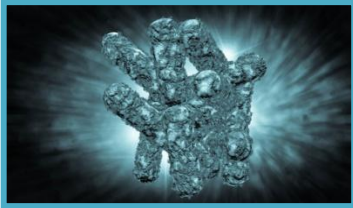# *Escherichia coli* (*mcr-1*) Fact Sheet

E. coli carrying the *mcr-1* gene makes the bacteria resistant to the antibiotic colistin, which is used as a last resort drug to treat patients with multi-drug resistant infections. Antibiotic resistance rates in *E. coli* are rapidly rising and most strains are acquired in the community rather than in health care settings.

General Information

Bacteriology

E. coli is a gram-negative facultative anaerobic bacterium that is commonly found in the lower intestine of humans and warm-blooded animals. Optimal growth of *E. coli* occurs at 37 degrees Celsius and uses oxygen when present or available but can continue to grow in the absence of oxygen using fermentation or anaerobic respiration.

The *mcr-1* gene exists on a plasmid, a small piece of DNA that is capable of moving from one bacterium to another, spreading antibiotic resistance among bacterial species.

Clinical manifestations

Most *E. coli* strains do not cause disease but virulent strains can cause gastroenteritis, urinary tract infections and neonatal meningitis. Symptoms may include: severe abdominal cramping, diarrhea that typically turns bloody within 24 hours, vomiting and a low fever less than 38.5 degrees Celsius.

About 5-10% of those who get sick will develop hemolytic uremic syndrome (HUS), an unusual blood disorder that causes kidney failure which can be fatal. Symptoms of HUS may include those mentioned above as well as: pale skin tone, fatigue and irritability, blood in urine, small, unexplained bruises or bleeding from the nose and mouth and swelling of the face, hands, feet or entire body.

Epidemiology of transmission

Drug resistant *E. coli* are readily acquired through consuming contaminated food, drinking water or through coming into direct contact with someone who is sick or with animals that carry the bacteria.

Infections can be caused by:
- Improperly cooked beef
- Raw fruits and uncooked vegetables
- Untreated drinking water
- Unpasteurized milk and milk products
- Unpasteurized apple juice/cider
- Direct contact with animals at petting zoos or farms
- Direct contact with an infected person or contaminated surfaces (such as a counter top)

Basic Prevention

Proper hygiene and safe food handling and preparation practices is key to preventing the spread of *E. coli*. Hand washing is one of the best ways to prevent the spread of *E. coli*. Contaminated foods may look and smell normal; therefore it is important to ensure that meat is thoroughly cooked to destroy bacteria. Some tips to help reduce the risk of *E. coli* infection include:
- Keep cold foods cold at or below 4 degrees Celsius
- Keep raw food away from other food while shopping, storing, preparing and serving foods
- Wash fresh fruits and vegetables before eating them
- Use warm soapy water to clean knives, cutting boards, utensils, hands and any surface that have come into contact with food, especially meat

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Infection Prevention and Control Measures

Healthcare Prevention Measures

Routine/Standard and Contact Precautions should be implemented with patients who are suspected or confirmed to have been infected by a multi-drug resistant organism such as *E. coli* carrying the *mcr-1* gene.

- Use PPE barriers (such as gloves) when anticipating contact with patient and the patients immediate environment or belongings

- Perform hand hygiene after removal of PPE. Use soap and water when hands are visibly soiled (e.g., blood, body fluids), or after caring for patients with known or suspected infectious diarrhea

- Gloves should be worn when handling potentially infectious specimens, cultures or tissues; laboratory coats, gowns or suitable protective clothing should be worn

- Clean/disinfect the patient room and shared patient care devices accordingly

- Instruct patients with known or suspected infectious diarrhea to use a separate bathroom, if available; clean/disinfect the bathroom before it can be used again

Environmental control measures

Hospital-grade cleaning and disinfecting agents are sufficient for environmental cleaning in the event of *E. coli* carrying the *mcr-1* gene. All horizontal and frequently touched surfaces should be cleaned daily and when soiled. The healthcare organization's terminal cleaning protocol for cleaning of the patient's room following discharge, transfer or discontinuation of Contact Precautions should be followed. All patient care equipment (e.g., thermometers, blood pressure cuffs, pulse oximeters, etc.) should be dedicated to the use of one patient. All patient care equipment should be cleaned and disinfected as per Routine / Standard Practices before reuse with another patient or a single use device should be used and discarded in a waste receptacle after use. Toys, electronic games or personal effects should not be shared by patients.

It is important to note that antibiotic resistance does not equate to chemical resistance. However, disinfectants that leave active residues on surfaces (such as QUATs) give bacteria an opportunity to build immunity to the disinfectant. Therefore consider disinfectant technologies that do not leave active residues behind.

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