ESCHERICHIA COLI O157:H7: FREQUENTLY ASKED QUESTIONS BY MEDICAL PROFESSIONALS

Updated: August 9, 2012.

This fact sheet answers frequently asked questions by pediatric healthcare providers about E. coli O157:H7, referred to as E. coli in this document. This document is not meant to guide management of established hemolytic uremic syndrome (HUS), which is best managed by pediatric nephrologists.

What is E. coli?
E. coli is a gastrointestinal pathogen that can cause diarrhea, bloody diarrhea and the hemolytic uremic syndrome.

What are the sources for E. coli?
Poorly cooked ground beef has been the most frequently implicated vehicle. However, many more exposures can lead to infection. It is impossible for a provider to identify a source in a sporadic case. Source tracing is best performed by public health authorities. They should be notified as soon as a case is diagnosed.

What are the symptoms?
Most cases have this history:
- Non-bloody diarrhea progressing to bloody diarrhea (in approximately 85 percent of cases)
- Painful diarrhea, often worse surrounding defecation
- Fever by report, but very few infected children have fever at time of presentation
- >5 bowel movements in 24 hours before presentation
- Vomiting is variable

What is the incubation period?
The average incubation period of E. coli, in outbreak analysis, is approximately 3 days, with a range between 1 and 12 days.

For more information call Children’s Direct at 800.678.HELP (4357).
Who should receive a stool culture?

Patients with acute bloody diarrhea; painful, non-bloody diarrhea; diarrhea with fever; acute diarrhea in an immune compromised patient; or diarrhea in a patient who has a family member or other contact with a stool culture positive for *E. coli* should receive a stool culture.

It is important to confirm that your laboratory will seek *E. coli*. It is also important to request that a sorbitol MacConkey agar culture be used to screen the stool. A toxin assay as the sole or first test (i.e., a screen) is inadequate. *E. coli* can usually be excluded by the microbiologist after an overnight incubation and it is not necessary to wait for the full panel of pathogens to be ruled out before determining that a patient is not infected with this organism of greatest interest. Talk to your microbiologist if you have additional concerns.

What blood tests are needed after admission, how often should they be obtained, and what do you discourage obtaining?

<table>
<thead>
<tr>
<th>Tests to be obtained on presentation and repeated q 12 hours for next 2 days</th>
<th>Tests to be repeated daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBC (goal is to drop, via IV hydration, hemoglobin concentration by 1 mg/dL/day if concentration is normal or high on presentation) and BUN, creatinine, and electrolytes. After hemoglobin is trending downward, this can be obtained daily.</td>
<td>CBC, BUN, creatinine, electrolytes</td>
</tr>
</tbody>
</table>

For patients who might be infected with *E. coli*, we do not recommend the following tests (without a compelling reason to obtain them):

- Urinalyses
- LDH
- Coagulation studies
- Viral testing
- Parasite testing
- Fecal leukocytes
- Fecal occult blood testing
- CT scans

*Note: testing for C. difficile is sometimes indicated, but this pathogen should not be treated unless and until it is clear that the patient is not infected with *E. coli*.*

For the first hospital day, we obtain blood counts every 12 hours, because the goal is to lower the hemoglobin by 1 g/dL per day, and it is helpful to learn as early as possible if reduction is not achieved with the initial fluid orders, so that more IV fluids can be provided.

How should *E. coli* patients be treated?

HUS, one of the most common causes of acute kidney failure in childhood, is the most important consequence of *E. coli* infection. No study has ever demonstrated that antibiotics are helpful, and multiple studies report that children and adults who have received antibiotics (of all classes) have higher rates of HUS.

Therefore, we do not recommend antibiotics for *E. coli* diarrhea. We also strongly urge against over-the-counter or prescription medications that slow the gut, including antimitility, antidiarrheal or anticholinergic agents, or narcotics, and NSAIDs, which can diminish renal blood flow.

We admit patients to the hospital with possible or definite *E. coli* infection. We usually administer a 20 mL/kg bolus of normal saline, and then maintain the IV at maintenance volume, using isotonic crystalloid (normal saline, 5 percent dextrose/normal saline, or lactated Ringer’s solution), repeating boluses as necessary. We do not administer hypotonic infusions.

We strongly encourage hospitalization of children with proven or probable *E. coli* infection, and continuation of IV hydration and monitoring, until it is clear that HUS is not developing. Blood pressure should be monitored closely, and children observed carefully for signs of intravascular volume overload. However, peripheral and eyelid edema are quite common (likely because of hypoalbuminemia), and are not reasons to reduce fluid administration.

Hospitalization is also an important means of community infection control.

IV access can be problematic because of the high volumes of fluids administered, edema, and antecubital blood draws. We discourage antecubital phlebotomies, and encourage consideration of a PICC line early in illness (when edema is becoming a problem), unless the patient is clearly improving. Occasionally, a patient is admitted to the hospital, and bloody stools (and diarrhea) cease immediately. In such situations, it is acceptable to discharge a child after an 8-hour period of hydration.
Can I add potassium to the IV fluid?

If the patient has normal or low potassium, then it is appropriate to add potassium to the IV. Serum electrolytes should be checked at least daily until resolution, and adjustments made accordingly.

When does HUS occur and when do I know that my patient has recovered without this complication?

HUS occurs about 7 days (range 5-13) days after the onset of diarrhea. Patients whose diarrhea has resolved for 2 days without laboratory evidence of HUS are very unlikely to develop this complication. Though some variables are associated with avoidance of HUS, no single test or intervention can completely exclude this outcome in the patient who is still symptomatic without determining the trend in the tests.

A decreased platelet count is usually the first abnormality to be noticed in the progression to HUS, and the first abnormality to correct. The platelet count usually falls in children even in the absence of HUS, and its return to or towards normal can be used to give assurance that HUS will not develop. We usually obtain an additional CBC, electrolytes, BUN, and creatinine on the day after discharge to confirm that there is no post-discharge deterioration. Table 4 in Holtz, et al, provides guidelines for discharge, based on easily determinable clinical characteristics (Gastroenterology. 2009;136:1887.98. http://www.gastrojournal.org/article/PiIS0016508509003448/fulltext#tbl4).

What percent of children with E. coli infection develop HUS?

Approximately 15 percent of infected children under age 10 develop full blown HUS (Hct <30 percent, creatinine above upper limit of normal for age, platelet count <150,000/mm³). A similar percentage of infected children develop partial HUS (two of these three criteria are met).

The average age of children with HUS in North America is 4 years, but it can occur at any age.

How contagious is E. coli?

About 10 percent of cases are secondary. Child to child, child to adult, adult to child, and nosocomial transmission have occurred.
Any patient with diarrhea should exercise good hygiene (handwashing, separate utensils). The decision to return to settings where transmission is likely to occur, such as child care, day care, health care, or food service, rests with the local health authorities, and should not be addressed by the providers. The AAP Red Book (2009 on-line version) recommends contact precautions for hospitalized patients who are infected with E. coli, and it is not reasonable to assume that such precautions can be implemented in the community. Hospitalization of infected patients can prevent secondary cases.

What does one do with a patient who looks “good,” when the report of the stool culture becomes known?

Unfortunately, there is an imperfect relationship between the severity of the enteric prodrome and the development of HUS. We therefore urge the same diagnostic and therapeutic precautions regardless of gastrointestinal symptom severity. Table 4 in Holtz, et al can help guide decisions in these situations. (http://www.gastrojournal.org/article/PIIS0016508509003448/fulltext#tbl4).

Can antibiotics prevent an incubating infection?

There are no data in support of this approach, and we do not recommend it. We also do not recommend antibiotics to hasten clearance.

This information was prepared by the Department of Pediatrics, Division of Gastroenterology and Nutrition, Washington University School of Medicine and St. Louis Children’s Hospital.

It is only intended for the use of physicians caring for patients with possible or confirmed E. coli O157:H7 infection. These statements are based on published and unpublished data, and represent the opinions of Phillip Tarr, MD. Physicians retain individual professional judgment regarding the applicability of this information to and for their care of specific patients. Physicians are encouraged to contact Children’s Direct at 800.678.HELP (4357) to speak to a specialist in pediatric gastroenterology for further questions.