Prescribing quality is not synonymous with cost minimization for antibiotics

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Sir,

There have been many recent reports on the problem of antibiotic resistance, and recommendations that doctors should only prescribe antibiotics when there is likely to be a clear benefit. There is a small or negligible benefit when antibiotics are prescribed for many common conditions, particularly upper respiratory tract infections. Both the Path of Least Resistance report from the Standing Medical Advisory Committee (SMAC) of the UK Department of Health and the recent Managing Antibiotic Prescribing Audit Handbook from the National Prescribing Centre advocate evidence-based antibiotic prescribing. The latter document discusses ways of developing consensus on ‘best practice’ in antibiotic prescribing, methods of encouraging implementation and the barriers to changing practices.

Antibiotics are unlike many other drugs in that overuse leads to an increasing reduction in efficacy. The development of resistance to an antibiotic within a community tends to follow a sigmoid (epidemic) curve. The proportion of isolates resistant to an antibiotic remains low for a variable period of time (lag phase) and then there is a rapid rise in the proportion resistant until a plateau is reached. The duration of the lag phase and the proportion resistant at the plateau phase is in large part determined by the selection pressure, which is determined by the amount of antibiotic prescribed.

In general when financial incentives are used to encourage changes in prescribing, targets are set that discourage inappropriate usage of expensive agents or encourage prescribers to use cheaper agents when there is equivalent efficacy. While reducing the usage of antibiotics will reduce the selection of resistant bacteria by reducing the selection pressure, reducing the range of antibiotics prescribed may have the opposite and undesirable consequence of increasing the levels of antibiotic-resistant bacteria.

Many primary care groups (PCGs) are now using or developing financial incentive schemes which encourage use of a limited range of antibiotics such as ampicillin (amoxycillin), phenoxymethylpenicillin, fluoroquinolones, tetracycline, erythromycin, trimethoprim, oral cephalosporin, metronidazole and nitrofurantoin. This target has probably evolved from audit commission quality of prescribing indicators. The audit commission includes cephalosporins as a proportion of antibiotics prescribed and the top 10 antibacterials as a proportion of total prescribed as indicators of the quality of prescribing, arguing that it is economical to use less expensive agents.

Campbell et al. describe the results of a Delphi consultation study designed to determine the face validity of indicators of prescribing quality or cost minimization. They report that the percentage of antibiotics prescribed that are contained in a predefined list was considered to be an indicator of both cost minimization and quality. The danger with this approach is that if there is replacement of other agents with a narrow range of antibiotics then the selection pressure for resistance to the narrow range of antibiotics increases. Resistant strains are not eradicated by use of non-limited list antibiotics, so they will be disseminated further within the community. The extreme example of this approach would be to prescribe only one antibiotic for a given indication—resistance to that agent would become widespread and efficacy would decline.

Many antibiotic resistance genes are linked so that bacteria can carry genetic elements that code for resistance to multiple antibiotics, for example resistance to ampicillin and trimethoprim as recently demonstrated by a study in Wales. These genetic elements may also be transmissible between bacteria, encouraging the acquisition of antibiotic resistance by a range of pathogenic strains. Escherichia coli is the most common cause of community-acquired urinary tract infection. Nitrofurantoin is used to treat cystitis but is not very effective in the treatment of pyelonephritis. Wide-spread acquisition by E. coli of resistance to ampicillin and trimethoprim reduces the number of antibiotics from the limited list for a patient with a suspected pyelonephritis to an oral cephalosporin.

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have encouraged appropriate use of antibiotics. None has advocated use of a limited range of antibiotics. PCGs should be cautious to avoid increasing antibiotic resistance by emphasizing targets that encourage less diversity of antibiotic prescribing. These policies may save money in the short term by encouraging the use of cheaper antibiotics but in the longer term may lead to greatly increased costs as the cheaper agents become ineffective. Incentives that discourage unnecessary use of antibiotics are more likely to benefit the community in the long term than encouraging use of a limited list.

References