

Microbial Pie, or What *Did* You Feed the Neighbors?

by
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Part I – Emergency Room

Frank Spring knew this was not going to be a good morning as he looked out into the packed ER waiting room. Scattered among the usual collection of cuts, broken bones, and respiratory problems were over a dozen people clustered around the restrooms. Despite their pale appearance and frantic dashes into the restrooms, they were all talking with each other—not usual behavior for a group of strangers in the ER. Several others held young children.

“Morning, Sam. What have we got?” Frank asked.

Sam looked up from the pile of charts. “The usuals, but then one strange bunch,” he replied. “Those folks have been drifting in over the last hour or so. Symptoms are abdominal pain, vomiting, and bloody diarrhea. Most of the adults are just a bit uncomfortable. The kids have it the worst. Four little ones came in around midnight with the same symptoms—only worse. Two are in Peds. The other two are on dialysis already.”

Frank’s eyebrows rose. “Put in a call...”

Sam cut him off. “Called the county after number three came in last night. The epidemiologist will be here inside of an hour. We’ve already taken stool samples. They’re in the lab now.” He handed Frank three charts. “These belong to the kids over there with the woman in the red jacket, Cara Hom. They just came in, but the youngest looks bad, lots of bruises as well as the other symptoms.”

Frank took the charts and walked over to her. “Mrs. Hom, will you come this way, please.”

Cara Hom tried to pick up the collection of children’s coats scattered on the floor around her.

“Go on, Cara, get the kids looked at,” said a woman from across the room. “We’ll watch your stuff.”

“Thanks,” Cara replied, lifting the whimpering toddler into her arms. She followed Frank down the hall.

Frank took advantage of the opening: “You folks all seem to know each other,” he said.

Cara looked puzzled. “You know, that’s odd. I think we have half the neighborhood here. We all thought the kids had just brought the flu home from school, but it’s a lot more than that, isn’t it?” she asked, half not wanting an answer.

“Let’s take a look at the kids and find out,” he said as he led them behind curtain three. “Don’t jump to conclusions.”

Two hours and many patients later, Frank, Sam, and Ami von Hoffer, the epidemiologist, sat together poring over the information they had gathered. Ami pulled out a marker and started charting on the board.

“Okay, we have 28 patients admitted, all under age 10. Their parents and any older siblings have some intestinal distress, but mild compared to the admissions. What else do we know?” She looked over at the two men as they scanned the charts.

“The children are all showing symptoms of some kind of hemolytic anemia. There are bruises and small hemorrhages visible in the mucosal lining of the mouth. RBC, hemoglobin, and platelet counts are all way down.” Sam just shook his head. “Poor kids. Looks like the intestinal lining is being attacked by something. Food poisoning?”

“The youngest are beginning to show signs of kidney failure. Is that typical?” asked Frank.

“Have the lab cultures turned up anything yet?” Ami asked just as a tech pushed open a door, a sheath of papers clutched in her hand.

“Here are the prelims,” she said. “No major parasites, a few pinworms, but that’s not unusual. Did find positives for O26:H11. Looks like you have an enterohemorrhagic *E. coli*. Same strain as the beef outbreak up north last month. Have fun.”

“Great, food poisoning. Now I have to track down the source.” Ami pulled out the laptop and opened a file. “Looks like a long day. Can you start sending in the parents who are out there.”

Questions

1. What is the most common source of contamination with *E. coli*?
2. At this point, can you make some preliminary guesses as to the source of the infection?
3. What information should Ami gather from the victims and their families?
4. Why do children seem to be the most ill?
5. How does this bacterium damage its victims?

Part II – Clean Kitchen?

Two days later, Ami knocked on the door of a neat house in the neighborhood of the sick children. The one thing all the victims had in common was strawberry pie. Miss Emma Braithwaite, well into her eighties, had promised the neighborhood children fresh strawberry pie in exchange for them picking berries from her backyard. Miss Emma's pies were well loved by everyone. So, the children had picked berries, and Miss Emma had made over a dozen pies to share. Unfortunately, a pinch of *E. coli* seems to have been added to the usual ingredients.

The door was opened by a small woman with snowy hair and snapping eyes. "May I help you, miss?" she asked.

"Yes, ma'am. I am looking for Miss Braithwaite. I am Dr. Ami von Hoffer. I'm with the county."

"Come in, come in. I heard you've been talking with the neighbors about the sick children. Have you found out the problem?" Miss Emma held the door open.

Ami entered the spotless house. This was the part of her job she really disliked. "That's what I've come to talk to you about. We've tracked the illness to a bacterium that produces a nasty toxin. It causes a type of food poisoning."

"I don't know anything about food poisoning," Miss Emma remarked as she offered Ami a chair. "Only food. I used to be a cook. May I offer you a bite to eat? I was just about to have some pie."

Ami schooled her features. "You haven't eaten any of the pie yet, have you?" she asked.

"Child, I can hear it in your voice. What are you not telling me?" Miss Emma sat rigidly down in a straight-backed chair near the window.

"Ma'am, we think the bacteria came from the strawberry pies you made. It is the only thing everyone ate. Please tell me you haven't eaten any. If you still have some, I need to sample it."

Miss Emma sat even straighter. "I keep a clean kitchen. Different knives between raw meat and fresh produce. Wipe down the cutting board between foods. I pay attention, so don't you try to tell me I poisoned someone."

"Ma'am, we didn't say you poisoned anyone, but we are concerned the berries may have been contaminated. Please, you haven't eaten any, have you? No offense, but at your age food poisoning could be very serious."

"Bah, I keep a clean kitchen. I washed all the berries well." Miss Emma got slowly up from her chair. "Come see my kitchen."

"There was an outbreak of this same strain up north last month. It came from hamburger. Have you had any hamburger lately?" Ami followed her into the kitchen. Like the rest of the house, it was spotless and smelled faintly of some cleaner. The aroma brought back memories of her grandmother's house.

Miss Emma stopped short. "I had some hamburger that thawed in the refrigerator. It leaked all over. I threw it out because I didn't trust it. Made a right mess in the kitchen. Scrubbed it all down before I made the pies. Same cleaner I've been using for years. No one ever got sick before. Go right ahead and run your little swabs along the counter. Right there is where I made the pies."

Questions

1. Based on this additional information, how do you think the pies became contaminated?
2. Think about the hand-washing lab. Based on the results, could this be a source of contamination?
3. What would you expect from the cultures of the counter?
4. What other objects would you culture in the kitchen? Why?
5. What would you expect to find from the kitchen samples?
6. Miss Emma cleans well. How is it that some *E. coli* survived? Think about the results you got from the antimicrobial lab.
7. What could be changed to prevent this from happening again?



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