doi:10.1093/fampra/cmm074

Do quality incentives change prescribing patterns in primary care? An observational study in Scotland

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MacBride-Stewart SP, Elton R and Walley T. Do quality incentives change prescribing patterns in primary care? An observational study in Scotland. *Family Practice* 2007; Pages 1–6 of 6.

Background. The 2004 General Medical Services (GMS) contract introduced financial incentives for the management of chronic illnesses in 10 clinical areas. The effect of the scheme on prescribing is unknown.

Objectives. To quantify the impact of the latest GMS contract, which incorporates additional payments for quality outcomes, on prescribing patterns in GP practices.

Methods. This retrospective observational study of prescribing compared the defined daily doses (DDDs) for drugs mentioned or implied within the Quality and Outcomes Framework (QOF) of the latest GMS contract (QOF drugs) to the DDDs for all other drugs listed within the first 10 chapters on the British National Formulary (non-QOF drugs) for four financial years; two before and two after the introduction of the latest GMS contract. These measures were calculated for 92 GP practices of 100 in the Lothian region of Scotland, and the rate of change of prescribing was calculated from regression slopes within the log-scale interrupted time series analyses.

Results. The prescribing of QOF drugs increased significantly faster than the non-QOF drugs both before and after the introduction of the latest GMS contract but the rate of increase for the QOF drugs slowed significantly after April 2005 unlike prescribing of non-QOF drugs.

Conclusions. The prescribing of relevant drugs increased before the introduction of the 2004 GMS contract; the increase continued in the first 2 years of the new contract but at a significantly lower level.

Keywords. Defined daily dose, drug utilization, General Medical Services, prescribing, Quality and Outcomes Framework.

Introduction

The 1990 General Medical Services (GMS) contract created GP fundholding and financial incentives to reduce prescribing costs.[1] These incentives substantially altered prescribing,[2,3] largely by promoting generic prescribing.[4] Generic prescribing (i.e. prescribing by generic name) was a simple cost containment exercise but did little to improve the quality of patient care. The 1997 GMS contract removed fundholding and introduced the concept of community-oriented primary care.[5] At the same time an alternative voluntary contract, the Personal Medical Services contract, created the possibility of salaried GPs. Prescribing incentive schemes, previously introduced for non-fundholding practices, were retained mainly to contain prescribing costs but increasingly also to try to improve quality of care. It was left to the primary care organizations to implement and manage these schemes which seemed to contain prescribing costs, although their effect on quality of care is less clear.[6]

A new GMS contract was implemented throughout the UK from April 2004. A fundamental element of this GMS contract is a system of financial incentives for delivering clinical and organizational quality—the Quality and Outcomes Framework (QOF). From April 2004 to March 2006, there were 76 indicators of treatment outcomes in 10 clinical areas, 56 indicators of organizational performance and 4 assessing the patient's experience. The level of attainment of these

Received 9 February 2007; Revised 12 October 2007; Accepted 7 November 2007.
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performance indicators determined part of the GP practice's income.[7] This contract was intended to have a significant impact on the quality of care, at least in the incentivized areas.[8]

Eight of the 10 clinical areas within the original QOF either specify or imply the prescribing of certain classes of drugs. The QOF indicators, their thresholds, points and the drug class directly affected are detailed in supplementary Table 1. The total number of points within the QOF is 1050 and the allocation of points to each quality indicator differs according to the associated workload.

We examined whether the incentives in QOF had changed prescribing behaviour.

Methods

This was a retrospective observational study of prescribing in relevant clinical areas before and after the introduction of the new contract in one National Health Service (NHS) area in Scotland (Lothian, population 790 000, largely urbanized and with overall lower levels of deprivation than the Scottish average).[9] One hundred (80%) of the GP practices in Lothian operated under the GMS contract and the remaining 26 had other contractual arrangements that included locally agreed outcome-related incentive payments similar to the QOF; they were therefore considered unsuitable as a control group. The local ethics committee decided that ethics approval was not necessary for the study; research governance was agreed with the Primary Care Division of NHS Lothian. All 100 GMS practices were informed of the study and given the option to withdraw if they wished. We excluded those practices without a complete set of data for the time period of the study (because of practice mergers or closures) and those that declined participation.

We used the World Health Organization (WHO) defined daily doses (DDDs) as the measure of prescribing volume rather than a count of prescription items or cost.[10]

The denominator was the prescribing unit (PU) (whereby patients aged less than 65 counting as 1 PU and patients aged 65 and over count as 3 PU) to allow for variation in prescribing between practices according to patient age profiles.[11] We calculated the DDD per PU of those classes of drugs likely to be affected by the QOF and those of all other drug classes listed within the first 10 chapters on the British National Formulary (BNF) (non-QOF drugs).[12] The classes of drugs included as QOF drugs (Table 1) were selected if the QOF indicators either directly mentioned the drug class [e.g. indicator coronary heart disease (CHD) 10 measures the percentage of patients with CHD who are currently treated with a beta-blocker] or if the use of a drug class or classes was implied (e.g. indicator CHD 8 measures the percentage of patients with CHD whose last measured total cholesterol is 5 mmol/l or less, which would require the prescribing of lipid-lowering drugs in many cases). We excluded drugs in the last five BNF chapters (eyes, ear nose and throat, dermatology, vaccines and anaesthetics) as these are only a small part of GP prescribing and there were no relevant QOF targets. All prescribing data and practice population figures were extracted from the Prescribing Information System for Scotland and analysed using SPSS (version 14). Information about the practice's contract was obtained from NHS National Services Scotland.

Each practice's DDDs/PU for QOF and non-QOF drugs were calculated for each month between April 2002 and March 2006. The data for each practice were analysed by interrupted time series analysis,[13] using linear regression to fit lines with different slopes but no change in level before and after the intervention at April 2005. The analysis was based on the logarithms of the DDDs per PU in order to allow estimation of proportional changes. The estimated parameters from these analyses were then used to provide confidence limits and significance tests for the mean changes over time across all practices using *t*-test methods. The analyses of individual practices did not incorporate serial correlation terms since they were being used to estimate parameters for further analysis rather than to make inferences about the significance of trends in each practice separately.

TABLE 1 *Classes of medicines classified as QOF drugs*

QOF drug classes	
1. Gastrointestinal system	–
2. Cardiovascular system	Alpha-adrenoceptor blocking drugs Antiplatelet drugs Beta-adrenoceptor blocking drugs Centrally acting antihypertensive drugs Lipid-regulating drugs Renin–angiotensin system drugs Thiazides and related diuretics Vasodilator antihypertensive drugs
3. Respiratory system	–
4. Central nervous system	Antiepileptics
5. Infections	–
6. Endocrine system	Insulin Oral antidiabetic drugs
7. Obstetrics, gynaecology and urinary tract disorders	–
8. Malignant disease and immunosuppression	–
9. Nutrition and blood	–
10. Musculoskeletal and joint diseases	–

[a]Chapters relate drug classes to a particular system of the body or to an aspect of medical care.

The total changes in prescribing of the classes of drugs affected by the QOF were also considered.

Results

We analysed data for 92 practices. Five had incomplete data and three declined to participate. Prescribing of both QOF and non-QOF drugs increased throughout the 4 years, both before and after the introduction of the 2004 GMS contract (Fig. 1). Estimates and confidence limits for the changes over the two time periods in prescribing of QOF and non-QOF drugs expressed as per cent change per month are presented in Table 2. In both periods, the prescribing of QOF drugs increased much faster than the non-QOF drugs ($P < 0.001$ in both cases), but the rate of increase for prescribing of QOF drugs slowed significantly after April 2005, whereas that for non-QOF drugs did not ($P < 0.001$ for difference in change in rates).

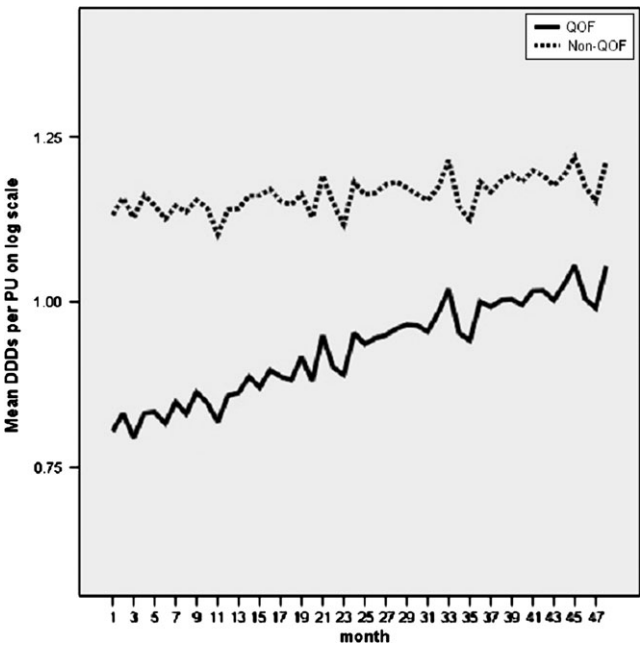

FIGURE 1. *Mean DDDs/PU for QOF and non-QOF drugs (n = 92)*

TABLE 2 *Estimates (95% confidence limits) of percentage increases in prescribing per month for QOF and non-QOF drugs during the 2-year periods before and after April 2005, based on regression slopes from log-scale interrupted time series analyses*

Before	After	Significance	
QOF	1.32 (1.24, 1.40)	1.01 (0.93, 1.09)	$P < 0.001$
Non-QOF	0.23 (0.16, 0.30)	0.32 (0.25, 0.38)	$P = 0.09$

Significance is shown for the change in slope between the first and second periods.

The mean DDDs/PU per month for almost all the classes of QOF drugs increased over the 48-month period. The exceptions were the centrally acting antihypertensive drugs and vasodilator antihypertensive drugs, both of which had very low prescribing throughout the study period. About half of the increase in QOF drugs was due to lipid-lowering agents (between years 1 and 4, increase in all QOF drugs 3.79 DDDs/PU/month and lipid-lowering drugs 1.92 DDDs/PU/month). Renin–angiotensin system drugs (BNF section 2.5.5) represented a further 22% of the change (Table 3). The trends in the prescribing of the four major classes of QOF drugs (DDDs/PU/month greater than 1.5) are graphically presented in Figure 2. In contrast, there was no further increase in rate of prescribing of antiepileptic drugs over the study period (Table 3).

Discussion

This analysis of the impact of the 2004 GMS contract on prescribing shows that there was increasing prescribing of QOF drugs compared to other drugs before and after the contract was introduced. It seems therefore that prescribing of these drugs paralleled the improvements in the quality of clinical care in defined areas seen before the introduction of the contract, especially in managing CHD.[14] Prescribing in the clinical areas later incentivized by the GMS contract was also influenced by other factors such as national guidelines or examples of service redesign such as managed clinical networks, which were developed in Lothian for stroke and CHD in 2004 (the National Services Frameworks developed in England and Wales did not exist in Scotland). National guidelines for hypertension and angina were published by the Scottish Intercollegiate Guidelines Network during 2001 and for cardiac rehabilitation and stroke in 2002. There was an escalation in the rate of increase of the use of QOF drugs the year before the contract's introduction, possibly suggesting an additional effort by GPs to maximize their QOF-related prescribing and so to attain the maximum rewards as soon as they were available.

Almost half of the change in QOF DDDs was for lipid-regulating drugs but there was only a relatively small change in other classes of drugs, e.g. antiepileptics (Table 3). This might be explained by the difference in the number of QOF indicators that might influence prescribing, the relative differences in the number of patients affected and ease of achieving the indicator targets through the prescribing of the relevant drugs. There were three indicators with targets for blood cholesterol, worth a total of 27 points but only one indicator for target seizure control in epilepsy worth only 6 points. By the second year of the contract, the average practice attained >99% of the points for the three indicators with targets for blood

TABLE 3 *Change in DDDs/PU by class of QOF drugs*

	Mean DDDs/PU/month		Percentage of total	
	Year 1	Year 4		Difference
Antiepileptics	0.20	0.23	0.03	1
Alpha-adrenoceptor blocking drugs	0.12	0.22	0.10	3
Centrally acting antihypertensive drugs	0.01	0.01	0.00	0
Renin–angiotensin system drugs	1.55	2.39	0.84	22
Vasodilator antihypertensive drugs	0.01	0.01	0.00	0
Antiplatelet drugs	1.32	1.66	0.33	9
Beta-adrenoceptor blocking drugs	0.88	1.00	0.12	3
Thiazides and related diuretics	1.13	1.37	0.24	6
Insulin	0.25	0.31	0.06	2
Oral antidiabetic drugs	0.38	0.53	0.14	4
Lipid-regulating drugs	1.24	3.16	1.92	51
Total QOF drugs	7.09	10.88	3.79	

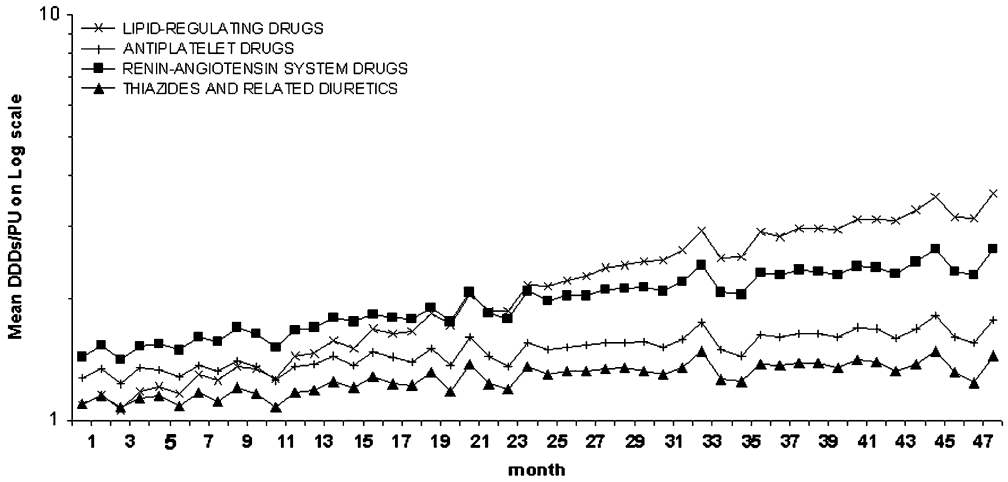

FIGURE 2. *Mean DDDs/PU/month for major classes of QOF drugs*

cholesterol but only 91.7% for the seizure control indicator.

A recent study on the effects of the new contract in England has shown that on average, practices attained 95% of the maximum QOF points, thereby earning a median of £76 200 per practice.[15] Unlike our study, this study had no baseline with which to compare performance but it acknowledged evidence that the quality of care in relevant areas was already improving before the introduction of the new contract. There was some concern, as there had been with GP fundholding,[4] that some practices might be removing patients from their lists who might undermine their achieving of targets. The authors conclude that financial incentives should be aligned to physicians' professional values to avoid serious distortions of care.

A longitudinal study of quality of care in 42 GP practices in England from 1998 to 2005 showed increases in the prescribing of antiplatelets, beta-blockers, angiotensin-converting enzyme (ACE) inhibitors and improved control of hypercholesterolemia. Although improvements were observed before the introduction of the 2004 GMS contract, there were further significant improvements observed between 2003 and 2005.[16] Research in 58 practices in the Ayrshire and Arran region of Scotland during the first 2 years of the latest GMS contract found increases in the proportion of patient with established CHD prescribed antiplatelets, beta-blockers and ACE inhibitors.[17]

A recent report by the National Audit Office in England included results from a survey of 1000 GPs in which 72% felt that the latest GMS contract had increased their prescribing in defined areas. However, the report also included details of Department of Health (England) research which suggested that the increase in statin prescribing following the introduction of the contract was simply a continuation of existing growth trends.[18]

The increase in the prescribing of QOF drugs before April 2004 observed in this study suggests the new contract rewarded existing prescribing behaviours and has probably reinforced it. It might be argued that the

QOF targets in the new contract were set based on established trends so as to ensure that most practices would achieve reasonable scores in the first year, thereby sweetening acceptance of the new contract. In fact, the average attainment of QOF points for the practices in the study was 94% in the first year of the contract and 98% in the second, both higher than the Scottish average.[19] This immediate reward contrasts with the establishment of GP fundholding in 1990, where achieving the rewards required a change in behaviour within each financial year to generate a budget underspent which would be carried into the following year.

Strengths and limitations of the study

A major limitation of this study is that it is a retrospective observational study linking changes to prescribing with the introduction of the 2004 GMS contract. As such it can only describe the temporal association of the new contract with changes in prescribing but cannot prove cause and effect. A strength is that it has included so many practices.

The WHO DDDs used in this study measure both the frequency and intensity of prescribing. We cannot say from this measure whether there are more patients treated or similar numbers treated with higher doses. A recent study comparing changes in the size of prescriptions in the UK and elsewhere suggests that one-third of the rise in statin prescribing (the class of drugs which accounts for the greatest changes seen in this study) is due to increased doses and two-thirds to increase in numbers of patients treated.[20] The cost of drugs is similarly sensitive to frequency and intensity but this can be confounded by changes in the prices paid for drugs. In the 4 years from April 2002, the cost of several 'blockbuster' drugs fell dramatically once their patents had expired and generics were introduced. However, DDDs are not perfect; DDDs of drugs even within the same class are not intended to be therapeutically equivalent. Not all drugs or preparations of drugs will have DDDs, for example combination or compounded preparations.

Implications for future research or clinical practice

An increasing frequency of prescribing is indicative of an increased workload, as not only are doctors identifying and treating more patients but also pharmacists are dispensing an increasing number of prescriptions. The increasing intensity of prescribing might also carry some risk for the patient as many adverse effects are dose dependant; this has implications for the NHS and particularly secondary care services as it is already recognized that a significant proportion of admissions are as a direct result of iatrogenic disease.[21]

The observed rise of use of lipid-lowering drugs has been described previously in England and in other European countries and has been seen as good practice.[20] Meeting the QOF targets by prescribing more cholesterol-lowering drugs seems to have been an earlier and possibly easier aim than prescribing in other clinical areas of QOF, but may already be reaching a plateau. This will require increased effort in other areas such as aggressive management of hypertension. It is important that quality of care within QOF targets and outside QOF be monitored, so that the contract does not create perverse incentives to ignore areas or elements of care not specifically rewarded.

Supplementary data

Supplementary Table 1 is available at *Family Practice* online (http://fampra.oxfordjournals.org/).

Acknowledgements

The authors would like to thank Dr Colette Fulton for the advice provided to the principal author and Doug Kidd for assisting with the PRISMS data.

Declaration

Funding: SM-S undertook the study as part of an MSc in Prescribing Sciences while working for NHS Lothian.
Ethics approval: Not applicable. This was confirmed by the local ethics committee in Lothian on April 13, 2005.
Conflicts of interest: SM-S is employed by NHS Lothian.

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