A prescription for improvement? An observational study to identify how general practices vary in their growth in prescribing costs

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Abstract

Objective To identify how some general practices have low growth in prescribing costs relative to other practices.
Design Observational study.
Setting Trent region of England.
Participants 162 general practices: 54 with low growth in prescribing costs, 54 with average increases in costs, and 54 with large increases in costs.
Main outcome measures Changes in prescribing costs in therapeutic categories in which it has been suggested that savings can be made.
Results There were significant differences between the three groups of practices in terms of their changes in prescribing costs for almost all the variables studied. For the group of practices with lowest growth in costs the most important factors were reducing numbers of prescription items and costs per item; relatively low growth in the costs of "new and expensive" drugs; increasing generic prescribing; and reducing costs for modified release products. This group of practices did not increase costs as much as the others for lipid lowering drugs (P = 0.012) and hormone replacement therapy (P = 0.007). The practices with the greatest increases in costs had particularly large increases for proton pump inhibitors, selective serotonin reuptake inhibitors, and modified release products. Compared with the other groups these practices had larger increases in costs for "expensive hospital initiated drugs" (P = 0.009).
Conclusion General practices vary in their growth in prescribing costs in many ways, with growth in costs for "new and expensive" drugs being particularly important.

Introduction

In 1994 the Audit Commission estimated that the NHS could save up to £425 million a year if general practitioners changed their prescribing habits by controlling the volume of prescribing, increasing rates of generic prescribing, and using expensive products more appropriately.[1] The suggestions were based on extrapolating the prescribing patterns of 50 selected practices to the rest of the country. While the commission might have suggested some potentially useful strategies for cost control,[1] however, there was little evidence that practices actually used such strategies to achieve low growth in their prescribing costs. Also, while the commission commented on high cost prescribing patterns, they did not look at how some practices increased their prescribing costs. Finding out how general practices change their prescribing costs is important for the development of successful cost control strategies.

Previous studies have suggested that general practices can control their prescribing costs by reducing the volume of prescribing[2–5] and the cost per unit of volume[2 4] and by increasing their rates of generic prescribing.[2–6] Few studies, however, have looked in detail at the range of cost control strategies suggested by the Audit Commission.[7 8]

We examined this issue by comparing three groups of practices characterised by different rates of growth in prescribing costs to identify how some general practices have low rates of growth of prescribing costs relative to others.

Method

The study was done with data from general practices in the Trent region of England. This region is reasonably representative of the rest of England and Wales in terms of general practice and sociodemographic characteristics.[9] We interviewed all health authority advisers in the region at the beginning of the study and were satisfied that there were no unusual incentives schemes in operation that might have biased the results.

We did an observational study of changes in prescribing costs between two financial years using anonymised data from all general practices in Trent (n = 840). Using prescribing data (PACTLINE), obtained electronically through the Prescription Pricing Authority, we ranked the general practices in terms of their percentage changes in net ingredient costs per prescribing unit (NIC/PU) between the financial years April 1994 to March 1995 and April 1995 to March 1996. We excluded practices with greater than 10% change in list size between the two years and obtained our sample from the 776 remaining general practices.

We sampled practices from the top, middle, and bottom fifths for percentage change in net ingredient costs per prescribing unit between the two years. We calculated that we needed at least 36 practices in each group to detect a 2.5% difference between groups in their change in percentage of items prescribed generically, with a type I error of 0.01 and a power of 0.9. Having established this as a minimum sample size, we decided that our resources were sufficient to allow a 50% margin above this minimum. Accordingly, we took the 54 practices with the lowest percentage growth in net ingredient costs per prescribing unit (group 1). We then found the 54 closest matches for these practices (on the basis of net ingredient costs per prescribing unit in the financial year 1994-5) from practices in the middle fifth (group 2) and from those in the fifth with the greatest percentage increase in costs (group 3).

We analysed changes in overall prescribing variables using PACTLINE data. To do more detailed analysis of prescribing patterns, however, we obtained PACT (Prescribing Analysis and CosT) catalogues for each of the study practices for each year of the study from the 10 health authorities in the region. The catalogues were sent to a company (Enigma Medical Systems) specialising in the analysis of prescribing data for entry on a database.[10] We took this approach because we knew the database software (Optimise) to be extremely flexible in terms of the analysis of changes in prescribing patterns.[10]

We concentrated our analysis on drugs and preparations within the chapters of the *British National Formulary* that have the highest costs in general practice (chapters 1-6 and 10, see box for details).[11] Also, we looked at the chapter on drugs used for malignant disease (chapter 8) as we were interested in the costs of expensive drugs that had probably been initiated during hospital treatment. From these chapters we calculated the costs for each practice for each year of the study where the Audit Commission had suggested that savings might be made (see box and appendix). The drugs and preparations included in each category were based on information in the *British National Formulary* and were validated by members of the research team and three independent pharmacists.

Drug categories used in the analysis

Variables obtained from PACTLINE data

- Net ingredient costs (NIC)/prescribing unit (PU)
- Items/PU
- NIC/item
- Percentage of items dispensed generically

Variables obtained from PACT catalogues

The net ingredient costs (from *BNF*, chapters 1-6, 8, and 10) for the following variables were calculated:

- Potential savings available if brand named preparations had been prescribed as their generic equivalents
- Modified release preparations
- Combination products
- Drugs of limited therapeutic value
- Drugs that could have been bought over the counter at a pharmacy
- Topical non-steroidal anti-inflammatory drugs
- New and expensive drugs (see appendix for details):
  - Proton pump inhibitors (*BNF* section 1.3.5)
  - Lipid lowering drugs (section 2.12)
  - Selective serotonin reuptake inhibitors (section 4.3.3)
  - Oestrogens and hormone replacement therapy (section 6.4.1.1)
  - "Other drugs" (these were considered together in the analysis): long acting β_2 stimulants; fluticasone preparations; sumatriptan preparations
  - Expensive hospital-initiated drugs (>£30/week for adult dose; see appendix)

Analysis

For the analysis of overall prescribing variables we used prescribing units as the denominator (these give a triple weighting to patients aged 65 years and older and were available with the PACTLINE data).[1] For the analysis of specific drug categories (see box) we used "net ingredient costs per 1000 patients" as the denominator, given that prescribing units and ASTRO-PUs[4 12] have not been validated for use across many of these categories.

Statistical analysis was done with SPSS for Windows (version 8). For categorical variables we used χ^2 tests to compare the groups of practices. For continuous data we assessed normality using the Kolmogorov-Smirnov test with the Lilliefors significance correction and examined normality plots. For variables derived from PACTLINE data we compared groups of practices using parametric methods (analysis of variance and analysis of covariance). Some variables derived from the PACT catalogues, however, were not normally distributed. We therefore used Kruskal-Wallis tests to compare the groups of practices in terms of their costs in 1994-5 and their changes in costs between 1994-5 and 1995-6.

Results

Practice characteristics

In 1995-6, in groups 1, 2, and 3 respectively, there were 20 (37%), 21 (38%), and 14 (26%) fundholders[7] and eight, five, and seven dispensers[13] (χ^2 $P=0.31$ and $P=0.67$, respectively). Table 1 shows that there were no significant differences in list size between the groups of practices in 1994-5 or 1995-6.

Analysis of prescribing variables

Table 1 shows that there were no significant differences between the groups in terms of net ingredient costs per prescribing unit, items per prescribing unit, and cost per item in 1994-5. The practices with lowest growth in costs, however, had a lower generic prescribing rate in this year. When we used analysis of covariance to take account of baseline values there were significant differences between the groups of practices for changes in prescribing variables between the financial years 1994-5 and 1995-6.

Table 2 shows baseline net ingredient costs for selected drug categories for the three groups of practices with data from chapters 1-6, 8, and 10 of the *British National Formulary*. There were few noticeable differences between the groups. For three of the variables (topical non-steroidal anti-inflammatory drugs, proton pump inhibitors, and selective serotonin

Table 1 Results of analysis of PACTLINE data on overall prescribing variables and list size for 54 general practices according to increase in prescribing costs. Figures are means (SD). Analysis of variance used unless indicated

Prescribing variables	Lowest increase	Average increase	Greatest increase	$F_{2,159}$	P value
List size:					
1994-5	4889 (3678)	6162 (3662)	4907 (3083)	2.37	0.097
1995-6	4967 (3764)	6179 (3641)	4846 (3071)	2.39	0.095
Net ingredient cost per prescribing unit (£)*:					
1994-5	53.40 (11.46)	53.55 (8.42)	53.65 (10.51)	0.01	0.992
1995-6	51.67 (11.07)	57.25 (8.99)	62.76 (12.77)	13.59	<0.001
Change	–1.74 (1.85)	3.70 (0.61)	9.11 (2.74)	478.96	<0.001†
Percentage change	–3.22 (3.17)	6.92 (0.38)	16.90 (2.83)		
Items per prescribing unit‡:					
1994-5	7.38 (1.94)	7.57 (1.70)	7.99 (1.76)	1.61	0.202
1995-6	7.26 (1.91)	7.77 (1.73)	8.56 (1.90)	6.82	0.001
Change	–0.12 (0.36)	0.20 (0.18)	0.57 (0.35)	65.54	<0.001†
Percentage change	–1.59 (4.46)	2.69 (2.39)	7.19 (3.86)		
Net ingredient cost per item (£):					
1994-5	7.48 (1.53)	7.29 (1.43)	6.85 (1.16)	2.96	0.055
1995-6	7.36 (1.52)	7.58 (1.44)	7.48 (1.31)	0.33	0.717
Change	–0.12 (0.38)	0.29 (0.18)	0.63 (0.31)	80.09	<0.001†
Percentage change	–1.50 (4.68)	4.17 (2.38)	9.16 (3.89)		
Items prescribed generically (%):					
1994-5	45.61 (14.05)	50.97 (11.01)	53.03 (12.70)	4.96	0.008
1995-6	48.64 (14.17)	53.46 (11.24)	54.14 (12.40)	3.03	0.051
Change	3.04 (3.22)	2.48 (2.56)	1.11 (2.29)	5.88	0.003†

*Net ingredient cost refers to cost of drug before discounts and does not include any dispensing costs or fees.
†Analysis of covariance on variables involving change between financial years 1994-5 and 1995-6.
‡Item refers to prescription of drug (or drug preparation) that has been dispensed in community).

reuptake inhibitors), however, there was a trend towards higher initial costs for the groups of practices that had the greatest increases in overall costs between 1994-5 and 1995-6.

Table 3 shows changes in net ingredient costs for selected drug categories for the three groups of practices. Practices that had the lowest growth in prescribing costs reduced costs for all drug categories apart from "new and expensive" drugs. Even in this, however, the increases in costs were less than those observed for the other groups. Indeed, the differences between the groups in their growth in costs for "new and expensive" drugs were substantial compared with the other drug categories, particularly for proton pump inhibitors.

The practices with the greatest increases in overall costs showed increases in all costs apart from making small savings on generic prescribing and drugs of limited therapeutic value. These practices had increases in costs for expensive hospital-initiated drugs compared with the other groups.

Discussion

Principal findings

This study has shown that general practices with low growth in prescribing costs changed their prescribing patterns in ways that the Audit Commission suggested might bring about savings without detriment to patient care.[1] These practices were also conservative in their uptake of lipid lowering drugs and hormone replacement therapy.

Strengths and weaknesses of the study

This was a large study that looked at changes in prescribing costs in much greater detail than in previous studies.[2–4 6] Also, the study was not limited to observing changes in particular groups of practices such as fundholders[2 3 5 6 8 14] or dispensers.[13 15]

This was an observational study that used anonymised data to determine changes in prescribing patterns between two financial years. Our findings cannot be taken as evidence of longer term trends in prescribing, and we cannot be certain of the underlying reasons for some of the observed changes in prescribing patterns. Indeed, it is possible that some of the changes simply represent random variation. Also, for the group of practices with lowest growth in prescribing costs the changes in net ingredient costs per item and percentage of items prescribed generically may have been partly due to a form of regression to the mean.

Comparison with other studies

Nevertheless, our findings are similar to those of studies that have shown that low growth in prescribing costs is associated with a reduction in the overall volume

Table 2 Baseline net ingredient costs per 1000 patients for selected groups of drugs and preparations from chapters 1-6, 8, and 10 of *British National Formulary*. Figures are mean (interquartile range) net ingredient costs per 1000 patients (£) for financial year 1994-5 for different variables* for 54 general practices according to increase in prescribing costs

	Lowest increase	Average increase	Greatest increase	Kruskal-Wallis test χ^2 (df=2)	Kruskal-Wallis test P value
Potential saving available if brand named preparations had been prescribed instead of generic equivalents	1666 (1494)	1367 (1268)	1361 (1725)	0.60	0.742
Modified release drugs	2641 (1834)	2710 (1317)	2638 (1787)	1.64	0.442
Combination products	2779 (1749)	2971 (1666)	3075 (1478)	3.18	0.204
Drugs of limited therapeutic value	164 (402)	194 (300)	285 (491)	2.61	0.272
Drugs that could have been bought over counter	2019 (854)	1 956 (950)	2189 (1072)	3.39	0.183
Topical non-steroidal anti-inflammatory drugs	488 (428)	544 (447)	616 (491)	5.99	0.050
Overall costs for "new and expensive drugs"	7443 (6487)	8676 (3475)	8965 (4318)	3.09	0.213
Specific "new and expensive" drug groups:					
Proton pump inhibitors	2925 (2077)	3155 (2438)	3467 (2843)	6.95	0.031
Selective serotonin reuptake inhibitors	1174 (1058)	1279 (1042)	1684 (1107)	6.36	0.042
Lipid lowering drugs	614 (530)	598 (684)	593 (657)	0.84	0.656
Oestrogens and hormone replacement	1246 (1346)	1181 (672)	1186 (757)	0.20	0.904
Long acting β_2 stimulants, fluticasone preparations, and sumatriptan	1510 (1749)	1402 (1408)	1425 (997)	0.14	0.934
Expensive hospital-initiated drugs	1689 (2136)	1544 (1430)	1329 (1695)	1.46	0.483

*Details shown in appendix.

Table 3 Changes in median (interquartile range) net ingredient costs (£) per 1000 patients between financial years 1994-5 and 1995-6 for selected groups of drugs and preparations* from chapters 1-6, 8, and 10 of *British National Formulary* for 54 practices according to increase in prescribing costs

	Lowest increase	Average increase	Greatest increase	Kruskal-Wallis test	
				χ^2 (df=2)	P value
Potential saving available if brand named preparations had been prescribed instead of generic equivalents†	−194 (498)	−85 (285)	−11 (266)	20.86	<0.001
Modified release drugs	−12 (435)	185 (480)	528 (459)	42.92	<0.001
Combination products	−96 (370)	41 (383)	280 (546)	27.67	<0.001
Drugs of limited therapeutic value	−45 (117)	−24 (68)	−17 (70)	4.75	0.093
Drugs that could have been bought over counter	−84 (204)	−16 (230)	116 (231)	27.42	<0.001
Topical non-steroidal anti-inflammatory	−6 (144)	45 (91)	63 (194)	9.31	0.010
Overall change in costs for "new and expensive drugs"	1315 (1484)	2627 (1373)	3856 (1847)	77.08	<0.001
Specific "new and expensive" drug groups:					
Proton pump inhibitors	341 (657)	1119 (1042)	1695 (1061)	70.87	<0.001
Selective serotonin reuptake inhibitors	300 (538)	576 (640)	884 (826)	24.95	<0.001
Lipid lowering drugs	142 (248)	240 (232)	252 (356)	8.88	0.012
Oestrogens and hormone replacement	152 (241)	247 (305)	211 (271)	9.96	0.007
Long acting β_2 stimulants, fluticasone preparations, and sumatriptan	191 (498)	352 (553)	463 (915)	9.04	0.011
Expensive hospital-initiated drugs	−87 (777)	−28 (624)	132 (646)	9.53	0.009

*Details in appendix.
†Negative value implies that practices reduced their costs for brand named products that could have been prescribed generically.

of prescribing,[2–8] a reduction in costs per unit of volume,[2 4] and an increase in generic prescribing.[2–6 8] One study showed that fundholders had lower costs than non-fundholders in one financial year for some of the therapeutic areas outlined by the Audit Commission.[8] Our study showed that general practices have low growth in costs in these therapeutic areas when their overall growth in prescribing expenditure is low.

Few studies have looked in detail at how some general practices increase their prescribing costs. Our study lends support to concerns that some practices have difficulties in controlling costs because of expensive hospital-initiated drugs,[1 16] although the increases were small compared with some of the other drug categories that we studied.

Implications of the study

This study provides some support for the types of cost control strategy suggested by the Audit Commission.[1] Those involved in managing prescribing costs in general practice should focus on controlling the volume of prescribing, limiting the uptake of new and expensive drugs, controlling the costs of modified release drugs, and prescribing generically when this will result in savings.

Our study raises concerns about whether general practices that make relative savings on their prescribing costs are being conservative in their uptake of important groups of drugs such as lipid lowering agents and drugs for hormone replacement therapy. While the differences between the three groups of practices were relatively small in real terms, policy makers need to continue to be aware of the importance of promoting effective prescribing at the same time as encouraging cost control.

The study suggests that expensive hospital-initiated drugs may be part of the reason why some practices show an increase in their prescribing costs. Most health authorities already take account of high cost patients in dealing with general practice prescribing budgets, and our study reinforces the importance of these measures.

What is already known on this topic

Low growth in prescribing costs in general practice is associated with increases in generic prescribing and reductions in prescribing volume and cost per unit of volume

What this study adds

General practices with low growth in prescribing costs had low growth in the specific therapeutic categories in which the Audit Commission has suggested that savings might be made

These practices had particularly low growth in costs for "new and expensive drugs" compared with other practices, including conservative uptake of lipid lowering agents and hormone replacement therapy

General practices with large increases in prescribing costs showed relatively large increases for various categories of drugs, including expensive hospital initiated drugs

Unanswered questions and future research

Two important questions arise from this research. Firstly, what are the underlying reasons for observed changes in prescribing costs? Secondly, what happens to the quality of prescribing when general practitioners have low growth in their prescribing costs?

A considerable amount of research has been done on the influence of incentives[2–7] and sociodemographic factors[7 12 17] on prescribing costs. Now it is important to look in greater detail at what motivates some general practitioners to achieve low growth in prescribing costs and what factors lead to large increases in costs in other practices. In terms of assessment of quality, it will be necessary to do analyses that take account of the reasons behind individual prescribing decisions and the amount of unmet need within practice populations.

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early stages of the study. Dr John Wilson provided information on the use of "new and expensive" drugs in the region. Linda Stead and Helen Cornfield from Enigma Medical Systems were responsible for the accurate of data entry on the Optimise database. Steve Davies, Brigitte Nicholls, and Phil Dwyer carefully checked the drugs and preparations that we included in the categories shown in the appendix. Lindsay Groom, Denise Kendrick, and Michael Dewey gave helpful comments on drafts of the paper.

Contributors: AJA conceived the study, wrote the protocol, managed the study on a day-to-day basis, developed the drug categories used in the study, liaised with the health authorities and Enigma Medical Systems, supervised the analysis, and wrote the paper. SR was the main contract researcher on the project on which this paper is based, and she did the statistical analysis together with TH. RC took the drug categories developed by AJA, incorporated these into the Optimise database, and helped with the data analysis. DW, MP, and RP were involved in the conception of the study; they actively contributed to project board meetings, advised on the analysis, and commented on drafts of the paper. DB made an active contribution to project board meetings, advised on the analysis, and commented on drafts of the paper. AJA is the guarantor.

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Competing interests: None declared.

Appendix: Detailed definitions of drug categories used in the study

Drugs and preparations from the following drug categories (derived from chapters 1-6, 8, and 10 of issue 31 (1996) of the *British National Formulary*) were used in our analysis.

Combination products

All preparations containing two or more drugs, excluding:

- Those in which clinically important components cannot be prescribed separately: dopa-decarboxylase inhibitors with dopaminergic drugs used in parkinsonism; clavulanic acid in co-amoxiclav; and sulfamethoxazole in co-trimoxazole
- Those in which components are in a dose that could not be prescribed separately but where equivalents could be bought over the counter at a pharmacy—for example, co-codamol, migraleve (these preparations are included in the "Over the counter" section)
- Lisinopril and quinapril preparations (where the combination products were as cheap as the angiotensin converting enzyme inhibitor prescribed alone at the time of the study)

Modified/sustained release preparations

All modified/sustained release preparations with the exception of:

- Adalat MR preparations (because MR preparations are indicated for the treatment of hypertension)
- Diltiazem and felodipine preparations (because no "short acting" equivalent available)
- Products for which the *BNF* gives a justification (shown in brackets) for the use of a modified release preparation: Theophylline preparations ("the use of rapid release oral theophylline preparations has declined because of the high incidence of side effects associated with absorption"); lithium preparations ("once daily administration is preferred when plasma concentrations [have been] stabilised"); modified release morphine salts (recognised advantages of these preparations, see page 12 *BNF*); carbamazepine preparations ("use of modified release tablets (Tegretol Retard) also significantly lessens the incidence of dose related side effects"); dopaminergic drugs used in parkinsonism ("modified release preparations may help with "end of dose" deterioration or nocturnal immobility and rigidity")

Drugs of limited therapeutic value

All drugs that the *BNF* suggests are of limited clinical value, except those for which similar preparations could be bought over the counter at a pharmacy (these appear in the "Over the counter" section).

Over the counter products

All drugs and preparations for which an equivalent could be bought over the counter at a pharmacy excluding enemas, nitrates, and topical non-steroidal anti-inflammatory drugs (these appear in their own section).

Topical non-steroidal anti-inflammatory drugs

All topical non-steroidal anti-inflammatory drugs listed in section 10.3.2 of the *BNF*.

New and expensive drugs

This section lists:

- Expensive therapeutic groups that showed an increase in costs of over 20% across the Trent region between the financial years 1994-5 and 1995-6: proton pump inhibitors (*BNF* section 1.3.5); lipid lowering drugs (section 2.12); selective serotonin reuptake inhibitors (section 4.3.3); oestrogens and hormone replacement therapy (section 6.4.1.1)
- A selection of drugs (not included in the above therapeutic groups) that showed an increase in costs of over 20% across the Trent region between the financial years 1994-5 and 1995-6: long acting β_2 stimulants (salmeterol and eformoterol preparations); fluticasone preparations; sumatriptan preparations

Expensive hospital-initiated drugs

Drugs that the research team and three independent pharmacists considered were probably hospital-initiated:

- Drugs used for malignant disease and immunosuppression (*BNF*, chapter 8)
- Drugs from *BNF* chapters 1-6 and 10 that were probably hospital initiated and cost over £30 per week at adult dose (according to the *BNF*): dornase alfa; granisetron; ondansetron; tropistron; zidovudine; didanosine; zalcitabine; ganciclovir; atovaquone; somatropin

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Commentary: Beware regression to the mean

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The study shows that prescribing costs increase over time quite differently in general practices with low and high growth in such costs. But how should we interpret this? To what extent are the differences due to the individual practices and how much to random variation? Or to put it another way, are the low growth practices consistently low growth practices or were they just low growth practices in this particular year?

Under the first interpretation the results for the observed year can be generalised to other years and the differences in expenditure can be considered to reflect policy decisions by individual practices. I will call this the "policy" interpretation. The alternative or "noise" interpretation is that prescribing costs increase over time in a broadly random way and are unaffected by policy. The differences in spending between low and high growth practices would therefore represent no more than random noise.

The truth obviously lies somewhere between these extremes of policy and noise, though it is hard to know exactly where. The authors acknowledge this uncertainty and are careful to avoid any suggestion that the low growth practices "control" their expenditure in any sense.

The key to interpretation is the association between baseline costs and growth in costs. In the presence of random variation the two are inversely related because of regression to the mean. Practices with high costs at the start will tend to show the lowest growth in costs and vice versa. Exactly the opposite pattern is to be expected under the policy scenario, with low cost practices having both a low baseline and low growth. If policy is the driving force, baseline and growth in costs should be positively correlated.

In practice, the noise component is always likely to predominate. To minimise its effect the study matches the practices for their baseline net ingredient costs (NIC) per prescribing unit, though this adjusts only partially for regression to the mean. Table 1 shows that in the low growth practices two other facets of baseline costs are consistently worse—that is, net ingredient cost per item is higher and percentage generic prescribing is lower. This looks more like noise than policy, as the authors acknowledge.

But against this, table 2 shows significant trends in the opposite direction for baseline spending on new and expensive drugs, particularly selective serotonin reuptake inhibitors and proton pump inhibitors. The low growth practices not only spend the least in percentage terms, they also show by far the lowest growth (table 3), and this fits clearly with a policy interpretation.

So on balance it looks as if the main policy difference between the practices lies in their speed to embrace the classes of new and expensive drugs. But these are drugs defined to have increased in cost by more than 20% across the Trent region during the year of study. So the slightly tautologous conclusion is this: that practices spending relatively more on the fasting growing sector of the drugs market show the highest growth in costs.

One hundred years ago

Plague in Glasgow

The outbreak of plague in Glasgow is a calamity which has very wide bearings. The city of Glasgow is not in such direct communication by sea with plague-infected ports or countries as some of our other seaports, and the appearance of the disease there is, perhaps, all the more alarming. The fact that the registered tonnage of the port of Glasgow is over 6,000,000, tons annually, equal, in fact, to the entire tonnage of France, conveys but a meagre idea of its commercial importance. Its trade is largely with America, but ships from almost every country find their way thither. The effect of the dislocation and the paralysis of traffic consequent upon such a centre being placed in quarantine is almost incalculable, and the probable financial loss to the country of a continuance of plague in Glasgow, even for a month or two, must be enormous. The worst feature of the outbreak is that the disease occurred at some distance from the harbour; not only is the locality some way inland from the Clyde, but it is above that part of the river where the ocean-going ships lie.

In London during the past twelve months, 6 cases of plague have been diagnosed, but they all occurred in ships coming from the East, and no case occurred beyond the docks. Not so in Glasgow; direct connection with the harbour has not been traced, and the cases of plague have occurred in the city at some distance from the shore and from ships.
(*BMJ* 1900;ii:675.)