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Increased monitoring of multiresistant CPO-bacteria in Denmark

In 2019, the Danish Health Authority added multiresistant carbapenemase-producing bacteria (also called CPO) to their list of notifiable bacteria. While CPO in humans is increasing, carbapenem resistance has never been detected in animals and food in the national antimicrobial surveillance programme, DANMAP.

The number of patients who carry CPO continued to increase in 2019. This is one of the findings in this year's DANMAP report from Statens Serum Institut (SSI) and the National Food Institute, Technical University of Denmark.

CPO are resistant to a group of antimicrobials called carbapenems which are critically important in public health and are used only to treat complicated and serious bacterial infections in humans. Bacteria resistant to carbapenems cause a serious problem because they are also resistant to a broad range of other antimicrobials—including penicillins which are the most commonly used antimicrobials in Denmark.

CPO detected in 187 patients in 2019

In 2019, CPO were detected in 187 patients, which is a significant increase compared to 2018 when CPO were detected in 160 patients.

The increase in CPO was mainly observed in 'screening samples'. Screening samples are collected according to the Guidance on preventing the spread of CPO, published by the Danish Health Authority. Finding CPO does not necessarily equate to an infection being present.

"Seeing CPO spread in our hospitals is worrying," Senior Physician Ute Wolff Sönksen from SSI says. She continues: "The spread of these bacteria is difficult to contain, and several outbreaks have affected patients across Danish hospitals for years. This is a problem because CPO can cause infections that are difficult to treat."

Tracking outbreaks through efficient monitoring

In September 2018, the Danish Health Authority added CPO to the list of notifiable bacteria which Danish hospitals must report. This means if CPO are identified in a hospital, reporting is compulsory and SSI carries out whole genome sequencing of all CPO isolates.

By using whole genome sequencing to analyze CPO, experts can identify possible outbreaks. They do so by comparing the DNA-profiles of the bacteria, which allows them to trace the possible spread within a hospital ward or between hospitals.

All sequencing data and data from hospitalizations are collated in a new database (KURS), which was established in 2019, allowing scientists to characterize and contain outbreaks. In 2019, 16 outbreaks were detected in Danish hospitals. The largest and longest lasting outbreak dates back to 2012 and involved 39 patients by the end of 2019. A characteristic of this outbreak has been that new patients tested positive for the bacteria causing the outbreak after long infection-free intervals at the affected hospitals, which made it difficult—before the launch of KURS—to detect that new cases were part of a continuous outbreak.

"We are pleased that the new outbreak database can help us to locate and contain the outbreaks. Thankfully, we have registered fewer cases of serious CPO infections in 2019 compared with the previous year. We hope that this new outbreak model will help us to contain serious infections by detecting the spread of infections earlier," Senior Physician Brian Kristensen from SSI says.

Carbapenem resistance not detected in production animals and food in Denmark

Europe has banned the use of carbapenems for treatment of sick animals. To get an overview of carbapenem resistance in the food chain, the EU introduced a harmonized monitoring program in 2014, in which member states systematically look for this type of resistance in *E. coli* bacteria.

To date, more than 50,000 samples have been collected from production animals and meat throughout Europe and subsequently analyzed. Carbapenem resistance has only been detected extremely rarely. It was found in a few samples from pigs in Germany and Italy, as well as in chicken from Romania and Germany. In contrast, carbapenem resistance has never been detected in bacteria isolated from Danish animals or meat.

The importance of good hygiene

It is expected that CPO can be transmitted from humans to animals, if the people who care for the animals are carriers of resistant bacteria—perhaps even without feeling ill. Animals living together in herds present ideal opportunities for CPO to multiply and spread if introduced. The risk of spreading within a herd increases, when antimicrobials are being used to treat the herd at the same time.

If CPO were to become widespread in production animals, it would pose a risk of transmission to meat at slaughter and then to humans through undercooked meat or poor kitchen hygiene.

“Foodborne carbapenem resistance would be a very unfortunate situation, which we must try to prevent. Fortunately, Denmark already focuses on controlling and limiting antimicrobial use in the treatment of animals. However, it is still very important that carriers of CPO, who work with animals, ensure good hygiene. They can do so, for example by washing hands thoroughly to avoid transmitting the bacteria to the animals,” says Head of Research Group Johanne Ellis-Iversen from the National Food Institute.

Read more

Since 1995, the DANMAP programme has monitored the use of antimicrobials in humans and animals in Denmark, and the occurrence of antimicrobial resistance in bacteria in animals, people and foods.

Download the [DANMAP report 2019](#) from DANMAP’s website. [A factsheet about antimicrobial resistance](#) is also available from the DANMAP website.

Read about trends in the use of antimicrobials for the treatment of humans and animals in two press releases on DANMAP’s website:

- [The usage of antibiotics in humans keeps decreasing in Denmark.](#)
- [In the past ten years, antimicrobial use has decreased in Danish pigs, increased in calves.](#)

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