Trends in antibiotic prescribing and associated indications in primary care from 1993 to 1997

Martin Frischer, Heath Heatlie, Jeff Norwood, James Bashford, David Millson and Steve Chapman

Abstract

Background Recent concerns that evidence on the appropriate use of antibiotics is not having an impact on prescribing trends are based on UK prescribing data relating to 1980–1991. The aim of this paper is to determine trends in antibiotic prescribing from 1993 to 1997 and link antibiotic prescriptions to diagnostic categories.

Methods A retrospective analysis of antibiotic prescriptions linked to diagnostic codes was carried out using the West Midlands General Practice Research Database.

Results The prescribing rate for antibiotics fell from 963 prescriptions/1000 patients in 1993 to 807 prescriptions/1000 patients in 1997 (p < 0.001). The proportion of antibiotic prescribing for respiratory conditions fell from 65 per cent in 1993 to 59 per cent in 1997 (p < 0.001). The main decreases in antibiotic prescribing are accounted for by non-specific lower respiratory tract infections (–22 prescriptions/1000 patients), non-specific upper respiratory tract infections (–21/1000 patients) and throat infections (–20/1000 patients). There was increased prescribing for non-respiratory miscellaneous conditions (6 prescriptions/1000 patients).

Conclusions Overall antibiotic prescribing declined by 16 per cent between 1993 and 1997, primarily for respiratory conditions. These results of the current study are in marked contrast to an earlier review, which found an increase of 46 per cent between 1980 and 1991 in England. The level of antibiotic prescribing for conditions which may not be bacterial in origin is still high and there is scope for further reductions in antibiotic prescribing. This study highlights the need for regular epidemiological data to inform the debate on antibiotic prescribing.

Keywords: antibiotics; prescriptions, drug; diagnosis; primary health care

Introduction

Although there is evidence that much antibiotic prescribing is of uncertain therapeutic value,1 there is also a perception that antibiotic prescribing is increasing.2 However, the most recently published trend data for England relate to 1980–1991: Davey et al. found that during this period the number of antibiotic prescriptions in England increased by 46 per cent. They speculated that this was due to increase in use of antibiotics for respiratory conditions but noted that they were unable to test this hypothesis because the Prescribing Analysis and Cost (PACT) data used in their analysis contained no information about indications.

PACT data have the advantage of being national and are readily available to all general practitioners (GPs), but do not contain diagnostic information or patient characteristics.4 Although PACT is the only nationwide prescribing database, the UK General Practice Research Database (GPRD) contains additional information on patient characteristics and diagnoses. It currently receives data from 525 practices with a population of 3.4 million patients and over 30 million patient years of prescribing histories.5 Participating GPs record every prescription, all significant morbidity and patient characteristics.

The recent report from the Standing Medical Advisory Committee (SMAC) recommended that antimicrobial agents should be used prudently and that inappropriate prescribing be kept to a minimum.6 The SMAC report noted that 80 per cent of antimicrobial prescribing in the United Kingdom occurs in primary care and resistance is increasing in community pathogens. The report proposed that a reduction in the volume of antimicrobial prescribing could be made by eliminating prescribing of antibiotics for simple coughs, colds and viral sore throats. A recent study of 190 general practices in Wales found that although the use of antibiotics and rates of resistance to antibiotics varied between surgeries, the correlation between the prescribing of an antibiotic and resistance to the same antibiotic was often significant.7 The authors speculated that much of this prescribing is likely to have been related to treatment of respiratory infections and this may have been an important factor in determining the observed resistance. In this paper we examine the indications associated with prescribing of antibiotics in the West Midlands from 1993 to 1997. Indications were also classified into respir-
atory and non-respiratory symptoms and diagnoses, to address
the hypothesis proposed by Davey et al.3

Methods

Sampling frame

The sampling frame was the West Midlands General Practice
Research Database (GPRD), which is owned by the Medicines
Control Agency and currently maintained by the Office for
National Statistics (ONS). The West Midlands data are held on
a Microsoft Access relational database with tables on patient
details, prescriptions and medical records (diagnoses, hospital
referrals). The tables are linked by an anonymized and encryp-
ted patient identifier. The database contains 642,986 individual
The period of observation for the analysis in this paper was
1993–1997. The number of participating practices was 53 in
the 1996 GPRD population with the mid-1996 population of
England and Wales shows that the distributions are similar with
regard to age and sex.5

Data and outcome measures

General practitioners who provide data record information in a
standard manner, which can be used for research purposes. The
ONS regularly monitors the quality of 15 key indicators that are
important to practices and researchers. A number of independ-
ent validation studies have found the recording of medical data
to be close to complete,6,9 although there have been no studies
specific to antibiotic prescribing. Studies of coded diagnosis
outcomes have shown good agreement between the recorded
diagnosis and the diagnosis on written clinical records.10

All prescription items in Section 5.1 of the British National
Formulary (BNF) (with the exception of antituberculous and
antileprotic drugs) were selected for the period 1993–1997.
These were then linked to diagnoses by patient identifier and
date of prescription and diagnosis. Prescriptions were divided
into three categories, those with (1) a single diagnosis on the
same day (SDSD), (2) no diagnosis on the same day or (3) more
than one diagnosis on the same day. Prescription rates per 1000
registered patients per year were calculated. SDSD prescrip-
tions were chosen as the primary unit of analysis because of the
high degree of confidence in the linkage between indication and
prescription.

Classification of diagnoses and symptoms

Diagnoses and symptoms on the GPRD are recorded by
OXMIS codes (Oxford Medical Information Systems). These
codes were devised for use by GPs and are based on ICD8 and
Office of Population Censuses and Surveys (OPCS; now ONS)
operation codes. OXMIS codes allow for the coding of symp-
toms as well as diagnoses. Two of the authors (J.B. and J.N.)
devised 16 therapeutic groupings and then assigned all OXMIS
codes associated with at least 10 antibiotic prescriptions to one
of these categories. As Table 1 shows, 2413 OXMIS codes were

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included in these groupings; there were a further 4162 OXMIS
codes each of which was associated with less than 10 antibiotic
prescriptions. This list was assessed by an external expert (a GP
with an interest in respiratory medicine), whose suggested
amendments were then used to compile the final list. (This list is
available from the authors.)

Analysis
The main outcome measure is the annual number of antibiotic
prescriptions per 1000 registered patients. This was calculated
for all prescriptions and those with a same-day single diagnosis
(SDSD). SDSD prescriptions were then divided into respiratory
and non-respiratory. Statistical comparisons for each pair of
consecutive years between 1993 and 1997 and for the first and last
study years (1993 and 1997) were made for (1) overall prescribing
rates, (2) SDSD prescribing rates, (3) proportion of respiratory
conditions. For comparisons (1) and (2), the test for independent
proportions was used, and the $\chi^2$ test was used for (3).

Results
There were 1 646 335 antibiotic prescriptions on the database
from 1993 to 1997. Of these, 1 177 399 (72 per cent) had an
SDSD. Of the SDSD prescriptions, 1 033 521 (88 per cent) were
associated with 2413 OXMIS codes (10 or more prescriptions
per code), and 143 878 (12 per cent) were associated with 4162
OXMIS codes (less than 10 prescriptions per code); 4990 (0.3
per cent) prescriptions were not associated with any diagnostic
code, and 315 078 (19 per cent) prescriptions were associated
with more than one diagnostic code.

There were significant annual reductions ($p < 0.05$) in the
prescribing rate for antibiotics each year from 1993 to 1997,
with the exception of 1994–1995, when there was a significant
increase (see Fig. 1). The proportion of antibiotic prescriptions
issued for respiratory conditions fell significantly ($p < 0.05$)
each year from 1993 to 1997, with the exception of 1994–1995,
when there was no significant change (see Fig. 2).

Table 2 shows the antibiotic prescribing rates for the 16 diagnostic
groups. The main decreases in antibiotic prescribing are accounted
for by non-specific lower respiratory tract infections
(–22/1000 patients), non-specific upper respiratory tract infections
(–21/1000 patients) and throat infections (–20/1000 patients). The main increase was for non-respiratory 'miscellaneous' conditions (+6/1000 patients).

Discussion
The results of the current study show that the rate of antibiotic
prescribing decreased in a large sample of general practices in
the West Midlands between 1993 and 1997. Although we cannot

Figure 1 Annual number of antibiotic prescriptions per 1000 patients, West Midlands GPRD 1993–1997.

Figure 2 Proportion of antibiotic prescribing for respiratory
Table 2: West Midlands GPRD: annual antibiotic prescribing rates per 1000 patients by diagnostic category, 1993–1997

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Diagnostic categories: 16, non-respiratory: miscellaneous conditions; 14, non-respiratory: other specified infection; 13, soft tissue and skin; 12, URTI nose; 10, unspecified respiratory; 9, asthma; 12, skin–acne; 5, URTI non-specific symptoms; 13, genitourinary; 15, possibly infection related; 4, URTI sinus; 7, LRTI specific; 1, URTI ears; 6, URTI non-specific diagnosis; 2, URTI throat; 8, LRTI non-specific.

*Absolute change in prescribing rate per 1000 patients from 1993 to 1997. †Proportionate change in prescribing rate per 1000 patients from 1993 to 1997.
Patients’ expectations and characteristics, for example, play an important role in antibiotic prescribing.25 Studies have shown that prescribing for sore throat is associated with future consulting for the same condition with the same expected outcome for future events.26 If the aim of good prescribing is to ‘maximise effectiveness, minimise risks, minimise costs and respect patient choices’,27 then there is clearly an important role for developing informed choice in the case of antibiotics. Indeed, this echoes the SMAC report, which called for a national campaign in educating the public about antibiotics.

In conclusion, the results of this study have shown that the rate of antibiotic prescribing fell between 1993 and 1997, and the largest reductions occurred for respiratory conditions where prescribing is thought to be inappropriate. However, the level of antibiotic prescribing for conditions that may not be bacterial in origin is still high and there is scope for further reductions in antibiotic prescribing. This is of particular importance in relation to reducing levels of bacterial resistance in the community.

Acknowledgements

The authors would like to thank the General Practice Research Database team at the Office for National Statistics, London, and Dr Steve Ruffles, who assessed the categorization of OXMIS codes. The study was conducted after review and approval by the GPRD’s Scientific Ethical and Advisory Group. PACT data were supplied by the Prescription Pricing Authority.

References


Accepted on 3 November 2000