



DANMAP 2010: ANTIMICROBIAL CONSUMPTION AND RESISTANCE No. 44, 2011

The annual DANMAP report (Danish Integrated Antimicrobial Resistance Monitoring and Research Programme) summarises the Danish consumption of antimicrobial agents used for animals and humans and follows the development of resistance in bacteria collected from animals, food and humans.

The 2010 DANMAP report is available at www.danmap.org.

The report outlines some of the main characteristics concerning consumption and resistance development in humans.

Antimicrobial consumption in primary health care

From 2009 to 2010, antimicrobial consumption in primary healthcare increased by 0.98 Defined Daily Doses (DDD) per 1,000 inhabitants per day (DID) to 16.93. The 2010 consumption and the increase were the highest recorded in DANMAP's history. The second half of 2010 saw a major outbreak of *Mycoplasma pneumoniae*, EPI-NEWS 48/10, and part of the increase in antimicrobial consumption, particularly macrolide consumption, coincided with the outbreak. The consumption of broad-spectrum antimicrobials increased by 9% from 2009 to 2010, and comprised 38% of the total consumption in 2010. Since 2001, the total consumption in primary healthcare has increased by 32% and the consumption of broad-spectrum antimicrobials has increased by 73%.

Antimicrobial consumption at hospitals – overall

The total antimicrobial consumption at hospitals (rehabilitation centres, hospices & private, psychiatric and somatic hospitals) remained unchanged at 1.91 DID in 2010. However, since 2001 the overall consumption has increased by 0.46 DID (31%).

Antimicrobial consumption at somatic hospitals

2010 saw increased activity at somatic hospitals. As in previous years, the number of admissions increased and the number of bed-days decreased compared with the preceding year, while the number of DDD remained in line with that observed in 2009. Compared with 2009, antimicrobial consumption increased by 3% expressed as DDD per 100 bed-

days, while it decreased by 4% when stated as DDD per 100 admissions. In 2010, broad-spectrum antimicrobials comprised an unchanged 67% of total hospital consumption vs. 49% in 2001.

Resistance occurrence in zoonosis

As in previous years, the resistance occurrence of several of the tested antibiotics, including ciprofloxacin, was higher in *Salmonella* Typhimurium, *Salmonella* Enteritidis and *Campylobacter jejuni* isolates from patients with infections acquired abroad than in isolates from patients with infections acquired in Denmark.

New zoonotic bacteria

Several studies reported in DANMAP 2010 described findings of the same subtypes/genes in bacteria from animals/foods and humans, indicating that these infections may be zoonotic:

- a) the same type of high level gentamicin-resistant *Enterococcus faecalis* was found in the intestine of swine, in the intestine of humans, in pork and in patients with cardiac valve infection,
- b) *Escherichia coli* (*E. coli*) isolates from swine, chickens, chicken meat and pork had the same virulence genes as the *E. coli* isolates which cause urinary tract infections in humans.

Resistance

In 2010 the occurrence of resistance to 3rd generation cephalosporines of both *Klebsiella pneumoniae* (9%) and *E. coli* (7%) from blood isolates was in line with that observed in 2009. In comparison, the occurrence of resistance was below 5% for both types of bacteria in 2006.

In 2010 the number of new human MRSA cases increased to 1,097 which is the highest level seen in more than 25 years. The increase covered both cases acquired abroad and cases acquired in Denmark.

A total of 93 new human cases of CC398 MRSA were recorded. This MRSA type is associated with contact with swine and the increase is substantial. In 15 cases the affected persons had neither had direct contact with pigs nor had anyone in their household.

This may indicate that MRSA CC398 has started to adapt in a manner facilitating human to human infection.

In 2010 the occurrence of penicillin and erythromycin resistance remained low among *Streptococcus pneumoniae*, and groups A, B, C and G streptococci.

The occurrence of ampicillin resistance was high (92%) in *Enterococcus faecium* isolates from blood, while the occurrence of vancomycin resistance was low for both *E. faecium* and *E. faecalis* isolates.

Commentary

In 2010 antimicrobial consumption only increased in primary healthcare. The majority of prescriptions in primary healthcare only carry unspecific indications such as "for inflammation". It is therefore difficult to determine why consumption increases and why more broad-spectrum antimicrobials are prescribed.

An increased risk of infection with resistant salmonella and campylobacter infections in connection with travels abroad was observed. Ciprofloxacin-resistant bacteria may be associated with an increased risk of treatment failure and it is therefore essential to consider any travel activity before initiating treatment. More studies are needed of the zoonotic potential of *E. faecalis* and *E. coli* and of the spreading of MRSA CC398.

The increased consumption of broad-spectrum antimicrobials (ciprofloxacin, 2nd and 3rd generation cephalosporines and carbapenems) recorded at hospitals in recent years coincides with an increased occurrence of *E. coli* and *K. pneumoniae*. It is worrying that the occurrence of these resistant bacteria is now higher in Denmark than in the other Nordic countries. In recent years, the unique situation previously enjoyed by Denmark with regard to low consumption of antimicrobials and low occurrence of resistance has changed. Increased focus should be directed at antimicrobial consumption both at hospitals and in primary healthcare. Furthermore, more studies are needed on the spreading of resistant *K. pneumoniae* and *E. coli* isolates. (A.M. Hammerum, U.S. Jensen, L. Skjøt-Rasmussen, S.S. Olsen, J. Larsen, L. Jakobsen, E.M. Nielsen, L.M. Lambertsen, A.R. Larsen, M. Sørum, A. Petersen, R.L. Skov, Dept. for Microbiological Monitoring and Research)