. These participants were separated into groups based on whether they had gotten a tick in a given period of time. Then, they were interviewed about specific risk factors they practiced during that time. Use the data below to find out which risk factors will be most important.

- Some scientists believe that wearing light colors allows people to spot ticks on their clothing more easily and therefore remove them before a bit occurs. This allows them to avoid contracting Lyme disease.

Time period: 2.0 weeks

Remind students that they should refer back to Lesson 9.8 (Relative Risk) if they are having trouble recalling the calculation or need to see a reminder model.

	Tick	No Tick
Wear dark colors	383	25,680
Wear light colors	235	20,128

$RR = 0.0147/0.0115 = 1.28$
 Those who wear darker colors are 1.28 times more likely (or 28% more likely) to get bitten by a tick than those who wear light colors.

- People have argued about the effectiveness of bug spray and insect repellent for years. Many believe it deters ticks from prying on those who wear it, therefore allowing them to avoid Lyme disease.

Time period: 7.0 weeks

	Tick	No Tick
No Bug spray	345	4,255
Bug spray	162	2,027

$RR = 0.075/0.074 = 1.01$
 Those who do not use bug spray are equally likely to get bitten by ticks than those who do use bug spray

3. Hikers often recommend wearing long sleeve shirts to reduce the amount of exposed skin while in the woods. Theoretically, this is supposed to prevent ticks from gaining access to the skin, and therefore prevent them from having the opportunity to bite and infect people with Lyme disease.

Time period: 5.5 weeks

	Tick	No Tick
No long sleeves	28	294
Wear long sleeves	35	2,333

RR = 0.045/0.014 = 3.0
 Those who do not wear long sleeves are 3 times more likely to get bitten by ticks than those who do wear long sleeves

4. Many people believe having long hair gives ticks a place to latch on to and hide. This, in turn, may increase the likelihood that ticks will infect these people with Lyme disease.

Time period: 4.2 weeks

	Tick	No Tick
Long hair	198	4,714
Short hair	290	3,020

RR = 0.040/0.088 = 0.45

 In this case a number less than 1 (way less!) indicates the inverse relationship may have been occurring. If we flip the equation (as if we were testing how short hair, as the exposure or risk factor, is related to tick bites, we would arrive at an RR of 2.2.

Section 3A: Which vaccine works best?

Directions: Use the data from each study to decide which vaccine is most effective in protecting victims against Lyme disease. **Data must be used to back up all your answers!**

Currently, there is only one vaccine that exists to protect against Lyme disease. However, controversy surrounding the effectiveness of the vaccine has led to a halt in production. Consider the results of the cross-sectional studies below on 3 new versions of the vaccine. For each study, a group of people were monitored, some who had the vaccine, others who did not, for a given time period. During the time period, researchers constantly tested for Lyme disease and recorded the number of cases in each group. Use the data to determine which version protects best against Lyme disease.

Vaccine A

Time period: 3.0 months

	Lyme Disease	No Lyme Disease
No Vaccine A	152	1,266
Vaccine A	821	91,222

Vaccine B

Time period: 8.0 months

	Lyme Disease	No Lyme Disease
No Vaccine B	38	253
Vaccine B	21	350

Vaccine C

Time period: 5.0 months

	Lyme Disease	No Lyme Disease
No Vaccine C	12	133
Vaccine C	46	5,111

Section 3B: Which vaccine is most safe?

Directions: Use the data from each study to decide which vaccine is most safe for people to take without suffering from dangerous side effects. **Data must be used to back up all your answers!**

Currently, there is only one vaccine that exists to protect against Lyme disease. However, recently, production of the vaccine was stopped due to complaints about side effects. One such side effect is called anaphylactic shock. It is an allergic reaction that can cause swelling, breathing problems, and, in some cases, even death. Therefore, researchers are testing 3 new vaccines to be used this year. For each study, a group of people were monitored, some who had the vaccine, others who did not, for a given time period. During that time, researchers checked for anaphylactic shock in all groups. Use the data to determine which vaccine is safest.

Vaccine A

Time period: 8.0 weeks

	Anaphylactic shock	No Anaphylactic shock
Vaccine A	63	787
No Vaccine A	96	4800

Vaccine B

Time period: 12 weeks

	Anaphylactic shock	No Anaphylactic shock
Vaccine B	24	200
No Vaccine B	13	4333

Vaccine C

Time period: 15 weeks

	Anaphylactic shock	No Anaphylactic shock
Vaccine C	121	930
No Vaccine C	84	933

Presentations:

Prepare a 5-minute oral and visual presentation to Camp administrators, parents, and the general public including your 3 recommendations:

Rec. 1: Where in New York State will the camp be held? Why?

Rec. 2: What behaviors should kids be required to do? Why?

Rec. 3: Should kids be vaccinated before camp? If, so which vaccine should they be required to receive? Why?

Powerpoint is the recommended tool for creating the visual portion of the presentation. Be SURE to include specific relative risk data as supporting evidence, both verbally and visually. An example slide is below:

Example: Behaviors

	Lyme Disease	No Lyme Disease
Wear perfume	40.	20405
No perfume	37.	42082

RR = 2.2

Behaviors

Studies show people who wear perfume are 2.2 times more likely to get Lyme disease than those who do not.

Students will NOT be allowed to bring perfume to Camp Idemic

Rubric:

The rubric can be modified and tailored as needed to individual instructor needs and grading policies/criteria.

Obj. 9.11: Apply relative risk analysis to make public health recommendations for an at-risk community.

	Needs Improvement	Emerging Mastery	Partial Mastery	Mastery
RELATIVE RISK DATA	Achieved 0 of 3 factors	Achieved 1 of 3 factors: 1) Accurate calculations 2) Meaning of relative risk numbers clearly & accurately communicated 3) RR's explained orally and presented visually	Achieved 2 of 3 factors: 1) Accurate calculations 2) Meaning of relative risk numbers clearly & accurately communicated 3) RR's explained orally and presented visually	Achieved 3 of 3 factors: 1) Accurate calculations 2) Meaning of relative risk numbers clearly & accurately communicated 3) RR's explained orally and presented visually
QUALITY OF CONCLUSIONS (Follows C-E-R format)	Achieved 0 of 3 factors	Achieved 1 of 3 factors: 1) Clear and thorough Claim 2) Accurate and aligned Evidence ; 3) Logical & useful Warrant	Achieved 2 of 3 factors: 1) Clear and thorough Claim 2) Accurate and aligned Evidence ; 3) Logical & useful Warrant	Achieved 3 of 3 factors: 1) Clear and thorough Claim 2) Accurate and aligned Evidence ; 3) Logical & useful Warrant
QUALITY OF ORAL AND VISUAL PRESENTATION	Achieved 0 of 3 factors	Achieved 1 of 3 factors: 1) All team members participate equally and transitions are smooth and professional 2) Communication is easy to understand and engaging 3) Professionalism is evident through preparation of visual and oral portions	Achieved 2 of 3 factors: 1) All team members participate equally and transitions are smooth and professional 2) Communication is easy to understand and engaging 3) Professionalism is evident through preparation of visual and oral portions	Achieved 3 of 3 factors: 1) All team members participate equally and transitions are smooth and professional 2) Communication is easy to understand and engaging 3) Professionalism is evident through preparation of visual and oral portions

Consider requiring each group & individual to evaluate themselves on the rubric.