

Published for the first time: an article on a death in Norway due to resistance to antibiotics.

An unexpected death?

In this edition of the Journal of the Norwegian Medical Association, Hennig Onarheim et al. describe a patient who died due to the absence of efficacious antibiotics (1). The use of any antibiotics, and the use of broad-spectrum antibiotics in particular, can lead to resistance. There has been a rapid increase in resistance in Norway over the past 4–5 years (2), particularly to the extended-spectrum beta-lactamase-producing (ESBL) *Klebsiella* and *E.coli* (3). These bacteria cannot be dealt with by means of beta-lactamase antibiotics. Carbapenems are used instead, and this in turn can lead to carbapenem resistance (3). In the patient in question, eight different multidrug-resistant bacteria were identified, and several of them produced transmissible carbapenemases, which deactivate carbapenems (1).

Patients who have been in countries with a high prevalence of antibiotic-resistance often become colonised with resistant bacteria and may bring these home. About 50 % of Norwegian tourists with diarrhoea who were tested after returning home from Asia were found to have beta-lactamase-producing bacteria in their bowel (4).

In Norway we also contribute to the development of resistance. Antibiotics are used too frequently, and often incorrectly. Two studies from Norwegian hospitals revealed a significant increase both in total use and in the use of broad-spectrum antibiotics, and a considerable difference in the profile of use between two hospitals that in principle are similar (5, 6). Unfortunately, the increase in use of broad-spectrum antibiotics occurred before the prevalence of resistance made this necessary. There is also great variation in the extent to which GPs use antibiotics (6).

How can we reduce the prevalence of resistance? One of the intentions expressed in the Norwegian government's action plan against antibiotic resistance is to reduce the use of antibiotics by 30 % by 2020 (7). This is realistic, viewed in relation to the increase and variation in use. The plan does not indicate how hospital use should be improved, but most hospitals are now planning to introduce antibiotic stewardship programmes (ASP). The success of the ASP is contingent on the programmes stemming from and being directed by the hospital management. Multidisciplinary ASP teams should be established, consisting of an infection disease doctor, microbiologist and pharmacist and backed by infection control personnel, nurses and the IT department. The implementation of computerised decision support systems to improve antibiotic treatment in hospitals should be accelerated. This will give hospital managements a tool with which to monitor the quality of antibiotics treatment. It will also be simpler for hospital doctors to comply with the guidelines for antibiotics treatment when these guidelines become available as an app for mobile telephones.

One of the goals of the government action plan is that the prescribing in general practice of antibiotics for respiratory tract infections should be reduced by 20 %, through peer guidance and the use of delayed prescriptions. Diagnostic codes will be required for all antibiotics prescriptions, so that GPs can use the National Prescription Registry to compare their prescription pattern with the average.

Dentists' prescription of antibiotics has increased by 50 % in a decade, and now accounts for about 5 % of non-hospital antibiotics

prescription (8). This is an inexplicable increase, so it must be possible to improve use in this area. The use of antibiotics in nursing homes varies widely (9).

The simplest way of attaining the government's goal is for prescribers to comply with the national guidelines on use of antibiotics (7). A reduction in use does not appear to lead to more infection complications (10). By reducing use, it is possible to save money and improve patient therapy at the same time (11, 12).

Antibiotics resistance can be transferred from animals to humans and vice versa, and it is then disseminated further in nature. The government therefore emphasises that doctors, dentists, veterinarians and marine biologists must act in concert against resistance. We do not know how the government action plan is to be financed. That is a pity, because as we know, you don't fatten a cow by weighing it.

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