ECDC Rapid Risk Assessment

Outbreak of Shiga toxin-producing \textit{E. coli} (STEC) in Germany

25 May 2011

\textbf{SOURCE AND DATE OF REQUEST}

Request from SANCO C3 on 24 May 2011.

\textbf{PUBLIC HEALTH ISSUE}

Unusual increase of STEC infections in Germany, with patients presenting with Haemolytic Uremic Syndrome (HUS) and bloody diarrhoea.

\textbf{CONSULTED EXPERTS}

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\textbf{DISEASE BACKGROUND INFORMATION}

Shiga toxin-producing \textit{E. coli} (STEC) is a group of pathogenic \textit{Escherichia coli} strains capable of producing Shiga toxins, with the potential to cause severe enteric and systemic disease in humans. There are around 250 different \textit{E. coli} O serogroups producing Shiga toxin, of which over 100 have been associated with human disease. While the serotype O157:H7 is considered as clinically the most important, it is estimated that up to 50\% of STEC infections are caused by non-O157 serogroups.

Transmission of STEC infection mainly occurs through contaminated food or water, contact with animals, and also person-to-person transmission is possible among close contacts (families, childcare centres, nursing homes, etc). A wide variety of food has previously been implicated in outbreaks as suspected sources, including raw (unpasteurized) raw milk and cheese, undercooked beef, a variety of fresh produce (e.g. sprouts, spinach, lettuce), unpasteurized apple cider, etc. Recently an outbreak of STEC O157 infections in Canada and the USA was linked to walnuts,
thus new sources continue to be identified. Various types of animals, in particular cattle and other ruminants, can be healthy carriers of human-pathogenic STEC that can be spread to humans through faecal contamination.

The infective dose is very low. The incubation period ranges from three to eight days. The typical presentation of infections with STEC is acute gastroenteritis, often accompanied with mild fever and sometimes vomiting. The typically bloody diarrhoea is in most cases mild and self-limiting and most people are recovering within 5 to 7 days. Around 15% of children diagnosed with STEC O157 infection develop the severe complication of haemolytic uremic syndrome (HUS); this proportion is much lower among adults, and this proportion in outbreaks of non-O157 outbreaks is not well documented. The severity of STEC diarrhoea is determined by several factors including the E. coli serotype, the type of Shiga toxin produced and other virulence characteristics of the bacteria. The patient’s age and the infecting dose also play an important role. Children under the age of 5 years are at higher risk of developing clinical disease when infected, and infants are at increased risk of death from dehydration and septicemia.

STEC is of public health concern because of the potential for outbreaks and the risk of serious complications. HUS is considered as the most common cause of acute renal failure in European children. Even if the clinical presentation of non-O157 STEC infections may vary, they can be as virulent as O157:H7 infections.

While the confirmation methods of O157 STEC infection are well established, this is not always the case for infections caused by E. coli non-O157 serotypes. Therefore, underreporting of non-O157 STEC infections is very likely, and their importance for clinical disease in humans is insufficiently understood.

The treatment of STEC infections is mainly based on rehydration, while antibiotic treatment is often contra-indicated as it may activate Shiga toxin release and therefore cause clinical deterioration with a potential evolution to HUS.

STEC infections in humans are under epidemiological surveillance in the EU and in 2009 there were 3 573 reported cases of STEC infections of which about half were caused by the E. coli O157:H7 serotype.

**Event Background Information**

On 22 May, Germany posted an EWRS message reporting a significant increase in the number of patients with HUS and bloody diarrhoea caused by STEC. An urgent inquiry was launched through the EPIS platform on 24 May.

The most recent update provided by Germany through EWRS on 25 May reports 138 cases of HUS since 25 April, although it has been acknowledged that ensuring exact case numbers has been a challenge. While HUS cases are usually observed in children under 5 years of age, in this outbreak 116 out of 138 cases (84%) are adults, with a clear predominance of women (95/138, 69%). Nevertheless, cases in children of school age are also reported. Two of the HUS cases have died. The latest reported case had an onset of disease on 22 May.
Preliminary laboratory results from samples taken in two patients identified serogroup O104 (Stx2-positive, eae-negative). Further testing on additional samples is ongoing.

Most cases are from, or have a history of travel to the North of Germany (mainly Hamburg, Northern Lower Saxony, Mecklenburg-Western Pomerania). One cluster of cases without such travel history was reported from Frankfurt, where employees of one company became ill after having eaten in local canteens. A retrospective cohort study is being implemented to investigate these cases.

The source of the outbreak is under investigation, but contaminated food seems the most likely vehicle of infection. There is currently no indication that raw milk or meat is associated with the outbreak.

Through the EPIS forum, eight Member States confirmed they did not see any unusual increases of STEC cases in the past weeks, i.e. Czech Republic, Finland, France, Hungary, Italy, Ireland, Norway and Poland. Sweden reported on possibly linked cases: of 30 persons travelling to the northern State of Lower Saxony 7-10 May, 12 developed severe gastro-intestinal symptoms; of these, five patients are have been hospitalised, and three cases have HUS. Final confirmation of the causative agent for these patients is awaited. Sweden reported an additional four but unrelated HUS cases with history of travel to Germany in the first half of May. The few lab results currently available indicate all serogroup non-O157, Vero-toxin-2 positive and eae-gene negative. Further diagnostic investigations are ongoing. The number of HUS cases reported by Sweden represents an unusual increase, and a link with the outbreak in Germany is probable.

In addition to Sweden, the Netherlands and the UK report one HUS case each, with travel history to Germany in the month of May.

**ECDC threat assessment for the EU**

The STEC outbreak reported from Germany is noteworthy considering its magnitude with 138 HUS cases in just a few weeks, and the majority of cases reported being adult women. Usually, about 15% of children with STEC infection present with HUS, and this proportion is much lower among adults. This means that several hundreds of STEC cases with diarrhoea are likely to be occurring in the current outbreak. The exact extent of the outbreak is likely to be revealed in the coming weeks, when case definitions are harmonised and reporting challenges have been addressed.

Since 2008, only five STEC O104 have been reported in the EU, by Denmark (1 case), Norway (3 cases) and Sweden (1 case); three of these cases were imported. In addition, it is worth noting that communication with EFSA revealed that between 2004 and 2009, Austria and Germany reported some positive findings of STEC O104 in food or animals.

The vehicle of the outbreak has not yet been identified, and intensive investigations are ongoing. While there is currently no indication that the usual suspects of raw meat or unpasteurised milk products are associated with the outbreak (based on two case control studies), German health authorities suspect that contaminated food is the vehicle of the outbreak, based on the epidemiological description (age and geographical distribution) of the current cases; current investigations are focused on
raw vegetables. Once the vehicle of the outbreak is known, appropriate measures to prevent further cases can be implemented.

Based on the available information, cases are limited to, or have an exposure history in Germany. There is currently no indication that the source of the outbreak has been distributed outside of Germany, but it is too early to conclude that the food involved has not been or could not be more widely distributed. However, as the cases reported from Sweden indicate, increased awareness among health care practitioners is needed in order to rapidly identify potential cases linked to this German outbreak. In particular, considering the apparent severity of the STEC disease in this outbreak, early diagnosis of infection is essential to prevent as much as possible clinical deterioration and development of HUS of the cases.

CONCLUSIONS

To date, this STEC outbreak is unusual and limited to exposures occurring in Germany. There is no evidence that any potential contaminated food product would have been distributed outside of the country. The thorough outbreak investigations ongoing in the country aim at identifying the vehicle of infection, and are crucial to further determining the scope and magnitude of this risk.

Rapid identification of potential cases linked to this outbreak, within Germany or among persons who have travelled to Germany since late April/beginning of May, is essential to prevent the development of severe disease. Secondary clusters of cases from person-to-person exposure are likely and thus personal hygiene messages are important.

ECDC continues to monitor closely this event, in collaboration with the concerned Member States, EFSA, the European Commission and WHO.

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REFERENCES


