the study period. The inflationary influences on prescribing costs discussed in the introduction have been more important than all of the cost control influences (of which fundholding was only one) combined. The effect of marketing pressure from the pharmaceutical industry is probably the most powerful of these influences; it is discernible in this study in the increase in cost per item of drugs for diseases of the central nervous system and for gastrointestinal disorders. No clinical research evidence exists that either the expensive selective serotonin reuptake inhibitor antidepressants or the new proton pump inhibitor omeprazole are more effective than the previous generation of drugs,⁷ but heavy marketing pressure has led to an increase in prescribing.

Increasing drug costs are not necessarily a bad thing. Both the Health of the Nation strategy and professional audits call for an increase in prescribing in certain areas of clinical practice. The mental health component of the Health of the Nation calls for an increase in the detection and treatment of depression in primary care; the heart disease component calls for an increase in the detection and treatment of hypertension. Both professional pressure and the financial incentives offered to practices to establish chronic disease management clinics were intended to improve the management of both asthmatic and diabetic patients. These clinics, together with a more active system of case finding, were bound to lead to an increased number of patients being treated. In addition, pharmaceutical companies are continually bringing new drugs on to the market, some of which have important therapeutic benefits that outweigh the increased costs—for example, angiotensin converting enzyme inhibitors for heart failure and sumatriptan for migraine. All these changes are likely to bring about cost effective improvements in health.

The reasons that fundholding seems not to have had the effect on prescribing costs that was predicted still have to be defined. Financial incentives provided by either fundholding or indicative prescribing schemes may never be sufficiently powerful to influence clinical practice; more sophisticated measures may be necessary. Or maybe we are being premature in seeking to identify the effect of these incentives. The cultural change required of doctors to achieve any form of cost containment may take a long time to manifest itself.

Key messages

- Early reports from observational studies set up to evaluate the effects of fundholding suggested that fundholding practices had been more successful than non-fundholders in controlling prescribing costs
- The first year results from one of these studies, the Oxford region fundholding study, have not been borne out over a longer period
- The differences in prescribing costs between fundholders and non-fundholders three years after the introduction of fundholding were small compared with the overall increase in prescribing costs
- In 1993-4 non-dispensing fundholders spent more on drugs than other types of practice
- Fundholding may have been more successful in controlling costs among dispensing fundholders than among non-dispensing practices

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Conflict of interest: None.

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Characteristics of general practices that prescribe appropriately for asthma

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We have previously found that the ratio of prophylactic to bronchodilator prescriptions is a crude indicator of appropriate prescribing for asthma.¹ In this study we explored the possible influence of the general practitioner, the practice, and the practice population on this ratio.

Methods and results

Complete data sets were obtained for 150 of the 163 practices in east London for April 1992 to March 1993. Their asthma prescribing patterns have been described elsewhere.¹ The 23 predictor variables selected for the analyses are listed in the table; detailed descriptions are available from the authors. The outcome variables

were the ratio of prophylactic drugs to bronchodilators prescribed measured as both items and net ingredient cost (logarithm of ratio). Two models were constructed by stepwise multiple linear regression analysis with backward elimination of variables. A significance level of 0.05 was used to determine variables staying in the model. The resulting regression models (see table) show that 31% of the variability in the prescribing ratio measured as items was accounted for by average age of the principals, the presence of a trainer, and the proportion of the list aged over 65, while 33% of the variability in the ratio when measured as net ingredient cost was accounted for by average age of the principals, nursing hours available in the practice, and the presence of a practice manager.

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Predictor variables	Model 1—ratio of practice items				Model 2—log of ratio of practice net ingredient cost			
	Regression coefficient	95% Confidence interval	Cumulative % of variance explained	Significance of t value	Regression coefficient	95% Confidence interval	Cumulative % of variance explained	Significance of t value
Average age of principals	-0.004	-0.006 to -0.003	18.8	<0.001	-0.007	-0.009 to -0.004	27.2	<0.001
Presence of a general practitioner trainer*	0.10	0.05 to 0.15	25.2	<0.001				
Proportion of list older than 65 years	0.54	0.25 to 0.82	31.2	<0.001				
Practice nursing hours per week per 1000 list size					5.79	1.43 to 10.17	31.1	0.01
Presence of a practice manager*					0.048	0.007 to 0.089	33.0	0.023
Constant	0.47	0.39 to 0.56		<0.001	0.305	0.17 to 0.44		<0.0001
Adjusted r^2	0.31				0.33			
Standard error of estimate	0.08				0.12			
F value	23.47	($P < 0.0001$)			25.48	($P < 0.0001$)		

Variables entered: Number of principals, list size per principal, prescribing units per principal, presence of a practice nurse,* practice nursing hours per principal, practice nursing hours per 1000 prescribing units, practice nursing hours per 1000 list size, presence of a practice manager,* administration hours per principal, administration hours per 1000 prescribing units, administration hours per 1000 list size, presence of a computer,* presence of general practitioner trainer,* average age of principals, 75% or more of principals less than 40 years of age,* average number of years since GMC registration, 75% or more of principals registered after 1973,* % patients over 65 years on list, % list size with deprivation payment, % list size with high deprivation payment, practice SMR 1981-91 (<75 years), practice UPA score (1991), % practice unemployed.

*Yes/no variable.

Description of the variables included in the models. For the prophylaxis to bronchodilator item/ratio, mean (SD)=0.33 (0.10), median=0.33, minimum=0.10, maximum=0.65, interquartile range 0.27 to 0.40. For the prophylaxis to bronchodilator cost ratio, mean (SD)=1.13 (0.37), median=1.08, minimum=0.28, maximum=2.53, interquartile range 0.85 to 1.37. Average age of principals mean (SD)=48.5 (8.7), median=49.5, minimum=32, maximum=68, interquartile range 42.1 to 55. For the percentage of the practice population over 65, mean (SD)=11.3 (5.1), median=11.1, minimum=1.6, maximum=29.6, interquartile range 7.6 to 14.0. For nursing hours per week per 1000 list size, mean (SD)=4.8 (4.8), median=4.3, minimum=0, maximum=16.7, interquartile range 0 to 8.1.

*For the logical variables 10% of practices had a practice general practitioner trainer and 46% a practice manager.

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Comment

Our underlying assumption is that the prophylaxis to bronchodilator prescribing ratio represents a useful marker of appropriate prescribing; its limitations have been discussed.^{1,2} We are currently trying to validate these ratios by linking them with asthma admission rates as a measure of morbidity.

The average age of the principals had the strongest association with the ratio, practices with younger practitioners having higher prescribing ratios. The finding that practices with a trainer prescribed more appropriately accords with our previous analysis.¹ Possibly younger practitioners, who received their training after inhaled corticosteroids became available in the early 1970s, are more likely to treat asthma with inhaled prophylaxis. Nevertheless, an age variable which broadly divided practices into those where practitioners qualified before or after 1973 explained less variation, as did a variable for year of General Medical Council registration. Our results cannot determine why these practices prescribe more appropriately, but they suggest that educational resources might most profitably be directed at older general practitioners and non-training practices.

As expected, increased staff resources were related to more "appropriate" prescribing, possibly because they improved practice organisation or because they released the doctor for more consultation time. A case can thus be made for helping practices with poorer resources to improve their staffing levels.

The only demographic variable related to the prescribing ratio was the proportion of the list size aged

over 65. This result is consistent with the widespread use of corticosteroids in elderly people with chronic obstructive pulmonary disease. We found no correlations with selected sociodemographic variables. Others have failed to show an association between deprivation and prescribing volume but have noted a relation with standardised mortality ratios.³ Overall, our findings suggest that appropriate prescribing could be fostered through targeted education and by increased staffing in some practices.

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