

► PRESIDENT'S MESSAGE



Scott E. Holmes,
MS, REHS

Sometimes You Need More Than a Three-Legged Stool

The NEHA Epi-Ready Course uses the three-legged stool analogy representing collaboration between environmental health specialists, epidemiologists, and laboratory staff to solve foodborne outbreaks (Figure 1). Environmental public health often needs to collaborate with many partners to solve environmental exposure mysteries. And at times, I can forget that people who were exposed are not just cases and data used to identify the source of the exposure—they are real people who became sick or hospitalized.

In this month's true story, some liberty was taken to elucidate how an environmental exposure affected one family.

Saturday, 5:00 p.m.—Finally!

Andrea's kids, Billy and Sparrow, were super excited! They were finally on the way to the annual town picnic to hang out with friends, eat BBQ turkey, and chow down on delicious homemade desserts. Their dad, Jack, was already at the firehall cooking the 25 turkeys that had thawed for 2 days at room temperature.

Saturday, 5:30 p.m.—Picnic

Andrea parked the car, and Sparrow and Billy immediately jumped out and ran for the park. The weather was perfect for a picnic. Andrea dropped off her secret recipe caramel brownies at the dessert tables. She followed the enticing smell of BBQ turkey and found Jack. He said more than 400 people were expected.

Saturday, 6:10 p.m.—Turkey Time

The fire bell began ringing, and everyone knew what that meant: "Come and get it!"

Environmental public health often needs to collaborate with many partners to solve environmental exposure mysteries.

The kids jostled for the front of the line, suffering FOMO (fear of missing out) on their favorite desserts. After loading up their plates with BBQ turkey and all the fixings, the kids drooled over the homemade cream pies, fruit pies, lemon bars, brownies, and cakes of every kind. After choosing some delicious desserts, they grabbed drinks. Billy was thirsty from playing soccer, and his favorite lemon-lime drink was "on tap." He filled his cup, chugged it down, and then filled it again. The kids sat at picnic tables laughing, talking, and wolfing down their food. Most went back for another dessert, and Billy got more lemon-lime drink.

Saturday, 7:30 p.m.—The Park

Andrea and her best friend Jenny walked to the park to check on their kids. Billy was sitting on the sideline. She asked if he was okay. Billy mumbled that he was tired. She thought he ate too much or was dehydrated and asked him if he had anything to drink. Billy's response was slow and slurred but sounded

like "lemonade" and "dizzy." She asked him if he had hit his head while playing soccer. Billy responded slowly, "Maybe."

Saturday, 7:35 p.m.—Mom Radar

Andrea's "mom radar" and anxiety increased to HIGH. Jenny, a registered nurse, noticed his pupils were dilated and asked him to stand up. Billy had trouble balancing. Suspecting Billy had a head injury, Jenny said, "Let's take Billy to the emergency department." Andrea told Sparrow to get her dad Jack and to meet them at the hospital.

Saturday, 7:45 p.m.—Emergency Department

As the emergency department team swiftly assessed Billy's condition, they asked Andrea, Jack, and Billy many questions. Billy's responses were slow, his speech was slurred, and he could barely keep his eyes open. An MRI was ordered. Andrea and Jack wondered if Billy had a bad concussion.

Saturday, 8:15 p.m.—MRI

The MRI did not reveal any evidence of a head injury. The doctor asked if Billy might have consumed alcohol at the picnic. Andrea said she did not think so. Billy was admitted, and despite supportive care, his condition deteriorated. When blood was found in his urine, the doctor said Billy needed to be taken immediately to the university hospital, which was 75 miles away.

Saturday, 11:00 p.m.—PICU

The ambulance arrived at the emergency department of the university hospital, with

FIGURE 1

The Three-Legged Stool of Foodborne Outbreak Response

Foodborne Illness Response Team



Jack and Andrea not far behind. The staff asked Andrea and Jack dozens of questions. Billy could not respond to questions, his respiration was labored, and his heart rate and blood pressure were high. Billy was quickly moved to the pediatric intensive care unit (PICU). Billy's kidneys quit working. Andrea and Jack feared they might lose their son. The PICU team was doing everything possible to save his life. The doctor said she had consulted the regional poison control center and the state toxicologist, and based on Billy's symptoms and laboratory results, ethylene glycol poisoning was suspected.

Sunday, 10:00 a.m.—The Call

My wife and I were enjoying a leisurely Sunday brunch when my boss called. At least two children may have been poisoned. They were rushed by ambulance to the university hospital last night and were in critical condition. The briefing was scheduled for 10:30 a.m.

Sunday, 10:30 a.m.—Briefing

The state epidemiologist gave a quick overview. Last night, two children were seen at a small community hospital emergency department. They both had slurred speech, dizziness, dilated pupils, and lethargy. Both attended a community picnic. Based on Billy's symptoms, the doctor initially suspected a

head injury. When a second child was admitted with similar symptoms, however, he considered alcohol exposure. Blood alcohol levels were negative. Both children's conditions deteriorated, and the doctor ordered transport to the university hospital. The PICU doctor suspected ethylene glycol poisoning. Toxicologic analysis found ethylene glycol in their urine.

Over 400 people were at the picnic, including about 100 children. Some may have less acute or delayed health effects. An environmental health investigation needed to be conducted to identify the source of the ethylene glycol exposure, and every person should be interviewed to identify additional cases and potential exposures and provided guidance on seeking medical care. The response team included two epidemiologists and me, the environmental health specialist.

Sunday, 3:00 p.m.—Environmental Health Investigation

Meeting with the picnic coordinators, I explained that two children had been poisoned by ethylene glycol and asked for their help to identify the source of their exposure. The fire chief said the firehall floor heating system used ethylene glycol. After inspection, there was an obvious cross-connection: A single twist valve separated the potable water

from the floor heating system. Water from a faucet a few feet from the twist valve was used to mix the lemon-lime drink served at the picnic. I took water samples for analysis by the state environmental laboratory.

Sunday, 11:59 p.m.—Interviews and Analysis

By midnight Sunday, we completed over 300 interviews. Guidance was provided to all people interviewed on the symptoms of ethylene glycol poisoning and when to seek medical attention. Overall, 29 people met the case definition for illness, and most were children <10 years. Main symptoms were extreme fatigue (90%), extreme sleepiness (76%), unsteadiness when walking (62%), and dizziness (55%). People who drank alcohol were excluded from analysis. Only two children were hospitalized and, thankfully, they recovered fully. One food item, a lemon-lime drink, was strongly associated with illness (RR [relative risk] = 31.0), and a clear dose-response effect was found.

Water samples from the faucet found ethylene glycol levels at 9% (90,000 ppm).

Monday, 7:00 a.m.—The Pump Handle Removed

A plumber removed the cross-connection between the floor heating system and the potable water.

Epilogue

After 3 days, Andrea and Jack were overjoyed when Billy was discharged from the hospital. Sometimes the three-legged stool does not have enough legs. Environmental health specialists often need to collaborate with nurses, doctors, environmental laboratory specialists, and toxicologists, and gain the cooperation of people who were potentially exposed to solve environmental exposure mysteries.

As an aside, despite being highly toxic, ethylene glycol is a sweet-tasting, greenish-yellow liquid. Even at 90,000 ppm, it would have been undetectable when mixed with lemon-lime drink powder. Further, despite improperly thawed turkeys and potentially hazardous homemade desserts, a secondary foodborne illness was not associated with this event. 🌸

Scott E. Holmes
sholmes@neha.org