Sharing resources to create a district drug formulary: a countywide controlled trial

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SUMMARY

Background. *Creating a drug formulary takes considerable time, but merely adopting one lacks local perspective and ownership. Sharing resources between several practices treads a middle path between these extremes, but is it effective?*

Aim. *The aim of the study was to audit the influence of a district primary care drug formulary on prescribing by general practitioners.*

Method. *A controlled trial was carried out to compare prescribing by 50 general practitioners from 11 urban and semirural practices in south Bedfordshire that participated in creating a district drug formulary with prescribing by all other general practitioners in the county.*

Results. *The proportion of prescription items that were for drugs listed in the formulary rose significantly in three therapeutics groups: cardiovascular (by 7–12% above control practice values); musculoskeletal (by 1–11% above control practice values); and obstetrics and gynaecology (by 6–9% above control practice values). The number of items prescribed per prescribing unit fell significantly in three therapeutic groups: musculoskeletal (by 1–7% below control practice values); nervous (by 7–12% below control practice values); and nutrition and blood (by 15–21% below control practice values). The estimated saving resulting from the creation of the formulary was £150 000 (£3000 per doctor) per year.*

Conclusion. *Sharing resources between practices to create a district-wide primary care drug formulary can lead to changes in prescribing and reduce costs sustained over 3 years.*

Keywords: prescribing; formulary; inter-practice cooperation.

Introduction

IN 1990, the Department of Health recommended the development and ownership of formularies at local, preferably practice, level, and that participation in and compliance with such formularies should be entirely voluntary.[1] Creating a local formulary gives participating doctors the chance to update their knowledge on the pharmacology, use and acceptability to patients of commonly prescribed drugs,[2,3] and provides a starting point for later discussions of management policies.[4] There is wide variation in prescribing choices[5] and evidence that a formulary can reduce prescribing costs.[6-9] The Audit Commission has reported that more rational prescribing by general practitioners (GPs) would lead to better quality care for patients and save the NHS £425 million a year;[10] however, purely financial pressure to change prescribing, such as through incentive schemes, may prove to be a false economy if treatment is less effective.[11]

Without professional help in gathering information and sorting the biased from the unbiased opinion from evidence, it is difficult to see how most practices could find the time to take a fresh look at the drugs they prescribe.[3,12] One way to overcome this problem is to combine the efforts of several practices, invite experts from university and hospital departments, and use the resources of a local practitioners' group. However, this could dissipate the sense of ownership and damage the effectiveness of the formulary. The aim of this audit was to determine whether practices which participated in creating a district-wide primary care formulary changed their prescribing as a result.

Method

Participants

Participants were not randomly selected but self-selected from willing practices in which at least one partner was a member of the South Bedfordshire Practitioners' Group. All 16 members of the group and their partners were invited to participate. Out of 300 GPs in Bedfordshire, 50 participated and the remaining 250 formed the control group. The participating doctors were from 11 urban and semirural practices. Twenty-seven GPs attended at least one of the formulary meetings, and every practice had at least one participating partner. Everyone received copies of the formulary, and all but one provided their level 3 Prescribing Analyses and Cost Tabulations (PACT) data for analysis. The practice with a dissenting partner could not be included in the analysis. Two practices dispensed a minority of their prescriptions. Invited advisers included a hospital pharmacist, a clinical pharmacologist and a consultant microbiologist.

Creating the formulary

The goal was to include drugs that would be first-line treatment for 80% of all conditions seen in primary care. Thus, 80% of prescriptions issued by a doctor who entirely agreed with the formulary would be for drugs in the formulary. Such a goal is arbitrary, but necessary to define the intended scope of the formulary.

Participants met once a month to discuss one therapeutic group. Drugs in any of three well-known primary care formularies[13-15] were automatically proposed for inclusion in the new formulary. Basic data on each drug were sent to everyone before each meeting. Information was drawn from the British National Formulary, the drug data sheet, primary care and local hospital formularies. Members had up to 2 weeks to review this information before sending proposals to add or exclude drugs from the shortlist. Reasons were invited on a single-page, structured ques-

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*Not members for the full period of the project. Prescribing data not included in overall analysis.
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tionnaire, which was sent to the pharmacist, who then had 2 weeks to research the areas of controversy before the meeting. At the meeting, the literature research findings were discussed and a vote was taken on each proposal. A drug was included in the formulary if a simple majority of members were in favour of its inclusion.

Cardiovascular, respiratory and musculoskeletal therapeutic groups were considered in autumn 1991; gastrointestinal, nervous, infections, endocrine, obstetric and gynaecology, and urinary, nutrition and blood groups in the second half of 1992; and eye, ear, nose and throat, and skin groups in early 1993. The most complete version of the formulary was distributed to each participant on each New Year's Day.

Audit

All data for analysis came from level 3 PACT for the first quarter of each year, with that for 1991 preceding the formulary. Prescribing by the subject practices was compared with that of all other practices in Bedfordshire. Control data were obtained by subtracting the subject practices' data from the county data. All doctors contributing to the formulary meetings were given feedback on their individual prescribing and asked not to see representatives of pharmaceutical companies during the study period.

Statistical method

Prescribing by each practice before the creation of the formulary was compared with the same practice in each subsequent year by one-tailed matched-pair *t*-tests. The tests were applied to deviations from the control values, as shown in Figures 1 and 2. The distribution within samples was reasonably normal.

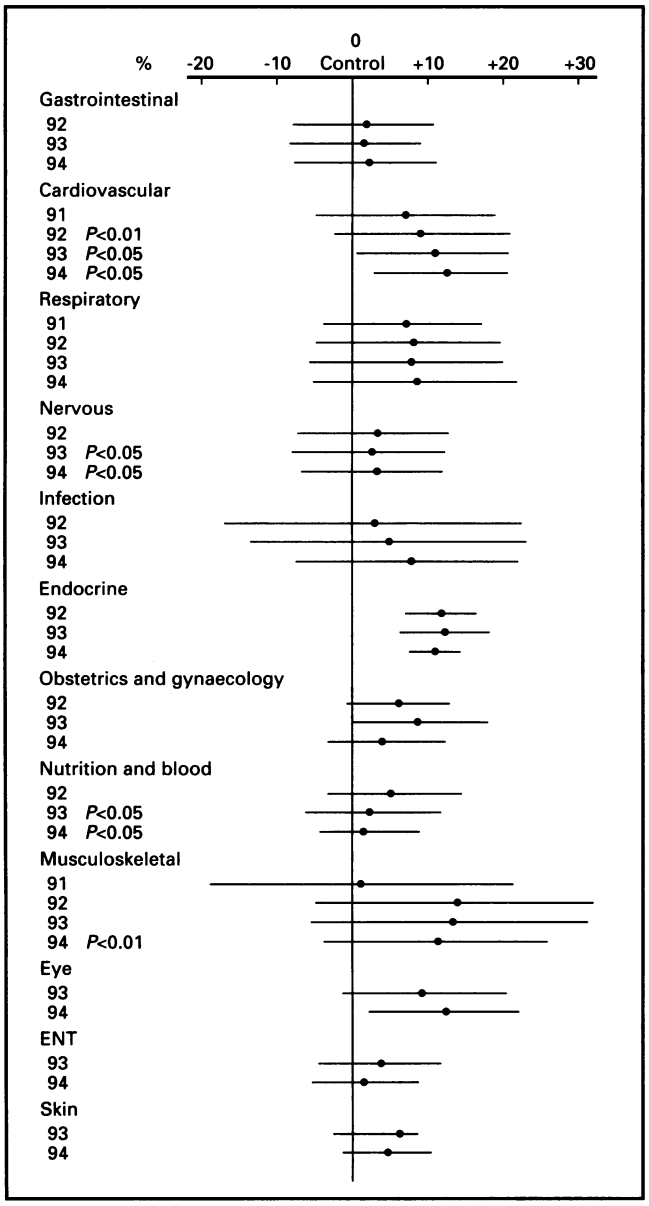

Figure 1. Proportions of prescribed items that were for drugs in the formulary, relative to control equivalent practices. For each therapeutic group, the first quarter-year shown was before the formulary for that group (mean ± 1 SD).

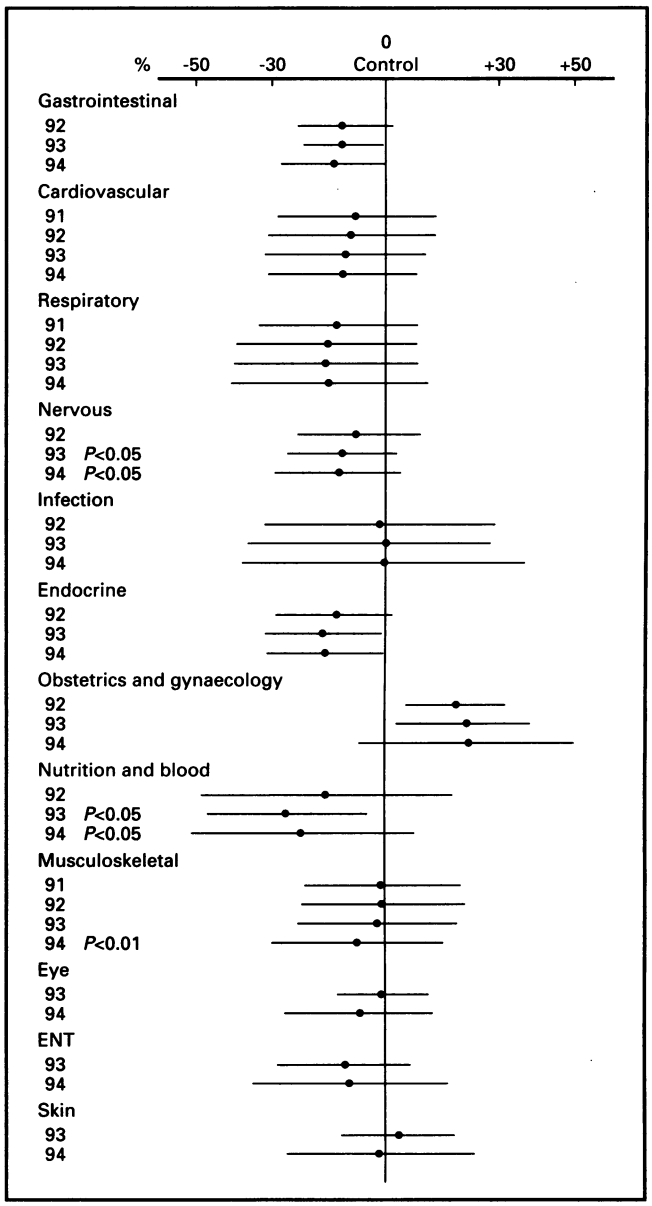

Figure 2. Total number of items prescribed by the subject practices per prescribing unit in the first quarter of each year, relative to control equivalent practices. For each therapeutic group, the first quarter-year shown was before the formulary for that group (mean ± 1 SD).

Results

The final formulary consists of brief notes on the selection of 179 drugs and drug delivery devices, 72% of which were specified by generic name. Figures 1 and 2 show the prescribing by the subject practices relative to the control group (the rest of the county), with a dot at the mean and the horizontal bar extending ± 1 SD. For each therapeutic group, the figures show the quarter-year before the creation of the formulary for that group, and all subsequent quarters. Figure 1 gives the proportion of prescriptions issued for drugs in the formulary. For example, if 60% of the items prescribed by the subject practices but only 55% of the items prescribed by the control group were in the formulary, this would appear as +5% relative to the control in Figure 1. In each therapeutic group, the statistical test of significance applies to the change that occurred in the subject practices between the first quarter-year shown, before the formulary for that therapeutic group, and subsequent quarters. Thus, when practices prescribed differently to the control group before the formulary as well as afterwards, such as in the respiratory group, no significant effect of the formulary is seen.

Significant changes in the choice of drug occurred in three out of 12 therapeutic groups: cardiovascular, musculoskeletal, and for 1993 only, obstetrics and gynaecology. Generic prescribing in the subject practices increased from 44% in 1991 to 51% in 1994, similar to that in the control practices, which increased from 40% to 48%.

Figure 2 shows the total number of items prescribed per prescribing unit (PU) relative to the control group. Patients under 65 years of age and temporary residents count as one PU; patients aged 65 years or over count as three. A significant reduction in the number of items prescribed per patient occurred in three therapeutic groups: nervous, nutrition and blood, and musculoskeletal. No group showed a significant increase in prescribing. Overall, between 1991 and 1994, the subject practices increased the number of items per PU by 11.8% compared with 14.0% for the control group.

Figure 3 shows the changes in drug costs in thousands of pounds for the first quarter of each year. The control cost was calculated in the same way as the current PACT data 'FHSA equivalent',[16] using the actual cost incurred by the control group adjusted to create an imaginary practice with the same number of PUs as the subject practices. Drug costs for the first quarter of each year are shown in Figure 4 for the 3 cohorts of therapeutic groups considered at the formulary meetings in each of the 3 years 1991, 1992 and 1993. The total drug bill for the 11 subject practices in the first quarter of 1991 was £11 000 less than for the control equivalent practices (£923 000 versus £934 000), but in the first quarter of 1994, it was £51 000 less (£1 303 000 versus £1 354 000).

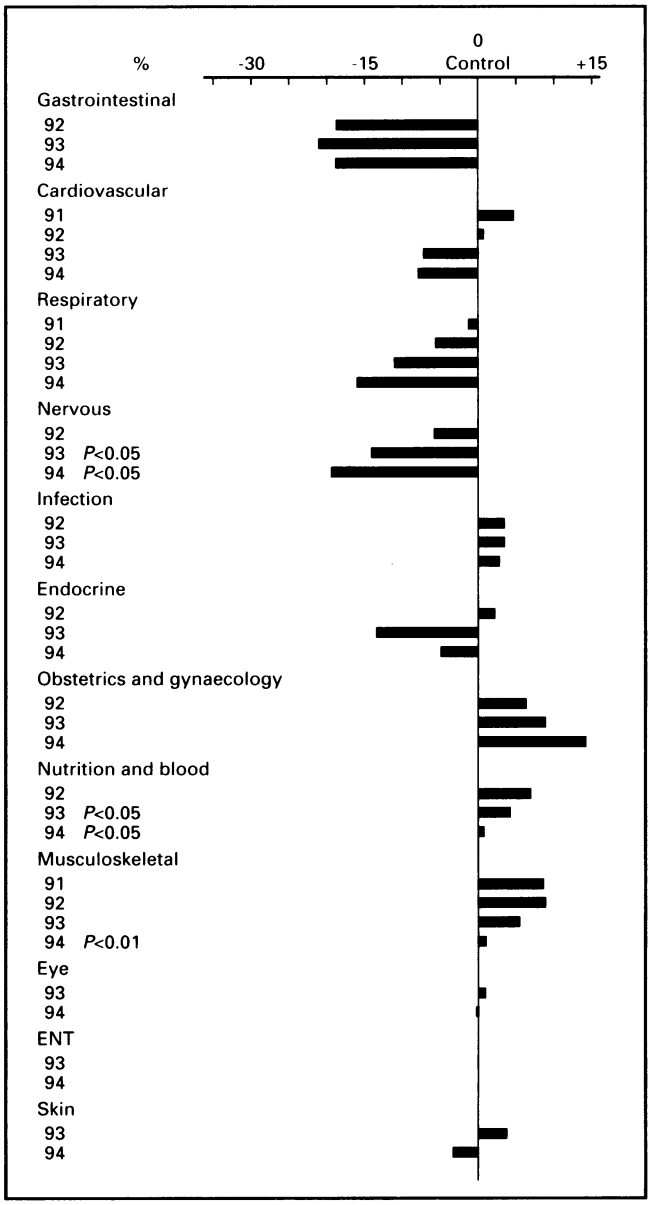

Figure 3. Cost of all drugs prescribed by the subject practices in the first quarter of each year, relative to control equivalent practices. For each therapeutic group, the first quarter-year shown was before the formulary for that group. Horizontal scale in thousands of pounds sterling.

Discussion

The results show that the subject practices changed their prescribing in a way not typical of other practices in the county, and that reduced costs were related in time to the formulary activity. Although it is likely that the creation of the formulary was responsible for these changes, other explanations are possible; for example, the subject practices could have been biased towards changing their age/sex profiles, fundholding[17] or dispensing status. Prescribing units, as opposed to the more sensitive ASTRO-PU,[18] were the standard measure of prescribing list size reported in PACT data during the period of this study. The only change in the age/sex profile of any of the subject practices was that one practice took on a university health commitment that might have influenced prescribing, particularly for contraception, but the volume of prescribing in this therapeutic group did not change significantly. During the study, two (18%) out of the 11 subject practices became fundholding (both in April 1993), as did 12 (13%) out of the 95 practices in the county. Health promotion activities increased generally between 1991 and 1994, and this would affect prescribing. Fortunately, a prescribing incentive scheme was not introduced until after the end of the study. The strength of this audit lies in the size of the groups: with 50 GPs in the subject group and 250 in the control group; general influences on prescribing should have little effect on the differences between the two groups.

Another limitation of this study is that the formulary group was self-selected in having at least one partner as a member of an active practitioners' group. Thus, the effect on their prescribing cannot be extended to all practices without reservation.

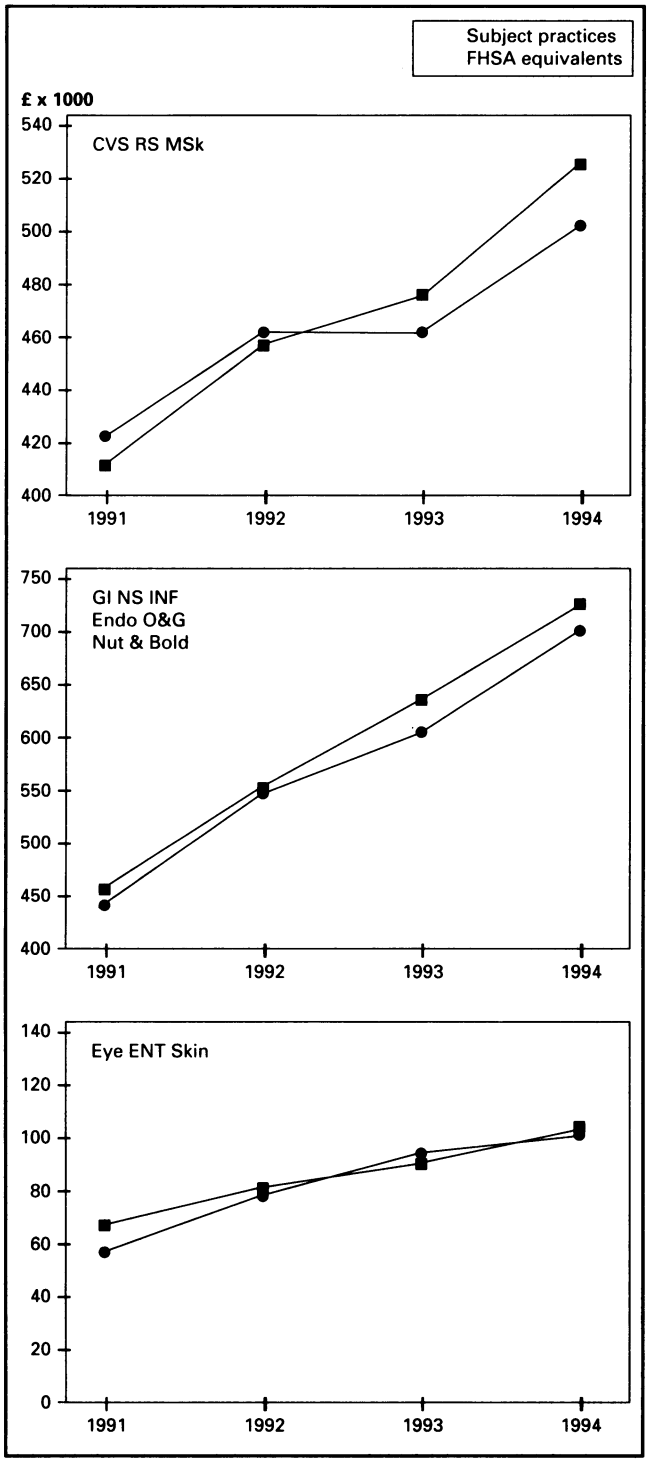

Figure 4. Cost of all drugs prescribed by the subject practices (circles) and control equivalent practices (squares) in the first quarter of each year. The three graphs correspond to three cohorts of therapeutic groups, with the time of the formulary meetings at the arrow. Vertical axis in thousands of pounds sterling.

Choice of drug

Statistically significant changes in the choice of drug occurred in the cardiovascular and musculoskeletal groups, and for obstetrics and gynaecology in 1993 only. Thus, two out of the three therapeutic groups considered in the first year of the formulary showed a significant shift; these groups were observed for the longest period of time, so perhaps the changes in other groups, such as infections, eye and skin, will become significant given time. There was a sudden change in the choice of musculoskeletal drugs, which are often used for acute conditions, whereas there was a gradual shift in the choice of cardiovascular drugs, which are used for more long-term conditions. The subject practices prescribed more of the formulary drugs than the control group even before the formulary was created. Clearly, there would have been a bias towards selecting drugs that are familiar, and there is a danger in creating a formulary that merely formalizes existing habits. The contribution of literature review, external expertise and discussion are crucial if there is to be any improvement in prescribing effectiveness.[4] In this study, the therapeutic group that showed the most change, musculoskeletal, was being prescribed by the participating practices in much the same way as all other doctors in the county before the formulary (32% of drugs in the formulary compared with 31%).

Volume of prescribing

The subject practices prescribed about 10% fewer items per patient than the control practices in seven out of 12 therapeutic groups before the formulary was introduced. In nine of the groups, the subject practices prescribed even fewer items per patient after the formulary than they had done before, but the degree of change was modest, reaching statistical significance in three groups. Discussion at the formulary meetings often identified drugs that were little better than placebos or others that were highly effective single agents that might avoid the need for multiple or repeat prescriptions.

Assessing the volume of prescribing by the number of items prescribed regardless of quantity issued on each prescription has drawbacks,[19] but it is unlikely that individual doctors who changed their quantity per item would have any significant effect on the large samples in this study. Quantity of prescribing was never discussed at the formulary meetings, so there is no reason to suppose that the subject practices would change their standard quantities differently from the controls. Until the new-style PACT data provide defined daily dosages,[20] it is impracticable to calculate this *de novo,* particularly for the huge number of non-formulary drugs prescribed by all doctors in the county. Further reassurance comes from the corresponding changes in costs, which do reflect total quantities prescribed.

Cost

The aim of this formulary was to empower the participants to improve their own prescribing and narrow the irrational, wide variation in prescribing practice that is known to exist.[5,21] One aspect of this is value for money, which is receiving increasing attention both here[22] and particularly abroad,[23] where family doctors prescribe much more.[24] Unlike many other resources, primary care prescribing is not limited by availability.[2,4] The 50 GPs in this study spent £1.3 million on drugs in the first 3 months of 1994; with such a large amount of money involved, relatively small changes in prescribing practice can release substantial funds for alternative therapies.[10] Compared with their family health service authority (FHSA) equivalent practices, the subject practices spent £11 000 less in the first quarter of 1991 before the formulary and £51 000 less in the first quarter of 1994, a saving of £40 000 attributed to the formulary. Assuming the spring and summer quarter costs might be lower, an approximate estimate of the annual saving would be £150 000, or £3000 per doctor per year. The saving in drug costs in just 3 months more than covers the regional grant of £36 000 for producing the formulary and con-

ducting the audit. If GPs' time is included in the equation, then an average of 20 GPs working for 2 h at 12 meetings would receive a total of £34 000 postgraduate education allowance. The formulary would then need to be effective for 6 months to break even.

A shift towards prescribing drugs in the formulary costs less. The average cost of an item in the formulary was lower than those not included (£4.61 compared with £11.06 in 1993) because essential, well-established drugs are the cheapest. The only exception to this was in the obstetric and gynaecology therapeutic group (£7.42 compared with £5.95), because of the choice of relatively expensive oral contraceptives with minimal effect on blood lipids (the increased risk of thrombosis was unknown at the time). Doctors who are engaged in auditing their prescribing may become more 'cost-conscious', so a reduction in cost may in part be the result of switches from expensive to cheaper drugs even within the formulary. The subject practices did not shift towards generic prescribing any more than the control practices.

Cheaper prescribing is not necessarily cost-effective,[11,12] and no attempt was made in this study to determine if the changes in prescribing affected morbidity. The total influence of the formulary on cost to the NHS might depend more on its educational value in encouraging effective prescribing rather than any immediate change to the drug bill.

Information for GPs

Currently, pharmaceutical companies provide a large proportion of information about drugs to GPs, particularly new ones, but they cannot be expected to be unbiased in what they provide and what they omit. Welcome sources of information on drugs and prescribing include pharmaceutical and medical advisers to FHSAs, drug information centres, hospital and community pharmacists, local therapeutics committees,[25] committee on safety of medicines (yellow card scheme), prescription event monitoring[26] (green card scheme), PACT data, medical audit advisory groups,[27] published formularies,[13-15] and medical libraries. Providing feedback on individual prescribing was an integral part of creating this formulary, and previous studies suggest that this may have influenced the outcome.[4,20]

Conclusion

Inter-practice cooperation can create a drug formulary that influences choice of drug, volume of prescribing and cost, and such changes can be sustained over 3 years. The saving on the drug bill far exceeds the cost of the expert and administrative support needed to produce the formulary.

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