

Respiratory illness and antibiotic use in general practice

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ONE of the current clinical problems of general practice is the uncertainty surrounding antibiotic usage in respiratory illness. Ultimate solution of the very real difficulties which face the family doctor in this field will require time and many good-quality prospective clinical trials. As a preliminary to problem-solving exercises there is still a need to define more closely the problems surrounding treatment of respiratory illness in general practice and this paper shows how retrospective epidemiological study can contribute to this need.

Source of data

The North-East Scotland faculty of the Royal College of General Practitioners and the university department of general practice at Aberdeen are collaborating in a study of general-practitioner consultations and the factors which influence the family doctor's work-load. Between May 1969 and April 1970, 155 doctors in the region (64 per cent of all the doctors approached) recorded nine items of information about each patient seen on one day per fortnight, the recording days being allocated randomly. Each participating doctor also supplied detailed information about himself and his practice. The full results of the study will be published in due course. This paper is based on two of the nine items of information—the diagnosis and the drugs prescribed.

Results

1. Overall pattern of antibiotic use in general practice respiratory illness

Of the 155 doctors contributing to the study 141 diagnosed new respiratory illness on 25 or more occasions. Figures 1–9 are based on analysis of these doctors' returns. For these doctors new respiratory illness represented between 16 per cent and 44 per cent of all new illnesses seen, the mean value being 30 per cent. The distribution of percentage frequency of diagnosis of new respiratory illness for these 141 doctors is shown in figure 1. The median values for city doctors, small town doctors and rural doctors were 31 per cent, 27 per cent and 29 per cent respectively. The 141 doctors recorded a total of 10,813 new episodes of respiratory illness, an average of 77 episodes per doctor.

Figure 2 shows the frequency with which antibiotics were prescribed for new respiratory illness by the 141 doctors defined above. The range will be seen to extend from antibiotic use in 24 per cent of new illnesses to antibiotic use in 100 per cent of such consultations with a mean value of 58 per cent (6,368 antibiotic prescriptions out of 10,813 consultations). The median value for all doctors is 55 per cent. The median values for city, small town and rural doctors are 56 per cent, 52 per cent and 59 per cent respectively. The median value for the 10 per cent of doctors with the highest diagnostic frequency rate for new respiratory illness (the right-hand end of the graph in figure 1) was

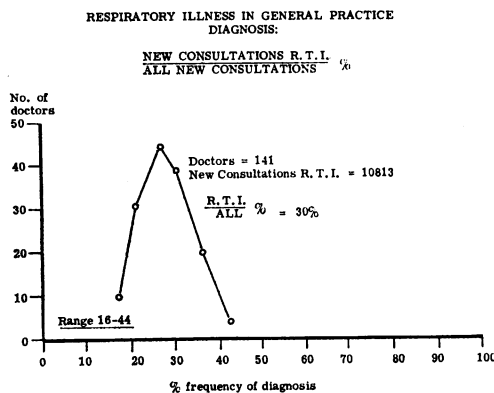


Figure 1

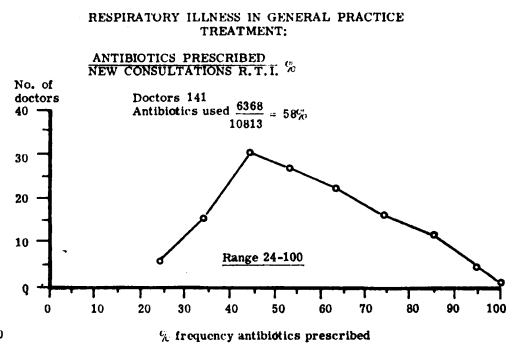


Figure 2

58 per cent, the same figure being found for the 10 per cent of doctors with the lowest diagnostic frequency rate (the left-hand end of the graph in figure 1).

The presence or absence of the tendency to diagnose and treat new respiratory illness over the telephone or through a third party (indirect consultations) did not influence the doctors' positions on the graph in either figures 1 or 2. Similarly, the distribution of recording days of the individual doctors appeared unrelated to their positions in figures 1 and 2.

It thus appears that, overall, respiratory illness is a diagnosis that is made with reasonable uniformity (figure 1) but that the approach to its treatment with antibiotics is far from uniform (figure 2). This would be in agreement with a subjective assessment of the management of general practice respiratory illness.

The wide base of the graph in figure 2 can be explained by:

- (1) The doctors having seen a different spectrum of illness, either by chance or by sampling error,
- (2) different use of diagnostic terms within respiratory disease as a whole,
- (3) different treatment within diagnostic categories, or
- (4) any combination of the above possibilities.

This study is retrospective and, while we acknowledge the risk of sampling error, we have carefully examined the data to assess this. We found it unlikely that this could have been a significant contributing factor to the apparent divergence of therapeutic choice. The subsequent sections examine the other possible explanations listed in this paragraph.

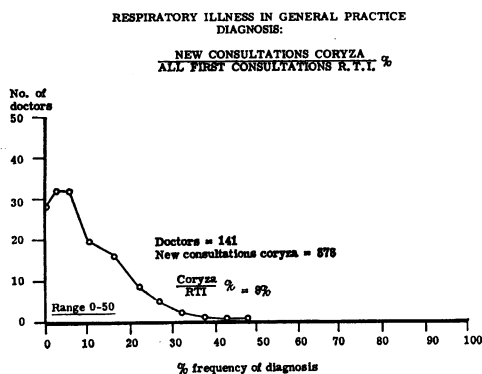


Figure 3

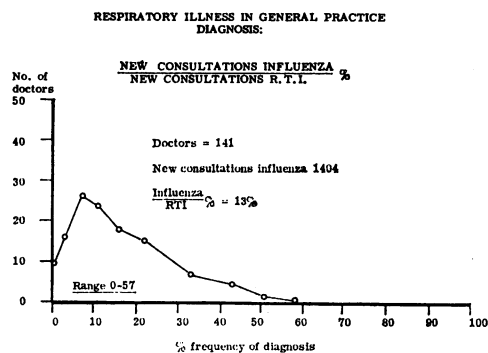


Figure 4

2. Definition of terms within respiratory illness

Figures 3, 4 and 5 show the percentage frequency with which the 141 doctors who recognized more than 25 episodes of new respiratory illness made the diagnoses of coryza, influenza and tonsillitis. The mean percentage diagnostic frequency values of coryza (8 per cent), influenza (13 per cent—including the 1969/70 epidemic) and tonsillitis (16 per cent), disguise wide fluctuations in range (coryza 0 per cent—50 per cent, influenza 0 per cent—57 per cent and tonsillitis 1 per cent—47 per cent). It is not surprising that one doctor's coryza may be another doctor's influenza but the diagnosis of tonsillitis should be the most objective of all respiratory diagnoses. The pattern shown in figure 5 suggests an acute need for re-definition of general-practitioner respiratory illness in terms which mean the same things to more doctors at a time than is the case at present.

It might be hoped that aggregation of all constituent parts of upper respiratory illness would leave a reasonably homogeneous group of lower respiratory illnesses, but figure 6 suggests that even the division into upper and lower respiratory tract illness (range of percentage frequency of diagnosis of lower R.T.I. 6 per cent—61 per cent, mean 23 per cent) is highly variable.

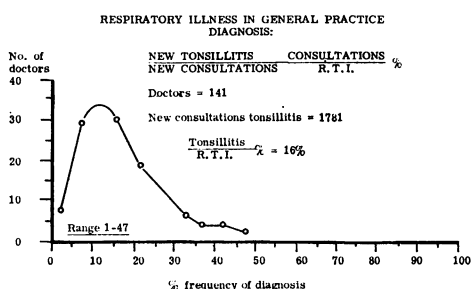


Figure 5

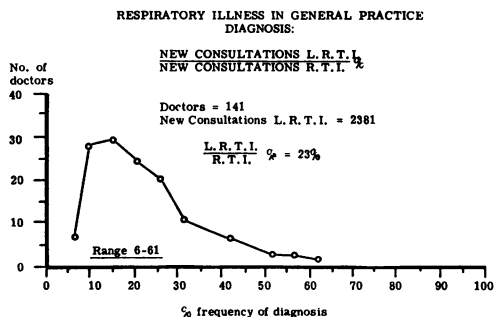


Figure 6

3. Treatment within diagnostic groups

Figure 7 shows that once a diagnosis of coryza has been made antibiotics are prescribed for 18 per cent of patients (159 of 878). The percentage frequency of antibiotic use for coryza has been plotted for those 27 doctors who diagnosed coryza on 10 or more occasions, the scale on the y-axis being adjusted to compare with the 141 doctors in the total series. Although the range of antibiotic use is wide (0-83 per cent) there is a clear weighting of doctors towards the zero end of the x-axis.

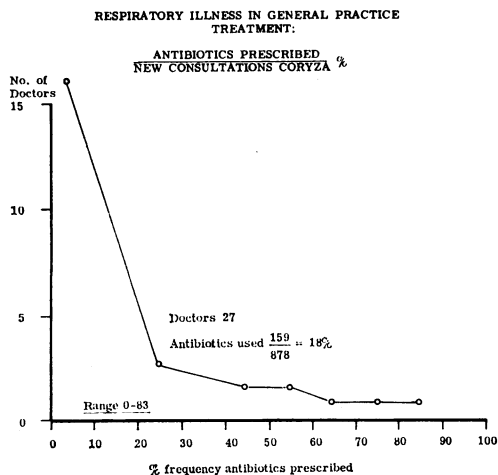


Figure 7

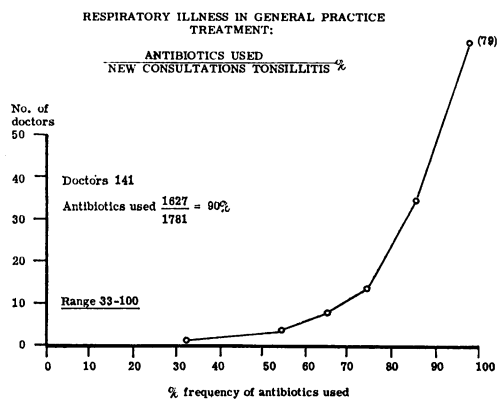


Figure 8

Figure 8, similarly constructed for percentage frequency of antibiotic use for tonsillitis, shows that for tonsillitis the decision to use antibiotics is heavily weighted to the "100 per cent" end of the x-axis, antibiotics being used on 90 per cent of occasions (1,627 of 1,781 consultations) with a range of usage for individual doctors from 33 per cent to 100 per cent. These two models indicate a consensus of broad therapeutic pattern amongst general practitioners which, until proved wrong, should be taken as showing that, in general practice, under normal circumstances, coryza requires no antibiotic treatment whereas tonsillitis does. This may be called an educational pattern.

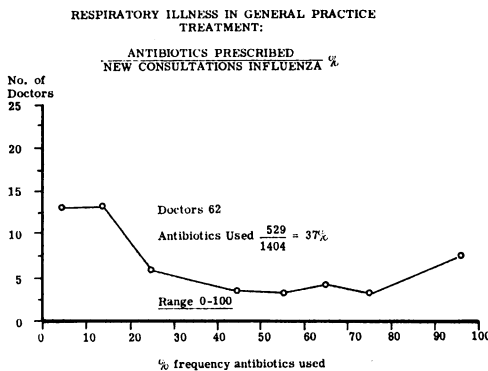


Figure 9

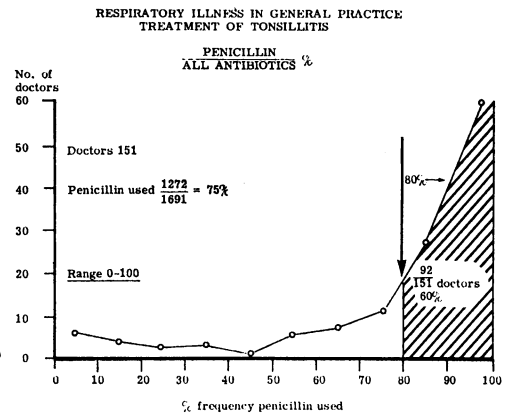


Figure 10

On the other hand figure 9, which shows the distribution of percentage frequency of use of antibiotics for the treatment of influenza for the 62 doctors who made this diagnosis on 10 or more occasions, illustrates a therapeutic pattern with almost equal disagreement on either side of an indecisive mean figure of 37 per cent use of antibiotic treatment (529 out of 1,404 diagnoses of influenza). There is no agreement as to right and wrong and this type of finding indicates a need for prospective study. This may be called a research pattern.

4. Choice of antibiotic

Table I shows the percentage use of the principal antibiotics prescribed as treatment for respiratory illness—new and return consultations being combined. Penicillin (40.5 per cent) and tetracycline (35.9 per cent) were easily the most commonly used but in the right-hand column of the table it can be seen that for individual doctors wide variation in preference exists. The 148 doctors who prescribed antibiotics on at least 20 occasions were eligible for this part of the table. It can easily be realized that the difficulties in defining precise indications for the use of individual antibiotics in the respiratory field are enormous, especially given the difficulties in terminology which we have shown to exist.

Almost any combination from table I could potentially be defended and the ideal of finding educational patterns as described in Section 3 above is not often achieved. Two such patterns do exist, however, and these are shown in figure 10 (Penicillin as treatment of choice for tonsillitis) and figure 11 (Avoidance of use of tetracycline at the majority of consultations—new and return—in small children). That penicillin is used for 75 per cent of patients with tonsillitis for whom antibiotics are prescribed (figure 10) suggests agreement of approach. Although the range of use is from 0 to 100 per cent, the majority of doctors—60 per cent—treat at least four out of five of their patients for whom antibiotics appear necessary with penicillin. The onus appears thus to be on the non-penicillin user to prove his case, or change his prescribing pattern.

Similarly, figure 11 shows that 79 per cent of doctors use tetracycline at less than one in five consultations for children between 0 and six years of age. This suggests that the doctor who uses it at 71 per cent of such consultations is not only disagreeing with

TABLE I
USE OF ANTIBIOTICS IN RESPIRATORY ILLNESS IN
GENERAL PRACTICE

Antibiotic	Overall use Per cent	Range use Per cent
Penicillin	40.5	0-81
Tetracycline	35.9	3-77
Ampicillin	12.3	0-50
Erythromycin	4.3	0-51
Bactrim/Septin	3.0	0-54
Sulphonamides	1.3	0-44
Others	1.2	
TOTAL	100=8,062	

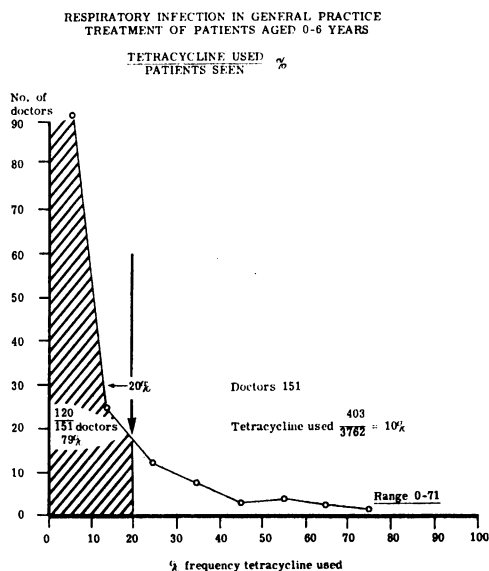


Figure 11

theoretical teaching on the risk of tetracycline use in children but also disagreeing with the point of view of the majority of his colleagues. (Figures 10 and 11 include information from 10 doctors who made infrequent returns in addition to the 141 doctors whose more complete returns were the basis of figures 1-9).

5. Characteristics of the doctors

The doctors were grouped according to age (below 40 years, 40-49 years, and over 50 years), according to type of practice (city, small town, rural), and according to the number of doctors in partnership (single-handed, two or three partners, four or more partners). In all cases except one, variations in diagnostic or treatment patterns were greater between the individual doctors in these groups than between the groups themselves. The exception was that of 24 doctors who appeared outside the consensus area in both figures 10 and 11; 20 were practising single-handed or in small groups and only four in larger groups. These proportions (20 out of 96 and 4 out of 55) differ significantly ($P < 0.05$).

6. 'Prophylactic' antibiotic use

The 155 doctors were arranged in rank order for their percentage frequency of use of antibiotics at first consultations for respiratory infection, for their percentage frequency of use of antibiotics at return consultations for respiratory infection, and for ratio of first to return consultations for respiratory infection. A weak correlation was obtained between high prescribing of antibiotics at first consultations and high prescribing at return consultations. No correlation was found between high antibiotic use at first consultations and the ratio of first to return consultation. A retrospective study of this type is not designed to test these possible relationships properly and these findings cannot be regarded as authoritative.

Discussion

In deciding on management of a patient the first need is to make a diagnosis. The second is to decide which—if any—categories of pharmacological preparations should

be considered for use, bearing in mind the present severity of illness and its projected natural history. If a particular category of drugs is felt to be indicated, the third need is to make a choice concerning which drug in that group should be used.

It appears that problems exist relating to all three aspects of management of general-practice respiratory illness. The difficulty of diagnosis between colds and influenza is easily understood and of minor significance as long as it is recognized. The variability of diagnosis of tonsillitis and of lower respiratory infection has more serious implications and suggests that application of pathologically-orientated terms (for example, bronchiolitis and laryngo-tracheo-bronchitis) to general practice illness is unhelpful and irrelevant and can only confuse the field for future study. An urgent need exists to define general practice illness in terms of its presenting signs and symptoms—cough, fever, red throat, presence of chest signs—so that objective respiratory syndromes may be recognized and studied with a view to deciding appropriate treatment.

The difficulty of deciding treatment involves principally the decision of whether to use an antibiotic. Most doctors would like to use fewer antibiotics than they do at present. The failure to find a relationship between high antibiotic use and low return consultation rate—although the study used is a retrospective one not designed to test this relationship ideally—should encourage doctors to stop prescribing in the belief that return consultations are thereby significantly reduced. Similarly the correlation—albeit weak and again not statistically ideal—between high prescribing of antibiotics at first and at return respiratory consultations fails to offer support for general ‘prophylactic’ prescribing of antibiotics.

The trend for antibiotic prescribing to aggregate to the ‘zero’ end of the scale (coryza) or the ‘100 per cent’ end of the scale (tonsillitis) indicates that a consensus view exists among general practitioners on the correct treatment for these diagnoses. Until satisfactory re-definition of terms takes place these model distributions can be accepted as standards for educational and training purposes and the onus should be placed firmly on doctors holding minority points of view to produce evidence to support their practices or to move towards the majority point of view. This evidence presents, we believe for the first time, clear guidance from within the specialty of general practice as to ‘right’ and ‘wrong’ treatment. That this type of guidance may be obtained from the study of prescribing patterns of those practising within the specialty and thus sharing an intimate first-hand knowledge of the problems of general practice, has surely far reaching implications.

The type of treatment pattern demonstrated for influenza, on the other hand, indicates an area where wide divergence of opinion exists and research is thus needed. The extreme points of view 0 per cent and 100 per cent are the logical but opposite extensions of the indecisive average value of 37 per cent and although both cannot be correct neither is wrong until proved so by future work. Any treatment pattern not weighted to 0 per cent or 100 per cent requires re-definition of the group of patients (by pathology, by age, by past history, etc) and possibly controlled prospective trial of active treatment against placebo.

The third problem of choice within a pharmacological group is the one which arouses most passion, attempts at suggestion of correct choice being sometimes regarded as an infringement of clinical freedom. The onus is on those who believe a specific treatment correct to present a rational case for their opinion and if the point of view is divergent from accepted or majority practice to support this with statistical evidence. Thus not only is penicillin indicated for tonsillitis on the theoretical grounds of the probable sensitivity of B-haemolytic streptococci but it is also the treatment of choice by the majority of general practitioners. The doctor who wishes regularly to use tetracycline must justify his point of view against not only theory but also the practice of the majority of his colleagues. This may be a much more difficult restraint to escape from than theory

alone. Similarly, the widespread use of tetracycline for small children, so often condemned in print, is also condemned by most general practitioners and thus the doctor regularly prescribing this treatment must again argue not only with theorists but also with his peers.

It appears that, from retrospective study, improved definition of known problems can be made, and agreement demonstrated from which educational standards may be laid down. It is thus possible for general practice to define its own clinical identity from within its own bounds, as indeed should any self-respecting specialty. We believe that just as it is possible to do this for respiratory illness in general practice so also should the general principles shown apply to any clinical problem in any specialty.

Summary

Using information on consultations with patients collected from 155 general practitioners on a random-sample basis of one day per fortnight for one year, an attempt has been made to define the problems of antibiotic usage in respiratory illness in general practice.

The use of antibiotics at 58 per cent of 10,000 new episodes of respiratory illness included extremes by individual doctors of from 24 per cent to 100 per cent. Considerable problems of definition of terms exist, but within groups of disease some are uniformly treated and others not. Patterns are demonstrated where there is argument to justify a statement of policies of treatment for educational and training purposes, whereas other patterns point to the need for future prospective trials.

The method used in this study might be applied to the defining of other clinical problems within and outwith the special area of general practice.

Acknowledgements

We are grateful to each of the 155 doctors who so willingly participated in the study which made this paper possible, and to all the many other people who enabled such a large-scale operation to be successfully completed. Financial help was obtained from the Research Foundation of the Royal College of General Practitioners and from the Research and Intelligence Unit of the Scottish Home and Health Department, and this we gladly acknowledge.

A Double Cure

Dr. Carlyle once, when at Carlisle, sent to invite his friend Chancellor Wedderburn to sup with him and his wife at his inn; but he learnt that the Chancellor was preparing to go to bed, as he was very hoarse. The Doctor, however, sent to say he would infallibly cure his hoarseness before the next morning. The Chancellor came but was very hoarse. The supper was good enough, but the liquors were execrable—the wine and porter were not drinkable. They made a bowl of the worst punch Carlyle ever tasted. Wedderburn said, if they would mix it with a bottle of the bad porter, it would be improved. They did as he directed, and to their surprise it became drinkable, and they were a jolly company. The counsellor did not forget the receipt to cure his hoarseness. This was nothing more than some Castille soap shaven into a spoon and mixed with some white wine or water, so that it could be swallowed: this he took, and next morning he was perfectly cured, and as sound as a bell.

Carlyle's Autobiography.

Quoted by JOHN TIMBS, F.S.A.

Doctors and Patients. 1873. P. 159.