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NATIONAL SURVEILLANCE OF COMMUNICABLE DISEASES

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DANMAP 2006: ANTIMICROBIAL CONSUMPTION AND RESISTANCE

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The annual DANMAP report (Danish Integrated Antimicrobial Resistance Monitoring and Research Programme) summarises the Danish consumption of antibiotics used for animals and humans and monitors the development of resistance in bacteria isolated from animals, food and humans. The 2006 DANMAP report is available at www.danmap.org.

Animal antimicrobial consumption

The overall animal consumption of antimicrobial agents increased by 2%, from 114.1 tonnes in 2005 to 116.5 tonnes in 2006. The increase is the result of a 1.2% decrease in antimicrobial consumption in pigs combined with increases in poultry (mainly turkey production) and aquaculture consumption by 20% and 73%, respectively. In 2006 antimicrobial consumption in pig constituted 91.4 tonnes of active compound, equivalent to 78% of the overall veterinary consumption. In the period, the Danish pig production remained stable. Pig consumption of cephalosporins quadrupled over the last six years - increasing from 24 kg in 2001 to 98 kg by 2006. Furthermore, recent years have seen an increase in the occurrence of cephalosporin-resistant Escherichia coli isolates from diseased pigs. Additionally, the first ESBL (Extended Spectrum Beta Lactamase) producing Salmonella Typhimurium isolate from a healthy pig was detected in 2006.

Resistant bacteria which can spread from animals to humans

The occurrence of resistance in S. Typhimurium isolates from imported pork was higher than resistance in the corresponding isolates from Danish pork for five of the 16 antibiotics tested. Furthermore, in S. typhimurium isolates from imported turkey meat, high levels of resistance to several antimicrobial agents were observed.

Resistance to ciprofloxacin and nalidixic acid in *S*almonella Enteritidis isolates from human infections acquired abroad was significantly higher than in isolates from infections acquired in Denmark.

Resistance to ciprofloxacin in Campylobacter jejuni isolates from human infections acquired abroad was higher than in isolates from infections acquired in Denmark.

In 2005, extended sampling of the poultry meat sold in Danish retail outlets was implemented. This initiative has brought the first ever case of vancomycin resistant Enterococcus faecalis isolates from meat. The vancomycin resistant E. faecalis isolates were detected in turkey meat imported from Germany in 2005 and 2006. Vancomycin resistant E. faecalis isolates have not previously been reported in meat or animals during the 11 years DANMAP has existed.

In Denmark as well as in other European countries, a special strain of methicillin-resistant Staphylococcus aureus (MRSA) has been detected in pig farms. A Danish study confirmed that pork producers are at increased risk of infection by the special MRSA strain and therefore concluded that MRSA is transferable from pigs to humans, EPI-NEWS 27-33/07. Infection presupposes direct contact with pigs. Consequently, no risk is associated with consumption of pork.

Animal antimicrobial consumption

Measured as DDD per 1,000 bed days, the mean antibiotics consumption in hospitals increased by 54% in the period 1997-2006. The increase was mainly caused by an increase in the consumption of recently introduced broad-spectrum antimicrobial agents. An increase was observed in the consumption of penicillins combined with betalactamase inhibitors, cephalosporins, fluoroquinolones and carbapenems instead of betalactamase-sensitive penicillins, broad-spectrum penicillins, minoglycosides and macrolides. In 2006, cephalosporins, fluoroquinolones and carbapenems comprised 28.8% of antibacterial consumption in hospitals compared with 15.4% in 1997.

Development of resistance in primary healthcare and in hospitals

The number of MRSA isolates decreased from 851 in 2005 to 706 in 2006. The number includes infected patients as well as asymptomatic carriers (one isolate per person). Most of the decrease is the result of a reduction in the number of cases associated with an extensive hospital outbreak in Vejle County caused by the ST22 MRSA strain, which now appears to be under control. In the rest of the country, a small increase from 540 to 561 new cases was observed.

Resistance to penicillins and macrolides in Streptococcus pneumoniae and Streptococcus pyogenes remained low in 2006.

Ciprofloxacin resistance in E. coli isolated from urine increased significantly from 2005 to 2006 in primary healthcare as well as in hospitals. Consequently, 5% of the isolates from primary health care and 6.3% of hospital isolates were resistant in 2006. This increase in ciprofloxacin resistance co-occurred with an increase in the consumption of fluoroquinolones (mainly ciprofloxacin) observed in recent years, both in primary health care and hospitals.

Commentary

The elevated occurrence of antimicrobial resistance (including multiresistance) in salmonella bacteria from imported pork compared with Danish pork probably reflects differences in the use of veterinary antibiotics between the exporting countries and Denmark. Infection with bacteria that are resistant to clinically essential antibiotics may entail an increased risk of treatment failure.

The causes of the increasing human consumption of antimicrobial agents are not known, but they may be a combination of physicians increasing dosages and a rise in the proportion of elderly patients. Hospitals also recorded an increase in the number of annual admissions which may, in turn, be causing an increase in consumption. Furthermore, hospital admissions have been shortened and therefore a considerable number of patients are prescribed supplementary antimicrobial treatment by their GP after hospital discharge.

Among the bacteria most commonly isolated from clinical samples in Danish patients, resistance levels remained low. In recent years, however, more multiresistant bacteria have been detected in Denmark. This may be associated with the increased consumption of broad-spectrum antibiotics.

Standard antimicrobial agents are ineffective in the treatment of multiresistant bacteria. In some cases these bacteria may be treated successfully with broad-spectrum antimicrobial agents, in others no treatment options exist.

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