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Monitoring antimicrobial use in Denmark important in the fight against resistance

Denmark has monitored the use of antimicrobials and the occurrence of antimicrobial resistance among animals, humans and foods for the past 20 years, making it possible to launch science-based initiatives aimed at combating antimicrobial resistance. Statens Serum Institut along with the National Veterinary Institute and the National Food Institute, which are both departments under the Technical University of Denmark are the partners behind the DANMAP monitoring programme. It was the first of its kind in the world to be launched and is often highlighted as the good example around the world.

The WHO has called antimicrobial resistance one of the biggest threats to human health. In order to limit the global occurrence of antimicrobial resistance it is important to identify the risk factors that cause bacteria to become resistant.

It was this realization which 20 years ago led the authorities in Denmark to establish a national farm-to-fork monitoring programme of both the use of antimicrobials in humans and animals and the occurrence of antimicrobial resistance in bacteria found in animals, humans and foods. The monitoring programme is called DANMAP.

Important milestones

The data collected has provided the scientific basis for various initiatives, which have significantly reduced the use of antimicrobials in Danish food production without compromising on either animal welfare or production. Data has among other things led to the Danish ban on antimicrobial growth promoters (AGPs) for animals. Such a ban has been in force across the EU since 2006.

DANMAP's focus on the use of antimicrobials in production animals also contributed to the introducing of the Danish Food and Veterinary Administration's Yellow Card scheme in 2010. The scheme requires a reduction in the use of antimicrobials in herds where consumption is high. The scheme has contributed to a 22% drop in antimicrobial use on Danish pig farms between 2009 – when antimicrobial use peaked following the ban on AGPs – and 2015.

In addition, DANMAP data has been actively used by the livestock sector itself. The sector has e.g. voluntarily minimized the use of cephalosporins - a critically important antimicrobial for the treatment of humans.

The close cooperation between sectors in DANMAP has also helped to focus the attention of researchers and policymakers on the issue of antimicrobial consumption and resistance, and has been instrumental in the establishment of the National Antimicrobial Council in 2010.

Finally, data from DANMAP was also used in the preparation of the Danish Health Authority's antimicrobial guidance from 2012, which among other things sets out guidelines to reduce the use of cephalosporins and fluoroquinolones for the treatment of human infections.

"Without DANMAP there is every reason to believe that Denmark would today be facing bigger resistance problems than we are currently experiencing. Throughout the years monitoring data has shown both where there has been a need for more research and where knowledge has been sufficient to launch initiatives to combat and prevent problems," MD Clinical Microbiology Specialist Ute Wolff Sönksen from Statens Serum Institut says.

Data provides historical knowledge

DANMAP data is used to continuously monitor and provide an overview of existing resistance in Denmark. As such collected data has created a basis for national action plans, e.g. the Danish Health Authority's guidance on how to manage MRSA in humans, as well as monitoring of multi-resistant bacteria.

Data has also been important in determining the spread of newly discovered resistance genes, like when researchers in August 2015 found a gene (*mcr-1*) in coli bacteria among animals, meat and humans in China, which causes resistance to the antimicrobial agent called colistin.

By using sequencing data from bacteria's DNA, researchers from the National Food Institute and Statens Serum Institut were able to establish within a very short time period that the gene had also been present in Denmark.

Source of inspiration around the world

DANMAP has inspired the development of similar monitoring strategies worldwide.

"For two decades, Denmark's experience in using as little antimicrobials as possible, but as much as needed to treat sick animals and humans, has been a source of inspiration globally," Head of Division Flemming Bager from the National Food Institute says.

Read more

Statens Serum Institut, the National Veterinary Institute and the National Food Institute have been the partners behind the monitoring programme since its beginning. The multidisciplinary approach to the work is a good example of how to tackle problems from a One Health approach.

One Health is based on the understanding that the disease risks and challenges that arise in the complex interactions between animals, food, people and the environment should be handled by focusing on all areas across all sectors at the same time

[Read more about the purpose behind the DANMAP programme, which turns 20 this year, see highlights from monitoring for 2015 in the press releases on the report and download the latest monitoring data from the DANMAP website.](#)

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Facts about antimicrobial resistance

Treatment with antimicrobials is intended to kill pathogenic bacteria. Unfortunately, antimicrobials also cause the bacteria to protect themselves by developing resistance to the type of antimicrobials that are used to treat them.

Resistant bacteria can be transmitted between humans, and bacteria can transmit resistance to each other. However, resistant bacteria are poor at surviving if antimicrobials are not present. Therefore, it is important to have an overall focus on using as few antimicrobials as possible for the treatment of both animals and humans.

Bacteria know no borders. Therefore antimicrobial resistance in one country can cause problems outside of its borders. As such the over usage of antimicrobials in both animals and humans is a global problem.