



DANMAP 2007: ANTIMICROBIAL CONSUMPTION AND RESISTANCE No. 47, 2008

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 2007 DANMAP report is available at www.danmap.org. Some of the main observations from the human area are described below.

Increase in antibiotic consumption for human treatment and consequences hereof

From 2006 to 2007, the consumption of antibiotics for human treatment increased by 7% to 35.6 million DDD (Defined Daily Doses) or 17.9 DDD per 1,000 inhabitants/day.

In primary health care, the total antibiotic consumption increased by 6.6% to 16.2 DDD/1,000 inhabitants/day. In the period 1997-2007, the mean hospital antibiotic consumption increased by 63% to an estimated 689 DDD/1,000 bed days. The previously observed increasing trend for the consumption of broad-spectrum antibiotics continued, EPI-NEWS 46/07. In 2007, cephalosporins fluoroquinolones and carbapenems comprised 34% of the total consumption; the corresponding figure for 1997 was 15%. This increase in the use of broad-spectrum antibiotics seems to have a number of consequences. Ciprofloxacin-resistance in *E. coli* isolated from urine in primary health care increased from 5% in 2006 to 6% in 2007.

Other consequences are the finding of ESBL-producing bacteria, EPI-NEWS 11/08, and a considerable increase in the number of *Enterococcus faecium* bloodstream infections at hospitals.

Prevalence of ESBL-producing bacteria in humans and animals, 2007

The period September-October 2007 saw the first nationwide prevalence survey covering ESBL-producing bacteria. A total of 14,674 isolates were tested for ESBL production. ESBL-producing *E. coli* and *Klebsiella pneumoniae* were detected in 4% and 5% of blood cultures, respectively, and in 2% and 7% of hospital urine samples, respectively. April 2007 brought the first major outbreak of gentamicin and ciprofloxacin-resistant ESBL-producing *K. pneumoniae* in Denmark, EPI-NEWS 11/08. A total of 33 patients

were infected or colonised with the outbreak strain. The number of ESBL-producing *E. coli* isolated from diagnostic samples from Danish swine and cattle increased from seven cases in 2006 to 23 in 2007.

Methicillin-resistant *Staphylococcus aureus*

The number of new cases of methicillin-resistant *Staphylococcus aureus* (MRSA) decreased for the second year running to 659 cases (from 851 and 706 cases in 2005 and 2006, respectively). The number of infections acquired at hospitals and nursing homes decreased in 2007, and the number of MRSA bacteraemia cases decreased from 19 in 2006 to eight in 2007. In contrast, the number of community-acquired infections and infections acquired abroad increased, EPI-NEWS 26/08. MRSA primarily transfers between humans, but a specific type of MRSA (CC398) will also transfer from animals to humans. At present, MRSA CC398 has only been detected in swine farms and not in any other animals. In 2007 a total of 14 human cases of MRSA CC398 were found most of which had close contact to swine.

Resistance occurrence for other human pathogens

In invasive *Streptococcus pneumoniae* and invasive Group A, B, C and G streptococci, resistance to penicillin and macrolides remained low in 2007.

Ciprofloxacin-resistance in *E. coli* isolated from urine in primary health care increased from 5% in 2006 to 6% in 2007.

Ampicillin resistance in *E. coli* urine isolates from primary health and from hospitals increased by 40% and 39%, respectively in 2007, and in *E. coli* blood isolates from hospitals, the resistance reached 44%. Resistance to sulfonamides in *E. coli* isolated from urine in primary health care increased from 36% in 2006 to 38% in 2007, and in isolates from hospitals an increase was observed from 34% in 2006 to 35% in 2007. Gentamicin resistance in *E. coli* isolated from blood increased from 2.5% in 2006 to 3.8% in 2007. Similarly, cefuroxim resistance in *E. coli* blood isolates increased from 3.5% in 2006 to 5.4% in 2007.

Resistance in zoonotic bacteria

In 2007 the travel-related information obtained from persons with salmonella and campylobacter infec-

tions was more complete than previously. On the basis of phone interviews, it is estimated that 40% of salmonella infections and 30% of campylobacter infections were travel-related. Ciprofloxacin-resistance in *Salmonella Typhimurium* and Enteritidis were considerably higher in isolates from infections acquired abroad than in isolates acquired in Denmark. The occurrence of resistance to ciprofloxacin in *Campylobacter jejuni* was similarly distributed.

Commentary

In Denmark, the antimicrobial consumption and occurrence of resistance remains low compared with other European countries. The increase in antimicrobial consumption is, nevertheless, worrying, and we can now discern clear consequences of such resistance. The increased consumption of cephalosporins in animal production and in humans has undoubtedly caused the increasing occurrence of ESBL-producing bacteria currently observed. The total reduction in the number of new MRSA cases and particularly the decreasing number of infections related to hospitals and the remaining health care system is a positive trend which will have been achieved through the implementation of the National Board of Health's MRSA-guideline from 2006. The existence of a zoonotic MRSA-reservoir causes some concern, and its development is monitored closely.

The high incidence of antimicrobial resistance in salmonella and campylobacter bacteria from travel-associated infections probably reflects a difference in the use of veterinary antimicrobial agents between the concerned countries and Denmark. Infections with 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. Overall, Denmark's position as a country characterised by rational use of antibiotics and a low occurrence of resistance is under pressure, and initiatives to counter such tendency are needed.

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Individually notifiable diseases

Number of notifications received in the Department of Epidemiology, SSI (2008 figures are preliminary)

Table 1	Week 46 2008	Cum. 2008 ¹⁾	Cum. 2007 ¹⁾
AIDS	1	33	44
Anthrax	0	0	0
Botulism	0	0	0
Cholera	0	1	0
Creutzfeldt-Jakob	1	4	8
Diphtheria	0	0	0
Food-borne diseases	9	786	574
of these, infected abroad	0	127	108
Gonorrhoea	5	338	322
Haemorrhagic fever	0	0	0
Hepatitis A	0	46	21
of these, infected abroad	0	23	10
Hepatitis B (acute)	0	21	25
Hepatitis B (chronic)	0	154	290
Hepatitis C (acute)	0	6	7
Hepatitis C (chronic)	1	402	540
HIV	2	222	277
Legionella pneumonia	4	112	110
of these, infected abroad	0	38	29
Leprosy	0	0	0
Leptospirosis	0	5	12
Measles	0	10	2
Meningococcal disease	0	47	63
of these, group B	0	20	34
of these, group C	0	15	19
of these, unspec. + other	0	12	10
Mumps	0	24	9
Neuroborreliosis	3	55	92
Ornithosis	1	4	8
Pertussis (children < 2 years)	1	88	74
Plague	0	0	0
Polio	0	0	0
Purulent meningitis			
Haemophilus influenzae	0	3	2
Listeria monocytogenes	0	1	10
Streptococcus pneumoniae	0	75	93
Other aethiology	0	19	11
Unknown aethiology	0	19	15
Under registration	1	8	-
Rabies	0	0	0
Rubella (congenital)	0	2	0
Rubella (during pregnancy)	0	0	0
Shigellosis	4	74	207
of these, infected abroad	0	57	47
Syphilis	2	125	85
Tetanus	0	1	2
Tuberculosis	13	346	349
Typhoid/paratyphoid fever	0	31	21
of these, infected abroad	0	25	20
Typhus exanthematicus	0	0	2
VTEC/HUS	3	136	147
of these, infected abroad	0	45	49

¹⁾ Cumulative number 2008 and in corresponding period 2007

Selected laboratory diagnosed infections

Number of specimens, isolates, and/or notifications received in SSI laboratories

Table 2	Week 46 2008	Cum. 2008 ²⁾	Cum. 2007 ²⁾
Bordetella pertussis			
(all ages)	7	173	192
Gonococci	11	327	310
of these, females	1	67	50
of these, males	10	260	260
Listeria monocytogenes	1	44	51
Mycoplasma pneumoniae			
Resp. specimens ³⁾	4	74	343
Serum specimens ⁴⁾	4	75	379
Streptococci ⁵⁾			
Group A streptococci	1	122	101
Group B streptococci	2	113	86
Group C streptococci	0	20	20
Group G streptococci	2	114	111
S. pneumoniae	19	803	906
Table 3	Week 44	Cum. 2008 ²⁾	Cum. 2007 ²⁾
MRSA	10	630	546
Pathogenic int. bacteria ⁶⁾			
Campylobacter	79	3030	3576
S. Enteritidis	9	579	499
S. Typhimurium	43	1789	311
Other zoon. salmonella	13	894	640
Yersinia enterocolitica	6	287	238
Verocytotoxin-producing E. coli	3	140	140
Enteropathogenic E. coli	10	185	160
Enterotoxigenic E. coli	7	362	269

²⁾ Cumulative number 2008 and in corresponding period 2007

³⁾ Resp. specimens with positive PCR

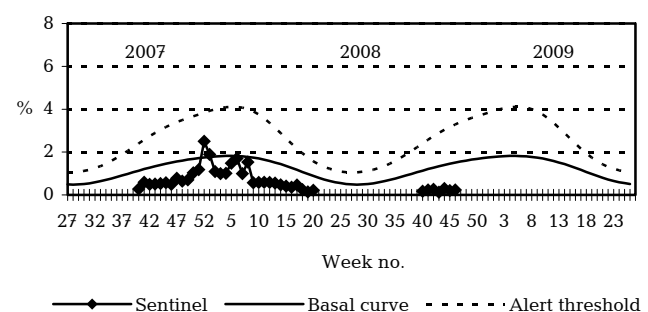
⁴⁾ Serum specimens with pos. complement fixation test

⁵⁾ Isolated in blood or spinal fluid

⁶⁾ See also www.germ.dk

Sentinel surveillance of the influenza activity

Weekly percentage of consultations, 2007/2008/2009



Sentinel: Influenza consultations (as percentage of total consultations)

Basal curve: Expected frequency of consultations under non-epidemic conditions

Alert threshold: Possible incipient epidemic