Accelerated bacteriological evaluation in the management of lower respiratory tract infection in general practice

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This paper examines the use of overnight accelerated bacteriological evaluation (ABLE) in the treatment of lower respiratory tract infection in general practice. The use of ABLE is compared with the empirical prescribing of antibiotics. The results indicate that ABLE leads to a saving in resource use without a deterioration in clinical outcome. In view of there being additional benefits, such as reduced antibiotic exposure and repeat visits, it is concluded that the use of ABLE in the way described would improve the management of lower respiratory tract infection in general practice.

Introduction

There is widespread concern about excessive use of antibiotics and its role in increasing resistance levels.\textsuperscript{1-3} Approximately half of all antibiotic prescribing in general practice is for respiratory infection\textsuperscript{4} and is frequently empirical, with no attempt at a microbiological investigation. This seems paradoxical as most community respiratory infection is viral in aetiology.\textsuperscript{5} The Audit Commission has described much prescribing of antibiotics by general practitioners (GPs) as irrational and unnecessary.\textsuperscript{6} The objective of this study was to determine whether the use of the clinical microbiology laboratory can lead to more rational antibiotic therapy for lower respiratory tract infection in general practice.

Materials and methods

The data came from a multicentre trial with an open 2 × 2 factorial design (Figure). The trial compared amoxycillin with cefaclor MR in the treatment of lower respiratory tract infection. Fifty-three patients were randomized to receive immediate antibiotic treatment with cefaclor MR or amoxycillin while 45 patients had their treatment delayed until an overnight bacteriological assessment was made of their sputum sample. Those patients randomized to overnight accelerated bacteriological evaluation (ABLE) were also randomized to receive one or other of the study drugs. However, they received an antibiotic only if their sputum sample was found to be positive for a respiratory pathogen after overnight culture by standard laboratory methods. The only pathogens considered significant were Haemophilus influenzae, Haemophilus parainfluenzae, Streptococcus pneumoniae and Moraxella catarrhalis. Samples were incubated for 48 h in 5% CO\textsubscript{2} on blood and chocolate agar and on gentamicin blood agar anaerobically. All samples were culture positive within 15 h, although two samples where mixed pathogens were present only yielded one isolate by 15 h. Those patients whose sputum sample contained no respiratory pathogen received no antibiotic treatment. The study was approved by the Grampian Ethics Committee.

A three-month assessment of patients’ medical records was made by the study nurse. The efficacy of the treatment regimen was assessed in terms of cure (elimination of signs and symptoms of infection with no recurrence within the post-therapy period), improvement (significant but incomplete resolution of signs or symptoms of infection), relapse (worsening of signs and symptoms of infec-
It was felt that the inclusion of this in the analysis would distort the true picture.

In order to cost repeat GP visits, a cost per consultation was estimated from Unit Costs of Community Care 1995. This was added to the average cost incurred by patients when visiting their GP. This was calculated from information collected in a patient cost questionnaire and comprises out-of-pocket travel expenses and the value of time spent travelling. For private transport, a cost per mile of 22.3 pence was used. The value of time was taken to be the value of leisure time, which is estimated as 40% of the value of work time. A verage hourly net earnings data for Grampian region were used to estimate the value of work time. On the basis of these data, the value of leisure time was estimated to be 3.4 pence per minute. The sum was multiplied by the number of additional visits per patient made by immediate treatment patient compared with ABLE patients.

The delivery of specimens was not included in the cost estimates. This was based on the assumption that no additional delivery costs will be incurred since the laboratory operates a 24 h shift system and transportation of other samples is already taking place morning and evening. In addition to information on costs, data were also collected in the ABLE arm on patients’ satisfaction with their treatment. Patients whose sputum sample was positive were asked how satisfied they were with having to return the next day in order to get their prescription. Patients whose sputum sample was negative, and who therefore would not have benefited from an antibiotic, were asked how satisfied they were with not receiving an antibiotic. Patients were given the option of expressing five different levels of satisfaction, ranging from very satisfied to very dissatisfied.

Results and discussion

Table I shows differences in cure rates and repeat GP visits between ABLE and immediate treatment. Since there was no significant difference between the two antibiotics in terms of cure rates (using a Fisher’s exact test), the data were pooled. Using a chi-squared test with one degree of freedom, the pooled data revealed no significant difference in cure rates between ABLE (5/43) and immediate treatment (6/53) arms.

Within the two arms there was no significant difference between the two antibiotics in terms of the numbers of patients making repeat GP visits (Fisher’s exact test), and so again the data were pooled. As can be seen from Table I, the immediate treatment patients made on average 0.278 more repeat GP visits than ABLE patients, and 0.371 more repeat GP visits than ABLE patients receiving an antibiotic. Tests of difference in means reveal that both of these differences are statistically significant (P = 0.049 and P = 0.011, respectively).
Accelerated bacteriological evaluation

Most repeat GP visits for lower respiratory infection are due to continuation of symptoms. The cost difference between the ABLE and immediate treatment arms as a result of the difference in repeat GP visits was £2.59 per case. A test of difference in means showed no statistically significant difference between the arms in terms of the cost of concomitant medication (P = 0.31) and therefore these costs have been omitted from the remainder of the analysis.

The resource implications of ABLE are summarized in Table II. The cost per patient of ABLE was estimated as £3.38. The use of ABLE would be anticipated to generate a net saving whichever antibiotic is prescribed. Given that there was no difference in clinical outcome between ABLE and immediate treatment, the evidence suggests that the use of ABLE would improve antibiotic therapy for lower respiratory tract infection in general practice.

The data analysed here are specific to a particular location (Grampian). Elsewhere specimen transport costs may be incurred, the costs of bacteriological investigation may be higher, or laboratories may not be able to process specimens overnight. Thus it is possible that rather than saving resources, ABLE may incur a net cost. However, it may be worth incurring these extra costs in order to reduce unnecessary exposure to antibiotics, the benefits of which include reduced side effects for patients and reduced selective pressures on antibiotic resistance.

If ABLE is indeed worthwhile for the management of lower respiratory tract infection in general practice, it may be worth considering its use in the management of other conditions, such as pharyngitis and urinary tract infections.

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