

EDITORIAL

The problems of antibiotic overuse*Acute otitis media among children and resistance development in the community*

Antibiotics provide little benefit for a large proportion of respiratory tract infections presenting in primary care. Prescribing antibiotics for self-limiting respiratory tract infections is nevertheless escalating and is probably the main reason for the emerging prevalence of antibiotic-resistant organisms in the community today [1]. The need has therefore been increasing to analyse the available data on antimicrobial usage in connection with the prevalence of antimicrobial-resistant organisms in order to help construct mathematical models predicting the likely outcomes of various antibiotic policy options [2].

Non-invasive pneumococcal infection, especially acute otitis media, is the main reason for antimicrobial prescriptions in the Western world [3]. Since the 1990s penicillin resistance of *Streptococcus pneumoniae* in Iceland has been a growing problem, and such resistance is still increasing, much faster than in most other European countries [3–5]. Over 35% of all pneumococci are now penicillin and macrolide non-susceptible [6]. This can probably be explained by the decades of higher antimicrobial usage in Iceland than in the other Nordic countries. Our own studies have shown that children under seven consumed about 20% of the total antimicrobial sales, and over 50% of these were prescribed only because of diagnosed acute otitis media. Furthermore, there was a causal connection between individual antimicrobial usage and the risk of carrying penicillin non-susceptible pneumococci in the first weeks after such treatment [3,5].

The most interesting aspect of the studies, though, was discerning the interaction between selective antimicrobial pressure and the clonal dynamics of penicillin non-susceptible pneumococci in the study communities. This was done by comparing individually linked data with group-level data

in relation to antibiotic use and resistance, which can be obscured by group-level ecological studies [7,8].

The Icelandic studies also showed the likelihood of relapsing ear infections and the need for tympanostomy tube placements later in the communities with the highest antimicrobial consumption [9]. This may be explained by antimicrobials' eradication of susceptible pneumococcus in the nasopharyngeal flora and interference with the natural balance of microbial species in the nasopharynx. This means that new strains can later emerge and increase the likelihood of new episodes of acute otitis media [3,10]. A tendency toward relapsing acute otitis because of superinfections by resistant strains may also be associated with decreased success in eradicating resistant pathogens from middle-ear fluid when otitis media is treated with antimicrobials [11]. The positive effect on antibiotic resistance and even infection rate following decreased antibiotic use may therefore outweigh the possible benefit of earlier symptom resolution attributed to antibiotic treatment in some cases.

In spite of several efforts to identify barriers against antibiotic overuse, more effort is needed to implement changes in this unfavourable development [3,7,8,12–14]. A phenomenological investigation in Iceland of why GPs prescribe antimicrobials in cases when there are no clear signs of bacterial infections, called “non-pharmacological prescriptions of antibiotics”, concludes that the principal reasons for such use of antibiotics are “the lack of stable doctor–patient relationships due to lack of continuity in medical care. Pressure from patients in a stressful society, the physician's work pressure, the physician's own personality, particularly the earnings incentive and service mentality and, last but not least, the physician's lack of confidence and uncertainty, resulting in use of antibiotic prescriptions as a coping strategy in an uncomfortable situation” [12].

The large variations in antibiotic prescriptions indicate a need for further interventions to decrease unnecessary antibiotic use for respiratory tract infections. Antibiotics are frequently prescribed for children with unspecified upper respiratory tract infections and bronchitis, despite recommendations to the contrary. In a recent study from Sweden, it was shown that although fewer primary healthcare patients were diagnosed as having a respiratory tract infection, the proportion of patients being prescribed antibiotics nevertheless remained the same [15].

Vaccines against the most common pathogens causing acute otitis media today, pneumococcus and *Haemophilus influenzae*, may lower the need for antimicrobial use in children. Implementation of these vaccines, which have not yet been decided for common use in children in Iceland, may give a good opportunity to deal with the resistance problem and diminish the demand for antibiotics.

The new (2008) NICE guidelines on respiratory tract infections (<http://www.nice.org.uk/Guidance/CG69>) aim to provide clear guidance on antibiotic management strategies for often self-limiting illnesses by giving evidence-based recommendations to diminish antimicrobial overuse in the community. National actions in Iceland have now followed these guidelines. It is hoped that we will see some positive changes, i.e. diminished development of resistance among the commonest respiratory pathogens in the community and even a lower infection rate through more prudent antimicrobial usage in the near future.

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