

One Tough Mudder:

Exploring Infectious Disease Transmission

by

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Sam is a 21-year-old college senior. She is in her final semester as an engineering major, and an RA for her dorm. She and the other RAs are planning to participate in a mud run as a team-building exercise, and raise money for charity. They have been training for the past four months for this event. Three days before the run, Sam receives her weekly “checkup” call from her mom, a family practice physician.

Mom: Hi Sam!

Sam: Hi Mom. How’s it going?

Mom: To tell you the truth, I’m feeling a bit tired. It’s been a very hectic week in the clinic.

Sam: What happened?

Mom: Well we weren’t sure at first. Many young, athletic-type patients came in complaining of diarrhea and vomiting.

Sam: Did you figure out what happened?

Mom: As it turns out, they had all participated in one of those mud runs at Michigan International Speedway last weekend.

Sam: So are you saying they got sick from the race?

Mom: It appears so. More than 200 of the 16,000 participants have reported have this gastrointestinal illness.

Sam: Wow, you did have a busy week. What caused the infections?

Mom: It was norovirus, the most common cause of viral gastroenteritis in the United States.

Sam: Are your patients doing okay?

Mom: Yes, thank goodness, but it got me thinking...

Sam: Thinking about what?

Mom: If I remember correctly, aren’t you and some of your friends planning to do one these mud runs soon?

Sam: Oh yeah, that’s this weekend. We’re really excited!

Mom: You know Sam, I watched one of those events, and in addition to going through mud, you have to swim through ice baths, encounter electric shocks, ...

Sam (interrupting): I know, Mom.

Mom: Anyway, as I was trying to say, I was worried about the physical hazards of the race, but now it appears that there could also be biological hazards.

Sam: Oh please, Mom. You worry too much.

Mom: Well wait, please hear me out. It seems that the infections seen here were not an isolated event.

Sam: What do you mean?

Mom: I started looking around to see if this has happened previously, and I found a report that came out earlier this month about another infection linked to a mud run.

Sam: Was it a credible report?

Mom: It was reported in the MMWR from the CDC.

Sam: English, please?

Mom: The MMWR is the *Morbidity and Mortality Weekly Report* from the Centers for Disease Control and Prevention in Atlanta, so yes, it is a credible report.

Sam: What did they say happened?

Mom: There was a mud run on a cattle ranch in Nevada. After the event, 22 runners reported gastrointestinal illness, including some that had bloody diarrhea.

Sam: That sounds serious.

Mom: It can be. One of them required hospitalization for IV rehydration and antibiotics.

Sam: How did they determine it was from the run?

Mom: The patients were a mix of military personnel and civilians, and the only common link between them all appears to be this mud run.

Sam: Did they figure out what caused the disease?

Mom: They tested patient stool samples and were able to culture *Campylobacter* from four of the samples.

Sam: Campylowhat?

Mom: *Campylobacter*, a bacterial species found as part of the normal flora of many domestic and wild animals.

Sam: Mom, I appreciate your concern, but I'm sure I'll be fine. Besides, I've been planning this for months, and millions of people run these races, and I've never even heard of this before.

Mom: I know Sam, I would just hate for anything bad to happen to you, especially in your last semester.

Sam: I know, Mom. Me too, but please don't worry so much.

Mom: I know, but I love you and it's my job to worry.

Sam: I love you, too. Oh wow, it's after nine and I have an exam tomorrow. I'd better go finish studying. Good night!

Mom: Good night, Sam, and please think about what I said.

As Sam hangs up the phone, she starts to wonder if her mom might have a point. Should she participate in the race? After a few minutes, she forgets about the race as she tackles her exam preparation.



Questions

1. Do you think Sam's mom's concerns are valid? Why or why not?
2. If you were Sam, would you decide to run the race? To help you make your decision, make a list of the pros and cons of participating.
3. If you were to participate in such a race, name three things you could do to decrease your risk of exposure to infectious agents.
4. If you were the organizer of such an event, name three measures you could take to decrease the likelihood of an infectious outbreak at your event.
5. For both the norovirus and *Campylobacter* infections, identify possible reservoirs, portals of entry and routes of transmission that could have been involved in the outbreaks.
6. What was the approximate incidence rate of norovirus infection among the participants in the Michigan International Speedway race?
7. Many infectious agents can be contracted through environmental exposure. For three such agents (other than the two given in the case), describe their reservoirs, modes of transmission, portals of entry and exit, the incubation period, and signs and symptoms related to the agents.
8. You are a laboratory microbiologist working at a state lab in Nevada at the time of the outbreak of diarrheal illness. You are given patient stool samples to test for *E. coli*, *Shigella*, *Salmonella*, and *Campylobacter*, the possible culprits of this outbreak. Describe a set of laboratory tests you would conduct to help determine which of the four species might be present. Include the results that you would expect for each species, and how you would come to a conclusion based on your work. Remember, time is of the essence, and everyone, including the governor, is waiting on these results.
9. You are the lead epidemiologist for the Michigan Department of Public Health at the time of the norovirus outbreak, and are assigned to investigate. You are brought into the investigation three days into the outbreak. Describe what actions you take in carrying out your assignment. (*Hint*: you may want to research the job of an epidemiologist to help answer this question.)



References

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