# OUTBREAK!

## Scene 1

Narrator: Kendra is the public health officer for the quaint rural town of Mapleville. She walks into her office and notices her phone blinking. She presses the button and smiles when she hears Natalia's voice but her face quickly tenses.

Natalia: Kendra, this is Natalia. I thought I should call you because you might know what is going on. I just picked up my daughter from school and she was so scared. She said her stomach wasn't feeling well and that her diarrhea was red. She said a few of her friends at Harpers Elementary weren't feeling well either. I'm getting a little nervous. Give me a call back if you hear anything.

Narrator: The phone rings.

Kendra: Hello, county public health office.

Nurse: Hello, this is Nurse Hudgepudger from the senior home. We have three seniors with bloody diarrhea. They are very ill.

Kendra: Well, please make sure they are well hydrated and keep an eye on their progress. Have the doctor check them and if they get worse, bring them to the hospital. Please keep me posted.

Narrator: Kendra has hardly set the phone down when it rings again. This time it is an elementary school principal.

Principal: Hello, this is Principal Hatcher. I have had to send five children home because they had diarrhea.

Kendra: Please describe those bowel movements.

Principal: They were very loose stools, and three of the five were bloody.

Kendra: How old were the students?

Principal: They were all in kindergarten or first grade. And by the way, we have had very high absenteeism in those lower grades the last few days.

Kendra: Thanks for letting me know. Send those kids to the doctor and keep me posted.

Narrator: Kendra then picks up the phone and calls the ER doctor in town.

Doctor: Hello, Dr. Fletcher speaking.

Kendra: Hi, Dr. Fletcher, this is Kendra from the county public health department. I'm wondering if you have seen an unusual number of cases of severe diarrhea in the last few days.

Doctor: Why, yes we have; in fact, there have been close to a hundred. We also have some children seriously ill with hemolytic uremic syndrome. We have yet to figure out the pathogen that might be causing this. And what could be the source of the problem?

Kendra: Well, I hope to get back to you soon about that. I'm putting together a list of questions to survey people in the community about risk factors. Could you please give me the names of the sick people? And could you please do some stool tests for possible pathogens? Thank you for all your assistance, Dr. Fletcher.

Narrator: Kendra hangs up the phone and begins to create a survey.

Kendra: Hmmm, I wonder what types of questions I should use to find out how the citizens are contracting this pathogen. I hope this survey works to solve the mystery of this devious pathogen.

Narrator: Kendra already suspects one particular pathogen. But this is more work than she can handle on her own, and it is urgent. Lives are at stake. She picks up the phone and calls the Super Crew.

Kendra: "Hi, this is Kendra, and we have a problem. Get started now and I'll keep you posted on any changes. Good Luck!"

## Questions for Scene 1

1) Give definitions for the following words:
   a. Pathogen
   b. Epidemic
   c. Diarrhea
   d. Hydration
   e. Bowel movement

2) What is a public health officer? What is the role of the county public health department?

3) Describe the role of the kidneys. Hypothesize why kidney malfunction might be present in the patients at Mapleville General Hospital.

4) Make a list of the pathogens that could cause the symptoms described in the case. From this list, create a hypothesis stating which pathogen is causing the illness in Mapleville. State the evidence that supports your hypothesis.

5) What should parents do if a child has diarrhea?

6) What are the most common ways people are infected by the pathogen you listed in #3?

7) What are the most common ways people are infected by other pathogens that cause diarrheal diseases?

8) Research and describe types of questions that you can use in a survey (Yes/no, True/false, etc.)

9) Based on your answers to #4 and #5, create a survey which asks people about ways they may have been exposed to a pathogen. The survey should ask them about 8-12 different sources of exposure.

**Scene 2**

Natalia: Hey Kendra. I've got some bad news Crystal is in the hospital and in critical condition. The doctors say that she could die. This is horrible. I hope you can figure this out before anyone else gets sick.

Kendra: I 'm so sorry, Natalia. I have my best people trying to figure this thing out. Every second counts in these situations. Crystal will be in our thoughts as we work. Call me if anything changes and take care of yourself.

Narrator: Kendra picks up the phone and dials the Super Crew.

Kendra: I have bad news. Things are getting worse down here. On Sunday, I received 100 calls. Forty people have been admitted into the hospital, and six children under five have died. I spent all weekend using your surveys and calling people in the community. I'll fax the results right over to you. I got stool tests back from the hospital, and they are all testing positive for E.Coli O157:H7. Good work. But we still have to figure out where the pathogen is coming from so we can stop transmission. Use the information I sent you to find out the source of this epidemic. Good Luck!

| **Variable** | **Risk Ratio** | **p value** |
|---|---|---|
| Family member attendance at day care | 2.12 | 0.0777 |
| Family member work at nursing home or institution | 1.29 | 0.4076 |
| Pets at home | 1.07 | 0.6304 |
| Ate hamburger or ground beef | 0.75 | 0.1071 |
| In contact with individuals outside of household ill with diarrhea | 1.21 | 0.2666 |
| Consumed drinking water from the tap at home | 2.79 | <0.0001 |
| Brushed teeth with tap water | 3.14 | <0.0001 |
| Washed hands with tap water | 3.2 | <0.0001 |
| Played with water balloons using tap water | 2.86 | 0.0341 |

## Questions for Scene 2

1) Define the following terms:
   a. E. Coli
   b. Stool test
   c. Transmission
   d. Statistics

2) Research the use and importance of the p value in statistics.

3) What is the number for the p value that shows a significant result? If a p value is higher or lower than this number, is it significant?

4) Make a list of the significant risk factors (variables) for becoming ill in Mapleville.

5) Using your list, hypothesize the way people have been infected by E. Coli in Mapleville. Support your hypothesis with evidence.

6) Based on your knowledge of E. Coli and the route of exposure, suggest action the townspeople can take to prevent further infection.

## Scene 3

News Report

Chiante: Hi, this is Chiante Kirkland from News 7. Public health practitioners have determined that the epidemic in Mapleville has killed 7 children under 5. The cause of their death was hemolytic uremic syndrome brought on by E. Coli O157:H7 infection found in drinking water.

How the drinking water system in Mapleville became contaminated is still unknown. Water officials in Mapleville contest that their water system is pure and that there is no possible source of contamination, but public health official Kendra March, based on information provided her by her Superb Southside Super Crew, contests that assertion. Ms. March is currently examining local maps to determine the source of groundwater contamination. Because Mapleville's municipal water system is a rural system using exclusively groundwater from wells, there is no comprehensive drinking water treatment plant in Mapleville.

In local weather, we are finally drying out after those heavy rains 2 weeks ago.

In other news, a local farmer complains that his irrigation water has disappeared.

Farmer: Ah don't know how it been done, but I shore is suspect of that new well. Ever since they build that well for the city water, all my ponds went dry. Now the cows, they just walkin' around on that dry pond.

## Questions for Scene 3

1) Hypothesize how the water in Mapleville became contaminated. Create two scenarios based on the facts of the case which give a plausible pathway for E. Coli to enter the groundwater or the city wells.

2) Create a public service announcement telling the people of Mapleville what has happened and what they should do to prevent the spread of disease.

**Epilogue (Optional)**

Kendra: Hello, county public health office.

Natalia: Hey Kendra, it's Natalia. Just wanted you to know that Crystal is doing fine. We all heard about the Boil Water Advisory you issued, and we're all boiling all our water. Thanks for your work on this.

Kendra: It's so good to hear about Crystal. Yeah, about 95% of people in Mapleville are boiling their water now, and it seems that the emergency has passed.

Natalia: I heard that the water got contaminated with cow feces. How did that happen? And how could that make people sick?

Kendra: Well, one of the municipal wells is served by a shallow aquifer that drew from a swampy area and, unfortunately, a nearby farm. Also, it seems that a second well may have been hydraulically connected to a farm pond. With the heavy rains, the wells became contaminated with animal feces. We collected samples from the wells and found several that were very contaminated with *E. coli*. We also visited the farms near the wells. Eleven of thirteen farms had animals with either *E. coli* 0157:H7 or campylobacter.