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To: Wisconsin Healthcare Providers, Infection Preventionists and Local Health Department Directors

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Outbreak of Shiga Toxin-Producing E. coli Infection and Hemolytic Uremic Syndrome

Increase in *E. coli* O157 Case Reports:
Between November 13 and November 15, 2019, the Wisconsin Division of Public Health (DPH) Communicable Diseases Epidemiology Section has observed a significant increase in the number of reported cases of *Escherichia coli* (*E. coli*) O157 infection. We are treating this as an outbreak. Cases have been reported from numerous jurisdictions within Wisconsin, and have not been isolated to a single region. One associated case of hemolytic uremic syndrome (HUS) has also been reported. The investigation into the source of these infections is ongoing.

Memo Purpose:
This memorandum provides an update and reminder to health care providers regarding the importance of early evaluation, detection and reporting of cases, and the public health implications of persons presenting with infectious gastroenteritis, bloody diarrhea, or multiple days of diarrhea.

Severity of HUS and *E. coli* O157:
Post-diarrheal HUS is an important cause of acute kidney injury and a leading cause of acquired chronic kidney disease among children. *E. coli* O157:H7 is the Shiga toxin-producing *E. coli* (STEC) infection serogroup most commonly associated with HUS. Infection with *E. coli* O157:H7, as well as other STEC, can result in dehydration, bloody diarrhea, and abdominal cramps 1-8 days (3-4 days, on average) after exposure to the organism. While most people recover within a week, approximately 15% of children under 5 years old of age and 6% of persons of all ages with culture-confirmed *E. coli* O157 infection will go on to develop HUS, which is defined by the triad of microangiopathic hemolytic anemia, thrombocytopenia, and acute renal dysfunction. HUS complications usually begin 5 to 10 days after the onset of diarrhea. Signs and symptoms of HUS may include fever, abdominal pain, pale skin tone, fatigue, small unexplained bruises, bleeding from the nose and mouth, and decreased urination.

Guidance for Clinicians Providing Care for Persons with Suspected STEC Infection and/or HUS

Testing:
- **Maintain a high index of suspicion and low threshold for ordering stool testing during an outbreak scenario. All patients with bloody diarrhea should be evaluated for the presence of Shiga toxin.**
- Obtain a stool specimen.

- Test by culture for *E. coli* O157:H7 and also screen for presence of STEC infection by PCR or EIA.
- Any isolates of E. *coli* O157:H7 or stool specimens positive for Shiga toxin should be promptly forwarded to the Wisconsin State Laboratory of Hygiene (WSLH) for culture confirmation, virulence gene characterization, and whole genome sequencing.

If stool culture or other recommended diagnostic testing is not available at your clinical laboratory, multiple methodologies are available at WSLH, including:

- Enteric culture
- *E. coli* O157 culture
- Shiga toxin PCR (STX 1 gene, STX 2 gene, eae gene, ehxA gene)
- Shiga toxin EIA

Treatment:

- **No antibiotics** should be prescribed for patients with suspected *E. coli* O157:H7 or HUS. Provide supportive care.
- Fluoroquinolones enhance toxin production and may increase the risk of developing HUS.
- Do not administer anti-motility agents.

Reporting:
Cases of STEC infection and cases of HUS must be individually reported to the patient's local health jurisdiction as separate conditions. The local health department will begin the follow-up process after receiving a report of STEC or HUS.

DPH conducts surveillance for and routinely investigates sporadic cases and outbreaks of Shiga toxin-producing *E. coli* (STEC) infection as well as HUS. State and local public health agencies in Wisconsin work in collaboration to ensure that timely and thorough case follow-up and laboratory surveillance are conducted among all patients with HUS and/or STEC infection. This includes completing follow-up interviews of all persons with HUS or STEC infection, and additional laboratory analysis of isolated STEC strains to identify potential outbreaks. Early detection of STEC infections and evaluation and monitoring of patients for HUS improve both patient outcomes and public health surveillance for these conditions.

Exclusion Requirements:
Patients who are food handlers, health care workers, or child care/4K program workers or attendees must be cleared by their local health department before returning to work or child care. Return to high-risk activities requires evidence of infection clearance be provided to the patient's local health department. Two negative stool tests for STEC (by culture or culture-independent diagnostic testing) are required. Specimens must be collected 1) after the patient is no longer having diarrhea, 2) at least 48 hours after discontinuance of any antimicrobial therapy that may have been received, and 3) at least 24 hours apart.

Patient Counseling:
To prevent household transmission of STEC infection, counsel patients with STEC infection and their families on how to prevent transmission within their home.

- Washing hands carefully with soap and water after going to the toilet, changing diapers, assisting others with toileting, handling contaminated clothing or linens, and before preparing food or associating with high-risk individuals.
- Parents should supervise the handwashing of children with an STEC infection or post-diarrheal HUS.
- Patients should be advised to avoid preparing food for others in their home while ill.
- Patients should not participate in recreational water activities and shared bathing while symptomatic.
- To prevent transmission in the community, notify patients who work in food service, health care or child care, or guardians of patients who attend a child care/4K program, of the need to remain home from these settings until they are asymptomatic and have received clearance to return from their LHD. Those with STEC infection or post-diarrheal HUS almost always will need two negative stool tests for STEC using the criteria described previously.
- Educate patients and their families that infected persons can continue to shed STEC in their feces for weeks to months after resolution of symptoms and are infectious to others as long as there are shedding the bacteria. It is important to always wash hands carefully with soap and water.

Additional Resources:

- Patient management and early evaluation for HUS:
- Niaudet, P. and Gillion Boyer, O. (2019). Clinical manifestations and diagnosis of Shiga toxin-producing Escherichia coli (STEC) hemolytic uremic syndrome (HUS) in children. In M. S. Kim (Ed.), *UpToDate.* Retrieved November 15, 2019.
- Niaudet, P and Gillion Boyer, G. (2019). Treatment and prognosis of Shiga toxin-producing Escherichia coli (STEC) hemolytic uremic syndrome (HUS) in children. In M. S. Kim (Ed.), *UpToDate.* Retrieved November 15, 2019.
- Grisaru S. Management of hemolytic-uremic syndrome in children. *International Journal of Nephrology and Renovascular Disease*. 2014;7:231-239.

Reporting and exclusion requirements:

- DPH STEC Case Reporting and Investigation Protocol (EpiNet), including reporting and exclusion requirements: https://www.dhs.wisconsin.gov/publications/p01882.pdf
- DPH HUS Case Reporting and Investigation Protocol (EpiNet), including reporting requirements: https://www.dhs.wisconsin.gov/publications/p01934.pdf
- For more information, please contact DPH Enteric Diseases Epidemiology at 608-267-7143 or DHSDPHEnterics@dhs.wisconsin.gov.