Appropriate prescribing in asthma and its related cost in east London

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Abstract

Objectives—To determine the patterns of preventive to reactive prescribing for asthma among general practices in the City and East London Family Health Services Authority area and their relation to prescribing cost.

Design—Descriptive study of asthma prescribing during April 1992 to March 1993. Prescribing data were linked with general practice and population data on one database.

Setting—City and East London Family Health Services Authority area, including all general practices in contract with the authority, which covers the inner city London Boroughs of Hackney, Tower Hamlets, and Newham and the Corporation of the City of London.

Subjects—All 163 general practices as at 1 June 1993.

Main outcome measures—Ratios of prescribed inhaled corticosteroids plus cromoglycates (prophylactic treatment) to bronchodilators; distribution of the cost of asthma prescribing; distribution of overall generic prescribing; proportion of asthma generic prescribing; distribution of cost of overall drugs prescribed per prescribing unit.

Results—Practices approved for band 3 health promotion or asthma surveillance and those with a general practitioner trainer had on average higher ratios of prophylactic to bronchodilator treatment and significantly higher asthma drug costs than other practices. Those practices with high levels of overall generic prescribing had significantly higher prophylactic to bronchodilator ratios than those with lower levels of generic prescribing. Practices with higher levels of asthma drug generic prescribing also had significantly higher prophylactic prescribing. However, the proportion of generically prescribed asthma drugs was lower than overall generic prescribing. There was no correlation between the ratio of prophylactic to bronchodilator asthma prescribing and the proportion of overall drugs expenditure, but high spending practices spent significantly more on asthma drugs.

Conclusions—Pressure to reduce the cost of asthma prescribing may lead to a lowering of the ratio of prophylactic to bronchodilator treatments. However, reducing prophylactic prescribing would run contrary to the British Thoracic Society guidelines and might worsen the quality of asthma care.

Introduction

General practice prescribing costs are high and rising. The indicative prescribing scheme seeks to control them and increase cost effectiveness.¹ There is, however, little consensus on what constitutes good prescribing and how to measure it. Though overall cost, even for specific drugs or categories, shows wide variation, it is too crude a measure. Low costs may reflect commendable parsimony or failure to diagnose.

They are affected by morbidity in the population served. Prescribing may save money in other aspects, such as consultation time, while prescribing may reduce other health care costs—for example, when a therapeutic trial of treatment is used instead of investigation or an expensive drug avoids hospital treatment. Generic prescribing is often promoted as good practice^{1,2} but it is not clear how it relates to cost effectiveness.

Baker and Klein studied the effect of population characteristics and practice organisation on general practice activities between family health services authorities,³ but this masks substantial variations between practices. We studied factors related to variation in prescribing costs between individual practices within one family health services authority.

We chose to look firstly at asthma. Asthma has a high prevalence, particularly in our area,⁴ and is one of the few conditions in which there is wide consensus on what constitutes good practice.⁵ Several studies have suggested that prescribing could be improved by increasing the ratio of prophylactic (inhaled corticosteroids and cromoglycates) to bronchodilator drugs prescribed.⁶⁻¹⁰ This could decrease morbidity and hospital admission rates. In our area admission rates for asthma are 80% above the national rates.¹¹

Jones investigated 59 practices with an interest in asthma and found that though their average total prescribing costs were lower than their family health services authority average, their respiratory drug costs were higher.¹² McGavock found that high spending urban practices prescribed proportionately more systematic (prophylactic) drugs for asthma than low spending practices.¹³ There are no general practice studies of the generic prescribing of asthma drugs.

We decided to look at the relation between overall drug costs, overall asthma drug costs, generic prescribing rates, and prophylactic to bronchodilator ratio. We also related these to other factors which have face validity as likely to be markers for good prescribing in this area—namely, approval for asthma surveillance, band 3 health promotion, and vocational training.

Subjects and methods

Applying a method analogous to that of Baker and Klein³ to individual practices, the City and East London General Practice Database allows study of factors which influence general practice activity. It uses routinely collected practice based information from the family health services authority, Prescription Pricing Authority, Office of Population Censuses and Surveys, and the district health authority. Issues of confidentiality and data security were negotiated with the local medical committee and City and East London Family Health Services Authority.

Data on general practitioner characteristics, practice resources, and practice populations for all 163 practices in east London (as at 1 June 1993) were collated

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on one database. Included in these data was health promotion banding, approval for asthma surveillance (after July 1993), and the presence of a general practitioner trainer (as at 1 October 1993). The source of these data was family health services authority files. Prescribing variables were obtained from general practitioners' prescribing analyses, and cost was then

TABLE I—Variability of prophylactic to bronchodilator ratios and net ingredient cost of asthma drugs per prescribing unit (data from 158 practices)

Descriptive statistics	Net ingredient cost (£) of asthma drugs per prescribing unit	Prophylactic to bronchodilator ratio for net ingredient cost	Prophylactic to bronchodilator ratio for No of items
Minimum	1.23	0.28	0.10
25th centile	2.58	0.85	0.28
Median	3.37	1.08	0.33
75th centile	4.37	1.37	0.39
Maximum	16.81	2.53	0.65
Mean (SD)	3.75 (2.07)	1.13 (0.37)	0.33 (0.10)

TABLE II—Asthma prophylactic to bronchodilator prescribing ratios and net ingredient cost per practice prescribing unit in practices according to whether practice was approved for asthma surveillance and band 3 health promotion and had general practitioner trainer

Practices	Median net ingredient cost (£) of asthma drugs per prescribing unit	Median prophylactic to bronchodilator ratio for net ingredient cost	Median prophylactic to bronchodilator ratio for No of items	No of practices
Approved for asthma surveillance	3.52 (P=0.007)†	1.15 (P=0.075)	0.35 (P=0.01)	117
Not approved for asthma surveillance	2.84	1.00	0.31	41
In health promotion band 3	3.67 (P<0.001)†	1.21 (P<0.001)	0.36 (P<0.001)	96
Not in health promotion band 3	2.71	0.90	0.30	62
With general practitioner trainer	4.54 (P<0.001)†	1.45 (P<0.001)	0.43 (P<0.001)	17
Without general practitioner trainer	3.17	1.03	0.32	141
All practices	3.37	1.08	0.33	158

Seventy seven per cent of practices approved for asthma surveillance were in health promotion band 3.

†P value based on analysis of log of net ingredient cost of asthma drugs per practice prescribing unit.

TABLE III—Asthma prescribing ratios and net ingredient cost per prescribing unit according to practice levels of generic prescribing for overall drugs

Percentage levels of generic prescribing for overall drugs	Median net ingredient cost (£) of asthma drugs per prescribing unit	Median prophylactic to bronchodilator ratio for net ingredient cost	Median prophylactic to bronchodilator ratio for No of items	No of practices
<35	2.79	0.91	0.30	40
35-44	3.16	1.03	0.33	48
45-54	3.51	1.13	0.30	35
≥55	4.60	1.33	0.39	34
All practices	3.37	1.08	0.33	157
Pearson's correlation coefficient	0.41 (P<0.001)	0.38 (P<0.001)	0.42 (P<0.001)	
Spearman's rank correlation coefficient	0.40 (P<0.001)	0.39 (P<0.001)	0.36 (P<0.001)	

Correlation coefficients were calculated from individual practice data.

TABLE IV—Asthma prescribing ratios and net ingredient cost per prescribing unit for levels of generic prescribing for asthma drugs

Percentage levels of generic prescribing for asthma drugs	Median net ingredient cost (£) of asthma drugs per prescribing unit	Median prophylactic to bronchodilator ratio for net ingredient cost	Median prophylactic to bronchodilator ratio for No of items	No of practices
<10	3.05	1.00	0.31	68
10-19	2.92	1.01	0.33	37
20-29	4.49	1.24	0.37	16
≥30	3.92	1.40	0.38	37
All practices	3.37	1.08	0.33	158
Pearson's correlation coefficient	0.26 (P=0.001)	0.47 (P<0.001)	0.28 (P<0.001)	
Spearman's rank correlation coefficient	0.25 (P<0.001)	0.38 (P<0.001)	0.26 (P<0.001)	

Correlation coefficients were calculated from individual practice data.

linked to the dataset and analysed to investigate the relations, if any, through statistical analysis. Practice data were compiled on a Foxpro 2 database and analysed with the SPSS-PC.

The number of practice prescribing units is the denominator. This figure is the number of patients aged under 65 plus three times those aged over 65.¹⁴ Other variables were the number of items prescribed, their net ingredient cost, and the percentage of items prescribed generically. These variables were included for all drugs and for asthma drugs¹⁵ for the period April 1992 to March 1993. Data were collected for the 163 practices in the City and East London Family Health Services Authority area but those with incomplete datasets were excluded from some calculations; the number analysed ranged from 155 to 158 practices. There are no dispensing practices in the city and east London area.

Analyses were based on the ratio of prophylactic (inhaled corticosteroids (BNF, ch 3.2)¹⁵ plus cromoglycates (BNF, ch 3.3)¹⁵ to bronchodilator drugs (BNF, ch 3.1)¹⁵ for asthma treatment and the net ingredient cost of these asthma drugs per practice prescribing unit.

The distribution of the prophylactic to bronchodilator ratios was found to be sufficiently normal for use of an independent samples *t* test on the raw data. However, the net ingredient cost of asthma drugs per prescribing unit was highly positively skewed, and in order to satisfy the requirements for a *t* test logs were taken before the test was carried out. The relation between continuous variables was investigated by means of Pearson's correlation coefficient and Spearman's rank correlation coefficient. Because there were several outliers and because of the problems associated with analysing percentage data Spearman's rank correlation coefficient was calculated to confirm Pearson's correlation coefficient. The median was used as the measure of central tendency to display the results in the tables.

Results

The three measurement variables used are listed in table I. The prophylactic to bronchodilator ratios had a near normal distribution but the unit cost for asthma drugs was highly positively skewed. Table II shows that the unit cost of asthma prescribing was significantly higher in practices with a general practitioner trainer (P<0.001), practices approved for band 3 health promotion (P<0.001), and those approved for asthma surveillance (P=0.007). These practices also had significantly higher prophylactic to bronchodilator item ratios than their counterparts. Band 3 and training practices had significantly higher cost ratios (P<0.001).

Practices with a higher level of overall generic prescribing showed a higher unit cost for asthma drugs (table III). The percentage of overall generic prescribing was positively correlated with prophylactic bronchodilator ratios for items and costs (P<0.001). There was also a positive correlation between the percentage of overall generic prescribing and the generic prescribing of asthma drugs, giving a Pearson coefficient of 0.52 (P<0.001).

The mean percentage of generic prescribing for asthma drugs was 19.3%, as compared with 44.5% for overall drugs. The mean percentage of generic prescribing for each group of asthma drugs was as follows: cromoglycates 8.6%; corticosteroids 7.3%; bronchodilators 23.7%. Table IV shows a positive relation between the percentage of generic prescribing for asthma drugs and the prophylactic to bronchodilator ratios for items and costs (P<0.001). The net ingredient cost of asthma drugs per prescribing unit

TABLE V—Asthma prescribing ratios and net ingredient cost per practice prescribing unit for practices by levels of expenditure on overall drugs

Level of expenditure (£) on overall drugs per practice prescribing unit	Median net ingredient cost (£) of asthma drugs per prescribing unit	Median prophylactic to bronchodilator ratio for net ingredient cost	Median prophylactic to bronchodilator ratio for No of items	No of practices
<30	2.51	0.86	0.30	27
30-34.99	2.97	1.14	0.34	40
35-39.99	3.58	1.08	0.34	37
≥40	4.37	1.09	0.34	51
All practices	3.37	1.08	0.33	155
Pearson's correlation coefficient	0.80 (P<0.001)	0.13 (P=0.12)	0.13 (P=0.12)	
Spearman's rank correlation coefficient	0.62 (P<0.001)	0.06 (P=0.44)	0.10 (P=0.2)	

Correlation coefficients were calculated from individual practice data.

increased with the percentage of generic prescribing of asthma drugs (P=0.001).

There were no correlations between the percentages of overall drug expenditure and the asthma drug prescribing ratios for costs and items (P=0.12 and P=0.12 respectively). Table V shows that high spending practices spent more on asthma drugs per prescribing unit than those with lower levels of expenditure.

Discussion

Our findings must be interpreted with caution. Though prescribing analyses and cost data derived from prescriptions dispensed and paid for are likely to be the most reliable available, neither items dispensed nor net ingredient cost is an ideal measure.¹⁶ An "item" is a variable quantity of medication, and the choice of drug and whether it is prescribed generically will influence net ingredient cost. As in asthma prescribed dosage may vary widely, and compliance could be a problem,¹⁰ even if we had an accurate measure of the quantity of drug prescribed—for example, by defined daily dosage—this would reflect patient morbidity and attitudes to treatment as well as prescribing behaviour.

Nor is the practice prescribing unit an ideal denominator. It has been criticised as too crude an attempt to reflect demographic factors affecting morbidity.¹⁷ The practice list size information from which it is derived is often inaccurate, particularly in inner city areas with high population morbidity. Higher prescribing rates may reflect "cleaner" lists owing to better practice organisation, which reduce the denominator, as much more prescribing increases the numerator. Our use of a

prescribing ratio cancels out some but not all of these sources of inaccuracy.

Though the individual doctor would be the most logical unit for studying prescribing behaviour, the practice is the most realistic. Few practices can separate the prescribing of individual doctors within the group. Despite these difficulties these data indicate interesting features both of asthma prescribing in particular and of the use of prescribing data in general.

Practices approved for vocational training, asthma surveillance, or band 3 health promotion show a higher ratio of prophylactic to bronchodilator prescribing, suggesting that they are following British Thoracic Society guidelines more closely (table II).⁵ The congruence of these factors suggests that they are indeed related to "good prescribing" in this area, though clearly they are not synonymous with it. However, the unit cost for asthma drugs is significantly higher in these practices, supporting Jones's view that higher expenditure in this area reflected good rather than bad practice.¹²

The higher the level of overall generic prescribing and generic prescribing of asthma drugs the higher were the unit cost of asthma drugs and the prophylactic to bronchodilator ratios (tables III and IV). This suggests that the more cost conscious practices prescribe more appropriately. However, the percentage of generic prescribing of all asthma drugs (19.3%) was far lower than the percentage of overall generic prescribing (44.5%). The Audit Commission has highlighted the low level of generic prescribing of bronchodilators nationally,¹ but we found that generic prescribing of corticosteroids and cromoglycates—both under 10%—was even lower than that of bronchodilators (23.7%). This may reflect differences in the ease of writing proprietary rather than generic names, perception of lack of generic equivalents, or merely habit. Clearly generic prescribing is not a valid measure of good quality prescribing, though it may be desirable to avoid waste.

Good clinical practice and cost consciousness do not seem necessarily to go together. Pressure to reduce drug costs therefore may not increase the cost effectiveness of prescribing; indeed, it may do the opposite. Our study discloses a need for a more sophisticated approach to improving the quality of prescribing, taking into account the many factors which influence prescribing decisions in general practice. We intend to continue to use the general practice database—now expanded to include population variables from census data—to develop our understanding of these factors.

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Key messages

- Cost alone is too crude a measure of asthma prescribing in general practice
- Practices approved for vocational training, asthma surveillance, or band 3 health promotion show a higher level of prophylactic prescribing
- A higher level of prophylactic prescribing suggests that these practices are following the British Thoracic Society guidelines more closely, but in so doing they spend proportionately more on asthma drugs
- In asthma prescribing good clinical practice and cost consciousness do not seem to run together
- Pressure to reduce the costs of asthma prescribing may lead to a reduction in prophylactic treatment and lower the quality of asthma care

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How many general practitioners for 1433 patients?

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Dumbiedykes, in Lothian, is an inner city council estate of 670 homes in Edinburgh. About half of the residents are registered at the Mackenzie Medical Centre. We ascertained the total number of general practitioners and partnerships with patients living in Dumbiedykes and determined the number of patients registered with each practice.

Method and results

We obtained from the community health index, which lists all patients registered with general practitioners in Scotland, the 12 postcodes of Dumbiedykes and the name of each resident's general practitioner. We summarised this list of patients according to each patient's general practitioner and grouped the patients into practices using a list of Lothian general practitioners by practice.

In all, 1433 patients were registered in Dumbiedykes in 1993. The population of Dumbiedykes is relatively stable (only 7% of households had moved there in the 12 months before the 1991 census). In total, 87 general practitioners had patients resident in Dumbiedykes registered on their lists. These principals represented 43 practices with 147 partners. As a shared list system generally operates in Edinburgh, most of these 147 doctors occasionally provide general medical services to residents of Dumbiedykes.

The table shows the number of practices serving Dumbiedykes by the number of Dumbiedykes patients registered with each practice. The distances of the practices from Dumbiedykes vary considerably, with seven practices within one kilometre (the Mackenzie Medical Centre, at some 400 metres) and two practices outside the city's boundary. In all, 283 patients were registered with practices more than

one kilometre away, and many patients registered at the Mackenzie Medical Centre lived well outwith its catchment area.

Comment

Small inner city areas are often served by many doctors. Our findings suggest that 31% of Lothian practices provide services to Dumbiedykes, which has only 0.16% of the total population of Lothian. We acknowledge, however, that it is hard to extrapolate far from our findings, which may be area specific.

Several implications may arise, however, for general practitioners, community nurses, and managers in primary care. A more cost effective and practical means of providing primary medical care may be to rationalise catchment areas. Patients, however, as consumers of health care are encouraged to make choices about their own care including, for example, selecting their own general practitioner. Imposing rigid catchment areas might seem to be in direct conflict with the ethos of recent reforms. The reforms also advocated, however, efficient and effective use of resources. Providing care to a widely scattered population entails more travelling for patients, doctors, health visitors, and district nurses.

Distance and travelling time are also potential barriers to general practitioners being able to provide a safe and prompt service. Patients value accessibility. The most common reason why patients change their general practitioner without moving is to register with a closer doctor.¹ Most people moving into a new area register with the nearest practice.² With fewer scattered patients a more community oriented primary care³ responsive to local health and social problems may be easier to develop.

Patients' wishes to choose (and retain when moving) their general practitioner may need to be balanced against any decrease in quality of care for other patients that might ensue. Mapping practice populations by postcode may help practitioners to rationalise gradually their practice areas. The enthusiastic recommendation of a neighbouring practice may allow some patients to feel that they will have continuity of care despite changing surgeries.

Most general practitioners who work in urban areas receive a request every week from a patient moving outwith the practice area to stay on the practice list. Exceptions may be made, sometimes for financial reasons to maintain capitation charges but usually because the patient values highly his or her relationship with the doctor. We need rational policies overall, but exceptions may also be necessary.

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*Numbers of patients from Dumbiedykes registered with various general practices. * Values are numbers (cumulative percentages) unless stated otherwise*

No of patients from Dumbiedykes registered in each practice	No of practices (No within 1 km of Dumbiedykes)	Patients in Dumbiedykes	
		Registered with practice	Registered with practice within 1 km of Dumbiedykes
> 500	1 (1)	602 (42)	602 (42)
100-499	2 (2)	301 (63)	301 (63)
50-99	2 (2)	186 (76)	186 (76)
20-49	6 (2)	201 (90)	61 (80)
10-19	5 (0)	57 (94)	0 (80)
3-9	12 (0)	57 (98)	0 (80)
1 or 2	15 (0)	29 (100)	0 (80)
Total	43 (7)	1433	1150

*Data do not include patients who might have moved to Dumbiedykes but had not yet reregistered.