Case Study Final
A case of *E-Coli* with complication of HUS
By Tracy Torrente

Joan is a 25 year old female who lives in Idaho. She is married and has two children ages 3 and 1. Joan loves to take her kids camping and often take trips to the farm and petting zoo near by their home. About 5 days after last visiting the farm and petting zoo, Joan and her children became ill. The children began feeling weak with diarrhea, vomiting and a low grade fever. Joan developed bloody diarrhea and stomach cramping. Joan was sick for two days when the diarrhea and cramping finally stopped. Her 1 year old was sick for about the same amount of time, the 3 year old however, became more ill with cramping in her lower back, bloody urine and severe fatigue. The 3 year old girl began to experience a high level of pain and discomfort and was taken to the hospital. At this point the girl has experienced symptoms for 7 days.

1. What do you suspect is the cause of the girls illness?
   I would first look at gastroenteritis caused by either viral factors (*norovirus, rotovirus* etc.) or bacterial (*Salmonella, E-Coli*).

2. What test are recommended for the 3 year old girl?
   I would start with a CBC to check for white blood cell count and infection. I would also test kidney function and test for a UTI. A stool sample should be taken because of the prolonged diarrhea. A brief history would be collected to see what they may have been exposed to and if parasitic infection is possible.

The doctor orders a CBC as well as a urine and stool sample. The child is admitted due to bloody urine and dehydration.

3. What is the cause of the girls illness? Name the etiological agent and general morphology.
   The girl had a case of *Escherichia coli* and developed a complication called hemolytic uremic syndrome or HUS.
   *Escherichia coli* is a Gram-negative, rod-shaped bacterium that is commonly found in the lower intestine of humans and animals. *E. coli* and related bacteria constitute about 0.1% of gut flora, and fecal-oral transmission is the major route through which pathogenic strains of the bacterium cause disease. This bacteria is small at 2 μm and can quickly form colonies that are small and round when grown on agar plates. Various strains exist, certain strains of *E. coli*, such as O157:H7, O104:H4, O121, O26, O103, O111, O145, and O104:H21, produce potentially lethal toxins and are the most common cause of gastroenteritis.[3][6]

4. What is the average incubation period? How long do symptoms usually last?
   The incubation period is usually 3-4 days after the exposure, but may be as short as 1 day or as long as 10 days. Symptoms of *E. coli* last a range of 2-7 days. HUS on the other hand can last much longer, most children that have HUS stay in an ICU unit for 2 weeks or more and may require transfusions as well as dialysis.[1][3]

5. How did the family most likely contract the toxic agent? How did it cause more problems for the girl?
   The family more than likely picked up the bacteria while handling animals at the petting
zoo and farm. If they were not diligent about hand washing and then ate lunch or put their hands in their mouth, they could easily have ingested a toxic strain of *E. coli*. The girl falls into a susceptible category being at an age where it is more commonly seen. It is unknown why children are more susceptible than adults, however research shows that genetics may have a role. Factor 1 and factor H where both notably different in a large percent of children who had the disease.[6]

6. What is required for a more severe case such as the girl in this study? Are there any long term risk for the girl? Children who develop HUS can heal and return to normal lifestyle without any long term effects. However, there is a small percentage who suffer long term effects such as kidney damage requiring a transplant or even death.[1]

7. What strain is most commonly seen?
*E. coli* 0157:H7 is most commonly seen, many others cause illness but symptoms may or may not cause infected person to go to the doctor, there is also a small time frame in which the strain of *E. coli* can be detected in a stool sample; sample must be collected within 48 hours of bloody diarrhea onset.[1]

8. When did this strain first get recognition? How prevalent are cases like this?
*E. coli* 0157:H7 was first recognized as a pathogen in 1982 during an outbreak investigation of hemorrhagic colitis. However, it was not until 1993, after a large multistate *E. coli* 0157 outbreak linked to undercooked ground beef patties sold from a fast-food restaurant chain, that *E. coli* 0157 became broadly recognized as an important and threatening pathogen. HUS first appears in the literature in 1955, but the link to *E. coli* wasn't confirmed until the early 1980’s. [8]

Cases like this are not common among the population. About 200-300 cases of HUS are reported in the United States each year.

9. Why did the young girl develop complications due to this toxin when her mother did not? Hint; What age group is more commonly effected?

Hemolytic-uremic syndrome most commonly affects children under the age of 5 years and is the most common cause of acute renal failure in infants and young children. It is also more common among the elderly. It occurs in 6%-9% of hemorrhagic colitis caused by *E coli* 0157:H7 and usually occurs approximately 7 to 10 days after the onset of diarrhea.

**Resources**


<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3414372/>.
