
EHEC - Information for healthcare facilities

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Since mid-May, an increasing number of people in Germany have contracted bloody diarrhoea caused by enterohaemorrhagic *Escherichia coli* (*E. coli*) bacteria. Very unusual is the high number of people affected in such a short period of time – particularly in combination with such severe courses – and the age: typically affecting children, the current EHEC outbreak mostly causes diarrhoea in adult women. In the meantime, epidemiological tests of the Robert Koch-Institute could identify raw sprouts from a farm in Lower Saxony as source behind the EHEC infections.

In the following, you will find detailed information for employees in health and nursing care on how to prevent transmission of EHEC bacteria.

Hygiene management

The pathogen is transmitted by the faecal-oral route, primarily by ingesting contaminated food. Hence, hygiene measures centre on thoroughly washing and cooking food and, for preventing human-to-human transmissions, disinfecting hands and surfaces.

For admissions of EHEC patients or of patients suspected of being infected by EHEC:

- Pathogen detection (National Reference Centre for Salmonella and other Enteric Pathogens, Robert Koch Institute/Wernigerode, Germany)
- Mandatory reporting according to Art. 6 and Art. 7 of the Federal Law on the Prevention of Infectious Diseases in Humans (IfSG) of both microbiologically proven EHEC infections and HUS (even suspected cases)
- Contact isolation
Isolation of EHEC patients in single rooms or cohorts

Basic hygiene

- Hand disinfection
Hand disinfection is the most important measure to prevent the EHEC pathogen from being transmitted. Also for outbreak management, disinfect your hands in accordance with the 5 moments:
 - Before patient contact
 - Before an aseptic task
 - After body fluid exposure risk
 - After patient contact
 - After contact with patient surroundings

- Protective clothing
 - Single-use gowns
Wear single-use gowns during all caregiving activities, preferably impermeable to liquids when it has to be expected that the clothes are drenched. When finished, dispose of the gown, take off the gloves (see below) and perform hygienic hand disinfection.
 - Examination gloves
Wear single-use gloves for all nursing activities for EHEC patients. When finished, dispose of the gloves; perform hygienic hand disinfection afterwards.

- Surface disinfection and cleaning
 - Disinfect surfaces with frequent hand contact (e.g. medical devices, surfaces, bathrooms, door knobs) and all other surfaces that have come or may have come into contact with the patient's infectious excrement.

- Reprocessing of medical devices
 - Use one blood pressure cuff, stethoscope, inhalation device, or thermometer per patient and reprocess them after use and contamination respectively using validated procedures and in accordance with the standard operating procedure.

Bactericidal disinfectants

Prophylactic and final disinfection in case of EHEC outbreaks requires disinfectants with proven efficacy against bacteria, tested in accordance with the EN or listed by the Association for Applied Hygiene (VAH) or the RKI for activity area A (bacteria).

Disinfectants with proven bactericidal activity are also effective against enterohaemorrhagic *Escherichia coli* (*E. coli*). To verify this conclusion by analogy, BODE has systematically tested selected bactericidal hand and surface disinfectants for their activity against EHEC. The test results could confirm the argument by analogy.

Product examples:

- Hand disinfection
Sterillium/ Sterillium classic pure/ Sterillium med/ Sterillium Gel
- Surface disinfection
Rapid disinfection: Bacillol AF, Mikrobac Tissues
Concentrates: e.g. Mikrobac forte, Mikrobac basic.

Background information on EHEC

Main transmission paths

EHEC bacteria can be spread via several routes. Naturally, the gram-negative bacteria live in the intestine of ruminants, e.g. cattle, sheep and goats, and are excreted with the animals' faeces. From there the pathogens can be transmitted directly or indirectly

- by eating contaminated food (main cause in adult patients). This particularly includes raw milk and raw milk products, raw or undercooked meat of ruminants, and fruits and vegetables contaminated by animal excrement.
- via contaminated water (e.g. when bathing)
- via human-to-human transmission (hand contacts or hand-to-surface/surface-to-hand contacts).

Incubation period

The time between exposure to the pathogen and start of symptoms is 2 to 10 days (3 to 4 days on average).

The symptoms of EHEC-associated HUS start approx. 7 days (5 to 12 days) after the diarrhoea has begun.

Glossary

Enterohaemorrhagic *Escherichia coli* (EHEC)

Escherichia coli (*E. coli*) are bacteria (gram-negative rods) commonly found in human and animal intestines. Enterohaemorrhagic *Escherichia coli* (EHEC) are a type of *E. coli*, which, in contrast to normal *Escherichia coli*, is able to produce toxins (*enterotoxins* →). These toxins are released in the intestine and may cause diseases there. Usually EHEC bacteria are not found in the human intestine. Ruminants (e.g. sheep, goats and cattle) are considered the main reservoir for human infection.

Enterotoxins (also endotoxins)

Enterotoxins are toxic to humans. They are produced, when the bacteria die and dissolve in the body. EHEC bacteria, for example, attach to the intestinal wall and may damage the tissue. They produce toxins (Shiga toxins) that may translocate through the intestinal wall and enter the body. In the large intestine, EHEC bacteria damage blood vessels, which in severe cases may lead to abdominal cramps and bloody diarrhoea.

Haemolytic uraemic syndrome (HUS)

Complications of intestinal infections with enterohaemorrhagic *Escherichia coli* (EHEC) can include haemolytic uraemic syndrome (HUS). The disease is characterised by the following three patterns:

1. Acute haemolytic anaemia

When suffering from haemolytic anaemia, the number of red blood cells (erythrocytes) is too low. This disease is characterised by the rapid breakdown (haemolysis) of red blood cells. In HUS, the walls of the blood vessels are damaged (endothelial damage) which may lead to internal bleeding. This also involves anaemia, causing physical impairment. The symptoms include pallor, fatigue, faintness, headache, and dizziness. Additionally, HUS-associated anaemia may cause rapid breathing and rapid heartbeat.

2. Thrombocytopenia (reduction of platelet count)

Thrombocytopenia (also: thrombopenia) is the lack of platelets (thrombocytes) in the blood. During an EHEC infection, the platelets may be destroyed causing an acute coagulation defect. This coagulation defect, in turn, causes many small blood clots (thrombi), which, when entering the blood circulation, may clog blood vessels. Typical symptoms of thrombocytopenia are bruises (haematoma) and unusually long bleeding (e.g. nosebleed or bleeding gums).

3. Acute kidney failure to anuria (nonpassage of urine)

In severe cases, HUS may cause acute kidney failure. The haemolytic anaemia leads to a deficient blood supply; consequent blood clots may clog the kidney's small blood vessels, thus blocking the oxygen supply of the kidney. The kidney is at risk of completely losing its excretory function (anuria) – acute renal failure. Through the nonpassage of urine, the kidney's toxic waste products (e.g. urea) accumulate and poison the body.

Sources:

Detailed information on the RKI website in the "RKI guide for physicians" (German) at http://www.rki.de/cln_169/nn_467482/DE/Content/Infekt/EpidBull/Merkblaetter/Ratgeber__Mbl__EHEC.html#doc200722bodyText15

Federal Institute for Risk Assessment (BfR): Consumer tips: Protection against infections by enterohaemorrhagic E. coli (EHEC), January 2011 (German)