



Lesson 1.5

The Usual Suspects

Estimated time: Two 50 min periods

Instructional overview

Using information from peer presentations, students will identify the ten most common foodborne pathogens and recognize the differences among each type of illness.

Instructional objectives

1. Explain the difference between an infection, intoxication and toxin-mediated infection.
2. Identify the ten most common or dangerous foodborne pathogens.
3. Work in the Investigative Teams to research one of the ten most common pathogens and present findings to the class in the form of a news report.
4. Access available information that consumers might use to learn about foodborne illness.

Assessment

Students will be assessed in two different ways in this lesson. Students will assess the presentations by other groups according to the grading rubric provided. Teachers also will assess each student based on the rubric provided. Students will be evaluated based on their class participation, quality of their group's presentation, and attentiveness to other presentations. Teachers may choose to incorporate student assigned grades as a part of the overall grade for the assignment. Student groups must earn at least three points according to the group presentation scoring criteria.

Relevant learning standards - NSES-C

Equipment, supplies, and materials

1. PowerPoint Presentation - PPT 1.5.
2. Disease Fact Sheets from "the Bad Bug Book" (Set of 10).
3. Case Notes 1.5 - one per student or use ppt template.
4. Investigation Activity 1.5 - one per student or use ppt template.
 - "Investigation of a Foodborne Illness" form - several per student.
 - "Peer Review" form - one per student.

References and background information

1. Marler Clark law firm focusing on foodborne illness trials.
<http://www.marlerclark.com/videoclips.htm>
2. U.S. Food and Drug Administration Bad Bug Book: <http://vm.cfsan.fda.gov/~mow/intro.html>
3. Food Safety and Inspection Service Web Glossary: <http://www.gsis.usda.gov/help/index.asp>

4. Department of Health, Center for Disease Control:
<http://www.cdc.gov/ncidod/dbmd/diseaseinfo/>
5. GAPsNET www.gaps.cornell.edu

Interest approach

If possible view video clips from the Marler Clark law firm’s website <http://www.marlerclark.com/videoclips.htm>. The video clip “*E. coli* in salad” tells the story of a girl developing kidney failure after consuming salad contaminated with *E. coli*. Additional reading articles are available if the video does not work or if a written article is desired. www.fda.gov/bbs/topics/NEWS/2006/NEW01450.html

Classroom Procedures

Teaching procedures	Content
<p>Briefly review materials from previous lesson.</p> <p>Have students turn in Homework Assignment 1.1. Use their homework as a springboard for discussion.</p> <p>Ask students to share some details from their “Eye Witness Account” homework assignment.</p> <p>Remind students about the importance of reporting the facts and not sensationalizing or dramatizing a situation.</p>	<p>Students should be able to tell:</p> <ul style="list-style-type: none"> • What FATTOM stands for and why it is important in food microbiology. <p>What foodborne illness outbreak did you find? Was the cause identified? Do you think the article you found presented the information in an unbiased manner?</p>
<p>State expectations for today’s lesson.</p>	<p>It is time to learn more about the green onion outbreak and other foodborne illnesses. By the end of today’s investigation you will be able to:</p> <ol style="list-style-type: none"> 1. Explain the difference between an infection, intoxication and toxin-mediated infection. 2. Name the ten most common foodborne pathogens.
<p>Handout Case Notes 1.5 or show the ppt template to help students organize their notes.</p> <p>Use the Case Notes to record the definitions of infection, intoxication and toxin-mediated infection, and review the term toxin.</p> <p>Toxin: A poisonous substance produced by bacteria or molds.</p> <p>The glossary in Appendix C contains all definitions presented in the Unit.</p>	<p>Microorganisms that cause illness are pathogens, but how do the pathogens make you ill?</p> <p>There are three ways a pathogen can make you sick:</p> <ol style="list-style-type: none"> 1. Infection: Caused by eating food contaminated with living pathogenic microorganisms. The infection is caused from the colonization of the host’s intestines by the pathogenic organisms. Examples of organisms that cause foodborne illness by infection include bacteria such as: <i>Salmonella spp.</i> and <i>Listeria monocytogenes</i>.

	<p>2. Intoxication: Caused by eating food containing toxins produced by bacteria and molds. When these bacteria grow in foods, they produce a toxin. The organism does not need to be present or alive in the food (but it could be) when it is consumed because what makes a person ill is the toxin in the food, not the organism. Examples of bacteria that cause food intoxications are <i>Staphylococcus aureus</i> and <i>Clostridium botulinum</i>.</p> <p>3. Toxin mediated infection: Caused by eating food that contains bacteria that produce toxin(s) in the human intestines. The bacteria and their toxins cause illness. You must eat food containing the living microorganism, which, once consumed, produces the toxin while it is in the body. Examples include <i>Clostridium perfringens</i> and <i>E. coli</i> O157:H7.</p>
<p>Have students get together with their Investigative Teams.</p> <p>Instruct students not to reveal their organism to any other team.</p> <p>Hand each Investigative Team a Fact Sheet for a microorganism from the list below:</p> <ol style="list-style-type: none"> 1. <i>Clostridium botulinum</i> 2. <i>Campylobacter jejuni</i> 3. <i>E. coli</i> O157:H7 4. <i>Clostridium perfringens</i> 5. <i>Salmonella</i> spp. 6. <i>Shigella</i> spp. 7. <i>Staphylococcus aureus</i> 8. <i>Cryptosporidium parvum</i> 9. Norwalk Virus Family, Norovirus 10. Hepatitis A <p>All can be found in the US FDA CFSAN “Bad Bug Book” fact sheets provided or: http://www.cfsan.fda.gov/~mow/intro.html</p>	<p>Use the Fact Sheet to research the assigned microorganism(s). Create and present a news report about a foodborne illness outbreak caused by the specific microorganism.</p>

Optional Extension Activity

If your class is not able to present all 10 of the microorganisms listed in this lesson, you may choose to have additional copies of the fact sheets available and give them to the students to complete their Investigation of a Foodborne Illness forms as homework.

Make sure that your news report is a factual representation of what might actually have happened. To help you do this, fact sheets will be provided for each of the microorganisms.

Each news report should reveal the following:

- Unusual or potentially dangerous food the person ate that day or the preceding days before getting ill.
- Where the food was eaten (home, restaurant, etc).
- How the food was packaged, stored, handled, or prepared.
- Other foods that were prepared or eaten at the same time as the suspect food.

Other questions to answer in the presentation:

1. Where did the microorganism originate?
2. How does this microorganism cause illness?
3. What happens to the microorganism inside the body? (Do they reach the intestines, attach to their walls, and begin to multiply? Do they produce toxins? Do they invade deeper body tissues?)
4. How long does it take to experience illness symptoms?
5. What are some common symptoms associated with this disease? (Nausea, vomiting, abdominal cramps, diarrhea etc.)
6. Who does it affect most severely? (Infants, elderly, people with weak immune systems due to illness, etc.)

The entire story including reporting location needs to be presented. For example, the news report can be done on location at a doctor's office, emergency room, ill person's home, news desk, or some other location. The news report should take no longer than five minutes and should include enough factual details to help the rest of the class fill out their "Investigation of a Foodborne Illness" forms. Have fun and be creative!

<p>Before beginning presentations, handout Investigation Activity 1.5 or show ppt template to help students organize their notes.</p> <p>Note: There are several pages:</p> <ul style="list-style-type: none"> • Investigation of a Foodborne Illness form should be added to student Case File. • Peer Review form should be collected at end of lesson. 	<p>During the presentations each student is expected to:</p> <ol style="list-style-type: none"> 1. Pay attention and be respectful to the presenters. 2. Use Investigation of a Foodborne Illness form to record important information about each illness. 3. Record assessment grades of each group's presentation based on the criteria on the Peer Review form. <p>5 Points: Group provided details about their assigned microorganism and the foodborne illness it causes. The presentation was clear and accurate describing at-risk populations, foods involved in transmission, time to symptom onset, and symptoms of a specific foodborne illness. They also cited several ways the foodborne illness could be prevented.</p> <p>3 Points: Group provided some details about their assigned microorganism and the foodborne illness it causes. The presentation described at-risk populations, foods involved in transmission, time to symptom onset, and symptoms of a specific foodborne illness but the presentation was not easy to understand. They only cited one way to prevent the foodborne illness.</p> <p>1 Point: Group provided few or no details about their assigned microorganism or the foodborne illness it causes. The presentation was vague or inaccurate and did not mention at-risk populations, foods involved in transmission, time to symptom onset, or symptoms of a specific foodborne illness. No prevention strategies were discussed.</p>
<p>Summarize.</p>	<p>Review:</p> <ul style="list-style-type: none"> • Definitions of infection, intoxication and toxin-mediated infection. • Why some segments of the population are more susceptible than others.
<p>Context with future instruction.</p>	<p>Now that we know which microorganisms are likely to cause foodborne illness, we are going to move our training activities into the field and determine how contamination can occur.</p>

Alternative writing activity	<p>Writing Situation: In class you read an article discussing a recent foodborne illness outbreak. The end of the article asks for opinions and responses.</p> <p>Writing Directions: Think about the food science and food safety information discussed in class. What are some ways people can reduce risks related to foodborne illnesses? Write a 3 -5 paragraph letter to the local newspaper and explain ways consumers can reduce the risk of foodborne illness in their home. Provide examples and details to help the general public understand how to better handle food.</p>
Reflection for future use.	



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Case Notes 1.5

Name: _____ Date: _____

Infection: _____

Example of microorganism that causes foodborne illness by infection: _____

Intoxication: _____

Example of microorganism that causes foodborne illness by intoxication: _____

Toxin-mediated infection: _____

Example of microorganism that causes foodborne illness by toxin-mediated infection: _____

Toxin: _____



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Investigation Activity 1.5

Name: _____ Date: _____

Directions: Use the Fact Sheet provided to research the microorganism assigned to your group. As a group, create and present a news report about a foodborne illness outbreak caused by the microorganism. The news report can be done on location at a doctor's office, emergency room, ill person's home, news desk, or some other location. The news report should take no longer than five minutes and should include enough factual details to help the rest of the class fill out the Investigation of a Foodborne Illness form for each disease.

Each news report should reveal the following:

- Unusual or potentially dangerous food the person ate that day or the preceding days before getting ill.
- Where the food was eaten (home, restaurant, etc).
- How the food was packaged, stored, handled, or prepared.
- Other foods that were prepared or bought at the same time as the suspect food.

Other questions to answer in your presentation:

1. Where did the microorganism originate? _____
2. How does this microorganism cause illness? _____

3. What happens to the microorganism inside the body? (Do they reach the intestines, attach to their walls, and begin to multiply? Do they produce toxins? Or do they invade deeper body tissues?) _____

4. How long does it take to experience illness symptoms? _____

5. What are some common symptoms associated with this disease? (Nausea, abdominal cramps, diarrhea, etc.) _____
6. Who does it affect most severely? (Infants, elderly, people with weak immune systems due to illness, etc.) _____

Have fun and be creative!

Investigation Activity 1.5

Name: _____ Date: _____

Directions: Fill out the required information in the boxes below for each foodborne illness presented.

1. Disease name:	2. Name of bacterium, virus, or parasite responsible:	3. How does the microorganism cause illness? Check one below: Infection Intoxication Toxin-mediated infection																			
4. Incubation period:		5. Susceptible populations:																			
6. Implicated food(s):	7. Location of exposure:	8. Contributing factors:																			
9. Symptoms: <table border="1" data-bbox="204 1325 782 1755"> <tr><td>Nausea</td><td></td></tr> <tr><td>Vomiting</td><td></td></tr> <tr><td>Abdominal cramps</td><td></td></tr> <tr><td>Diarrhea</td><td></td></tr> <tr><td>Fever</td><td></td></tr> <tr><td>Bloody stool</td><td></td></tr> <tr><td>*</td><td></td></tr> <tr><td>*</td><td></td></tr> <tr><td>*</td><td></td></tr> </table>		Nausea		Vomiting		Abdominal cramps		Diarrhea		Fever		Bloody stool		*		*		*		10. Duration of illness:	Additional comments:
Nausea																					
Vomiting																					
Abdominal cramps																					
Diarrhea																					
Fever																					
Bloody stool																					
*																					
*																					
*																					



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Investigation Activity 1.5

Name: _____ Date: _____

You are assigning each group a grade of 1-5 (5 = highest, 1 = lowest) based on the following criteria:

5 Points: Group provided details about their assigned microorganism and the foodborne illness it causes. The presentation was clear and accurate describing at risk populations, foods involved in transmission, time to symptom onset, and symptoms of a specific foodborne illness. They also cited several ways the foodborne illness could be prevented.

3 Points: Group provided some details about their assigned microorganism and the foodborne illness it causes. The presentation described at risk populations, foods involved in transmission, time to symptom onset, and symptoms of a specific foodborne illness but the presentation was not easy to understand. They only cited one way to prevent the foodborne illness.

1 Point: Group provided few or no details about their assigned microorganism or the foodborne illness it causes. The presentation was vague or inaccurate and did not mention at risk populations, foods involved in transmission, time to symptom onset, or symptoms of a specific foodborne illness. No prevention strategies were discussed.

Once all of the groups have completed their presentation, you will turn this sheet in to your teacher. Then place your “Investigation of Foodborne Illness” form for each of the microorganisms in your Case File for future reference.

Group Number	Group Members	Foodborne Illness Report	Grade Awarded
1			
Comments			
Group Number	Group Members	Foodborne Illness Report	Grade Awarded
2			
Comments			

Group Number	Group Members	Foodborne Illness Report	Grade Awarded
3			
Comments			
Group Number	Group Members	Foodborne Illness Report	Grade Awarded
4			
Comments			
Group Number	Group Members	Foodborne Illness Report	Grade Awarded
5			
Comments			
Group Number	Group Members	Foodborne Illness Report	Grade Awarded
6			
Comments			
Group Number	Group Members	Foodborne Illness Report	Grade Awarded
7			
Comments			
Group Number	Group Members	Foodborne Illness Report	Grade Awarded
8			
Comments			
Group Number	Group Members	Foodborne Illness Report	Grade Awarded
9			
Comments			
Group Number	Group Members	Foodborne Illness Report	Grade Awarded
10			
Comments			