Quality circles to improve prescribing patterns in primary medical care: what is their actual impact?

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Abstract

Rationale, aims and objectives Quality circles comprise small group sessions of doctors and written feedback on their individual practice patterns. Although 50% of German primary care doctors participate in quality circles, their effectiveness has hardly been evaluated in Germany. This study determined the impact of a large-scale programme of quality circles on quality and costs of prescribing. Method A controlled before–after study was performed, in which primary care doctors were allocated to a quality circles group or a control group. Subjects were 100 000 patients in 1996 and in 1998, who had visited one of 177 doctors in the 3 month registration periods in one region in Germany. The intervention comprised a quality circles programme, comprising 11 sessions and repeated feedback on prescribing. Main outcome measures were proportion of patients who received a prescription, mean prescription costs per patient and proportion of generic prescriptions. Results The absolute numbers of prescriptions decreased in both groups, but the mean prescription costs per patient increased. The quality circles reduced the proportion of patients who received a prescription (OR = 0.86) and the mean prescription costs per patient (B = −3.99 euro), while it increased the proportion of generic drugs (OR = 1.10). The intervention had intended effects on four of the 15 secondary indicators. Conclusions Large-scale application of quality circles had intended effects on prescribing decisions in primary care in Germany. The effects found in this study may reflect better what improvements can be achieved than randomized trials of similar interventions.

Introduction

Although the volume and costs of prescriptions drugs has grown in most western countries, Avery et al. (2000) showed that there is a substantial variation in the growth curves across different care providers. These differences are associated with the differential composition of patient populations, but also with other factors such as the use of generic drugs and the use of strongly marketed drugs. A review by Gill et al. (1999) showed that continuing professional education has proven to influence prescribing decisions,
particularly if it is provided in small groups or outreach visits and if it comprises structured feedback on prescribing patterns. However, the impact of such professional education may be more limited in large-scale programmes in the real world as compared to randomized trials. Szecsenyi (2003) suggested that many contextual factors influence prescribing decisions in clinical practice, such as patients’ expectations, pressure from colleagues and marketing by drug companies, as shown by Bradley (1991), Jones et al. (2001) and MacFarlane et al. (1997). This study examined a large-scale quality improvement programme to optimize prescribing decisions in primary medical care.

Most of the published research on prescribing patterns is from the USA and the UK. Primary care in Germany has a number of specific characteristics, which may have influence on prescribing. Primary care doctors have a variety of medical backgrounds, including general practice, internal medicine and paediatrics. More than half of the doctors in ambulatory care are medical specialists. Patients have free choice of doctors; the primary care doctor is not a gatekeeper to specialist care. Most primary care doctors work in single-handed practices and patients are not obliged to register at a specific practice. Clinical guidelines to support clinical decision making were not available until 2001 and drug formularies have been used in only a small number of places as shown by Kochen et al. (1994). Public authorities have little means to influence clinical decisions (Sauerland 2001). Doctors get reimbursement from regional associations of sickness fund doctors, which have contracts with mandatory health insurance funds that cover 90% of the population. Fixed budgets for outpatient care were first introduced in 1993. Copayment and price limits, as described by Chaix-Couturier et al. (2000), have been introduced in the pharmaceutical market to reduce prescribing costs. So, primary care in Germany is characterized by competition between doctors, restricted financial budgets, copayments and little guidance of clinical decision making.

German primary care doctors were allowed to prescribe any drug from a list of more than 120,000 drugs, brands and applications. About half of German patients in general practice expect a drug prescription and doctors may be afraid to lose patients if they do not prescribe a drug. However, a study by Himmel et al. (1997) showed that patient satisfaction of German patients was not affected by not receiving a prescription drug. An international study by Grol et al. (1999) showed that German patients expected that a primary care doctor critically evaluates the value of drugs. A multifaceted educational intervention, called ‘quality circles’, was developed to improve the quality and the efficiency of prescribing decisions. As described by Bahrs et al. (2001), this intervention comprised repeated feedback on prescribing patterns and educational small group sessions of doctors. Similar interventions have been used elsewhere, as shown by Beyer et al. (2003), but these tended to be less intensive with respect to the number of meetings and focused on one specific clinical area (see Van Dijk & Bakker 2002 for an example). Quality circles of doctors have been introduced on a very large scale in all regions in Germany, as described by Gerlach et al. (1998), but the impact of this strategy on prescribing patterns has not yet been well evaluated (Von Ferber et al. 1999; Tausch & Härter 2001). This study aimed to determine the impact of a large-scale quality circles programme on quality and costs of prescribing in primary care.

Methods

Study design

A controlled before–after study was performed between 1996 and 1998. Allocation to intervention and control groups was at the level of the primary care practice. Patients were blinded for the intervention, but blinding of doctors was not possible. A committee for data protection gave approval for the project.

Subjects

The intervention group comprised patients from primary care doctors (general practitioners or primary care internists) in the region Sachsen-Anhalt, who volunteered to participate in the quality circles. Doctors who had concerns about their prescribing decisions were particularly stimulated to participate in the quality circles. The control group comprised patients from a random sample of primary care doc-
tors in the same region (not participating in the quality circles), which was recruited simultaneously with the intervention group and monitored prospectively. More than 90% of the primary care doctors in this study worked in single-handed practices, which reflects the situation in this area. The study focused on patients who had health insurance through the AOK, the largest health insurer in Germany, because of the availability of prescribing data (these data were not available otherwise at the time of the study in general practices in Germany).

Intervention

The intervention comprised repeated feedback on prescribing routines and an intensive programme of educational small group sessions, as described by Bahrs et al. (2001). A structured feedback report (‘Verordnungspiegel’) was provided at each meeting to each primary care doctor to present the number and costs of prescriptions of patients in the practice compared to patients in other practices. The feedback report was send 2 weeks before each session and focused on the category of drugs (for instance, antibiotics) to be discussed in the next meeting. In sum 10 groups of 10–12 doctors had 11 meetings of 2 hours, which were moderated by a primary care doctor, who had received a short training. Each meeting focused on a specific group of drugs (listed in Table 1), using clinical guidelines and other evidence-based information as well as a video that showed a demanding patient. The programme for the meetings was based on principles of quality improvement, which implied that a systematic procedure was followed: themes were selected, objectives were formulated, plans for improvement were made and implemented and changes were evaluated. One session focused on how to say ‘no’ to a patient who wanted a prescription that is not necessary, using a video from a real general practice consultation.

Measures

Indicators for assessing the quality and costs of prescribing were developed at the AQUA institute, based on work by Campbell et al. (2000), and on consensus among pharmacists, general practitioners and quality improvement experts. Primary outcomes were prescription costs per patient (pharmacy prices at the year of recording), proportion of patients who received a prescription and proportion of generic prescriptions of all potentially generic prescriptions. Secondary outcomes comprised 15 other indicators, which were related to clinical areas included in the feedback reports and discussed in the small group meetings. Indicators had different denominators: these referred to patients registered at the practice after a visit in the registration period (‘registered patients’), patients who received a prescription in the registration period (‘prescription patients’), or prescriptions issued in the registration period (see Table 1). Type of medication was recorded (based on a German system for classification of drugs), as well as patient age and sex in patients who received a prescription.

Data were derived from the health insurer AOK. Baseline data refer to April to June 1996 and post-intervention data refer to April to June in 1998. The data are based on individuals who visited the practice at least once in these registration periods. Baseline data and post-intervention data refer largely to the same patient population, but linking at an individual patient level was not possible. Doctors in the intervention group completed a short questionnaire to document their attendance of group sessions (number of sessions) and their evaluation of the sessions (using a six-point scale, 1 = very satisfied, 6 = very dissatisfied).

Analysis

The units of analysis varied across the indicators: the registered patient (who visited the practice in the registration period), the prescription patient (who had received a prescription), or the prescription. Multivariate models were used to examine the effects of the intervention on the outcomes in terms of differences between study groups regarding changes between baseline and post-intervention scores within groups. The models included measurement moments (baseline, post-intervention), group allocation (intervention, control), the interaction of measurement moment and group allocation (= intervention effect), and patients or prescriptions nested within practitioners. The intervention effect can be interpreted as the differential change on the relevant indicator between the two measurement moments in
Table 1 Effects on indicators for quality and costs of prescribing

<table>
<thead>
<tr>
<th>Primary outcome measures</th>
<th>Intervention group</th>
<th>Control group</th>
<th>Intervention effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Post-intervention</td>
<td>Baseline</td>
</tr>
<tr>
<td>Percentage of registered patients who received a prescription</td>
<td>81.3</td>
<td>79.5</td>
<td>76.8</td>
</tr>
<tr>
<td>Mean prescription costs in euro per registered patient</td>
<td>98.3</td>
<td>99.6</td>
<td>83.5</td>
</tr>
<tr>
<td>Percentage generic drugs prescriptions of all potentially generic prescriptions*</td>
<td>68.3</td>
<td>71.1</td>
<td>67.4</td>
</tr>
</tbody>
</table>

Secondary outcome measures

| Mean number of ATC components per prescription patient | 3.9 | 3.6 | 3.7 | 3.4 | B = −0.05 (P < 0.076) |
| Percentage of prescription patients who received six or more ATC components | 22.2 | 18.8 | 20.1 | 17.3 | OR = 0.97 (0.92–1.02) |
| Percentage potentially generic drugs prescriptions of all prescriptions (SIV6)* | 71.5 | 73.4 | 70.6 | 72.2 | OR = 1.02 (1.00–1.04) |
| Percentage of controversial drugs prescriptions of all prescriptions | 18.5 | 15.3 | 19.5 | 17.0 | OR = 0.93 (0.91–0.95) |
| Percentage of prescription patients who received six or more ATC components | 71.5 | 73.4 | 70.6 | 72.2 | OR = 1.02 (1.00–1.04) |
| Percentage of potentially generic drugs prescriptions of all prescriptions (SIV6)* | 71.5 | 73.4 | 70.6 | 72.2 | OR = 1.02 (1.00–1.04) |
| Percentage of controversial drugs prescriptions of all prescriptions | 18.5 | 15.3 | 19.5 | 17.0 | OR = 0.93 (0.91–0.95) |
| Percentage of recommended antibiotics of all antibiotic prescriptions* | 46.3 | 47.2 | 43.6 | 44.6 | OR = 0.99 (0.89–1.11) |
| Percentage of recommended antidiabetics (insulines, metformin, sulfonylureas) of all antidiabetic prescriptions* | 78.7 | 83.5 | 79.0 | 83.2 | OR = 1.04 (0.94–1.15) |
| Percentage of controversial drugs prescriptions of all prescriptions | 18.5 | 15.3 | 19.5 | 17.0 | OR = 0.93 (0.91–0.95) |
| Percentage of recommended antidiabetics (insulines, metformin, sulfonylureas) of all antidiabetic prescriptions* | 78.7 | 83.5 | 79.0 | 83.2 | OR = 1.04 (0.94–1.15) |
| Percentage of recommended antihypertensives (specific diuretics, beta-receptor inhibitors and ACE-inhibitors) of all antihypertensives* | 33.6 | 38.5 | 34.0 | 37.9 | OR = 1.04 (1.00–1.09) |
| Percentage of recommended lipid lowering drugs (Lovastatin, Simvastatin, Pravastatin, Gemfibrozil, Colestymarin, Colestipol, Fenofibrat) of all lipid lowering drugs prescriptions* | 60.3 | 47.0 | 55.4 | 46.8 | OR = 0.85 (0.71–1.01) |
| Percentage of registered patients on lipid lowering drugs who received HMG CoA reductase inhibitors | 2.0 | 3.6 | 1.6 | 2.6 | OR = 1.13 (1.01–1.27) |
| Percentage of patients on proton pump inhibitors who received triple therapy | 9.6 | 7.1 | 7.5 | 6.9 | OR = 0.76 (0.49–1.18) |

Decrease intended, except in indicators marked *, where increase was intended.
the intervention group compared to the control group. Linear regression analysis (method: enter) was used for continuous dependent variables and logistic regression analysis for dichotomous dependent variables. Analyses were performed with SPSS version 9 and SAS version 6.

**Results**

The patient population comprised about 50,000 patients per study group at baseline and at post-intervention measurements (Table 2). The intervention group comprised 90 primary care doctors and the control group 87 doctors. The percentage of female doctors was similar in both groups, but patients were slightly older in the intervention group (Table 2).

Table 3 shows that the absolute numbers of prescriptions decreased in most categories of drugs during the intervention period. Exceptions were lipid lowering drugs, antivaricose drugs and thyroid drugs. Doctors in the intervention group had attended on average 8.1 sessions; only two doctors had attended less than six sessions. Their mean satisfaction score was 2.1 on the six-point scale, which indicated a high satisfaction with the quality circles.

The intervention had intended effects on the primary outcomes (Table 1). The percentage of registered patients who received a prescription decreased slightly in the intervention group, while it slightly increased in the control group (OR = 0.86). The mean prescription costs per registered patient increased in both groups, but less in the intervention group (B = -3.99 euro). The percentage generic drugs prescriptions of all potentially generic prescriptions increased in both groups, but more in the intervention group (OR = 1.10). In addition, the intervention had intended effects on four of the 15 secondary outcome measures: the use of controversial drugs decreased (OR = 0.93), the use of strong dyspepsia drugs increased (OR = 1.15), the number of daily doses of psychotropic drugs decreased (B = -0.39), and the use of strong analgesics increased (OR = 1.40).

Further explorative analysis of the effects on prescription costs showed that the reduction of
### Table 2 Sample of patients and prescriptions

<table>
<thead>
<tr>
<th></th>
<th>Intervention group (n = 90 doctors)</th>
<th>Control group (n = 87 doctors)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of patients registered</td>
<td>52,354</td>
<td>52,123</td>
</tr>
<tr>
<td>Total number of prescriptions</td>
<td>227,319</td>
<td>201,341</td>
</tr>
<tr>
<td>Mean age of patients in years (SD)</td>
<td>61.8 (20.3)</td>
<td>59.5 (21.8)*</td>
</tr>
<tr>
<td>Percentage female patients</td>
<td>62.9%</td>
<td>62.7%</td>
</tr>
<tr>
<td><strong>Post-intervention</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of patients registered</td>
<td>51,191</td>
<td>49,864</td>
</tr>
<tr>
<td>Total number of prescriptions</td>
<td>195,570</td>
<td>177,445</td>
</tr>
<tr>
<td>Mean age of patients in years (SD)</td>
<td>61.5 (19.5)</td>
<td>57.3 (21.6)*</td>
</tr>
<tr>
<td>Percentage female patients</td>
<td>63.2%</td>
<td>62.1%*</td>
</tr>
</tbody>
</table>

SD, standard deviation.  
*Significant between group difference in t-test (P < 0.002).

### Table 3 Samples of prescriptions

<table>
<thead>
<tr>
<th></th>
<th>Intervention group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Post-intervention</td>
</tr>
<tr>
<td><strong>Targeted by the intervention</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antibiotics (J01, R05G)</td>
<td>6,389</td>
<td>5,562</td>
</tr>
<tr>
<td>Diabetes drugs (A10, N07XB, V04CA)</td>
<td>13,157</td>
<td>12,664</td>
</tr>
<tr>
<td>Hypertension drugs (C02, C03, C07, C08, C09)</td>
<td>41,069</td>
<td>38,473</td>
</tr>
<tr>
<td>Antivariocose therapeutics and capillary stabilizing agents (C04, C05B, C05C)</td>
<td>9,660</td>
<td>6,003</td>
</tr>
<tr>
<td>Cough and cold therapeutics (L03AH, L03AP, R01, R02, R04, R05, R07AX)</td>
<td>13,139</td>
<td>9,701</td>
</tr>
<tr>
<td>Lipid lowering drugs (C10)</td>
<td>2,537</td>
<td>3,145</td>
</tr>
<tr>
<td>Gastrointestinal drugs (A02, A03F, A04, A05, A07, A09)</td>
<td>14,819</td>
<td>11,778</td>
</tr>
<tr>
<td>Psychotropic drugs (N05, N06, N07BB)</td>
<td>19,415</td>
<td>17,392</td>
</tr>
<tr>
<td>Analgesics (M01, M02, M09AB, M09AH, M09AP, M09AX, N02)</td>
<td>30,987</td>
<td>24,310</td>
</tr>
<tr>
<td><strong>Not targeted by the intervention</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antiallersics, except steroids (R06,V01,A07EB, D04AA, R01AC, S01GX)</td>
<td>2,064</td>
<td>1,684</td>
</tr>
<tr>
<td>Asthma drugs (R03)</td>
<td>6,720</td>
<td>6,191</td>
</tr>
<tr>
<td>Haematological agents (B)</td>
<td>6,563</td>
<td>7,385</td>
</tr>
<tr>
<td>Steroids (A01AC, A07EA, C05AA, D07, G01B, H02, R01AD, S01BB, S01CB, S02B, S02C, S09B, S03C)</td>
<td>5,101</td>
<td>4,352</td>
</tr>
<tr>
<td>Dermatological drugs (D)</td>
<td>7,477</td>
<td>5,502</td>
</tr>
<tr>
<td>Cardiac therapy (C01)</td>
<td>22,402</td>
<td>19,267</td>
</tr>
<tr>
<td>Thyroid drugs (H03)</td>
<td>3,073</td>
<td>3,281</td>
</tr>
<tr>
<td>Sexual hormones (G03)</td>
<td>454</td>
<td>454</td>
</tr>
<tr>
<td>Vitamins, tonics and mineral supplements (A11, A12, A13)</td>
<td>5,227</td>
<td>4,096</td>
</tr>
<tr>
<td>Other drugs</td>
<td>17,066</td>
<td>14,330</td>
</tr>
</tbody>
</table>

ATC codes inside brackets.
prescription costs was mainly based on decreased costs of antihypertensives ($B = -0.75$ euro) and antivaricose drugs and capillary stabilizing agents ($B = -0.69$ euro) (Table 4). Further analysis of generic prescribing rates suggested that the increased prescription of generic medication was found in all categories of targeted drugs, except diabetes drugs and cough and cold drugs (Table 5).

Table 6 shows the mean prescription costs for patients in different age groups in patients who received a prescription. It shows that the prescription costs increased with age, and that increases between baseline and post-intervention were larger in patients aged between 20 and 79 years in the intervention group than in the equivalent age categories in the control group.

### Discussion

The quality circles programme decreased the proportion of patients in primary care who received a prescription and it increased the proportion of generic drug prescriptions. The programme also reduced the increase of prescription costs, particularly with respect to antihypertensives and antivaricose drugs. The study provided insight into the actual effect of quality circles rather than their effectiveness in the optimal conditions of a randomized trial. It can be concluded that the large-scale programme of quality circles had intended effects on prescribing decisions of primary care doctors in Germany.

The statistical significance of the intervention effects was obviously influenced by the high number

### Table 4  Prescription costs per prescription for targeted drugs

<table>
<thead>
<tr>
<th>Targeted Drugs</th>
<th>Intervention group</th>
<th>Control group</th>
<th>Intervention effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Post-intervention</td>
<td></td>
</tr>
<tr>
<td>Antibiotics</td>
<td>22.5</td>
<td>21.2</td>
<td>$B = -0.92$ (P &lt; 0.20)</td>
</tr>
<tr>
<td>Diabetes drugs</td>
<td>42.0</td>
<td>46.9</td>
<td>$B = 0.45$ (P &lt; 0.53)</td>
</tr>
<tr>
<td>Hypertension drugs</td>
<td>31.2</td>
<td>34.5</td>
<td>$B = -0.75$ (P &lt; 0.00)</td>
</tr>
<tr>
<td>Antivaricose drugs and capillary stabilizing agents</td>
<td>25.7</td>
<td>27.6</td>
<td>$B = -0.69$ (P &lt; 0.07)</td>
</tr>
<tr>
<td>Cough and cold drugs</td>
<td>7.6</td>
<td>7.6</td>
<td>$B = 0.08$ (P &lt; 0.74)</td>
</tr>
<tr>
<td>Lipid lowering drugs</td>
<td>66.5</td>
<td>87.0</td>
<td>$B = 2.21$ (P &lt; 0.16)</td>
</tr>
<tr>
<td>Gastrointestinal drugs</td>
<td>26.8</td>
<td>32.5</td>
<td>$B = -0.15$ (P &lt; 0.83)</td>
</tr>
<tr>
<td>Psychotropic drugs</td>
<td>18.8</td>
<td>20.7</td>
<td>$B = 0.51$ (P &lt; 0.10)</td>
</tr>
<tr>
<td>Analgesics</td>
<td>11.7</td>
<td>13.3</td>
<td>$B = 0.11$ (P &lt; 0.61)</td>
</tr>
</tbody>
</table>

### Table 5  Generic prescribing rates for targeted drugs (EDV7)

<table>
<thead>
<tr>
<th>Targeted Drugs</th>
<th>Intervention group</th>
<th>Control group</th>
<th>Intervention effect OR and 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Post-intervention</td>
<td></td>
</tr>
<tr>
<td>Antibiotics</td>
<td>83.1</td>
<td>76.7</td>
<td>1.39 (1.16–1.66)</td>
</tr>
<tr>
<td>Diabetes drugs</td>
<td>51.2</td>
<td>57.0</td>
<td>1.01 (0.92–1.10)</td>
</tr>
<tr>
<td>Hypertension drugs</td>
<td>59.9</td>
<td>67.7</td>
<td>1.16 (1.10–1.23)</td>
</tr>
<tr>
<td>Antivaricose drugs and capillary stabilizing agents</td>
<td>62.5</td>
<td>62.4</td>
<td>1.24 (1.11–1.37)</td>
</tr>
<tr>
<td>Cough and cold drugs</td>
<td>84.1</td>
<td>84.3</td>
<td>1.00 (0.89–1.13)</td>
</tr>
<tr>
<td>Lipid lowering drugs</td>
<td>90.6</td>
<td>94.7</td>
<td>2.19 (1.36–3.53)</td>
</tr>
<tr>
<td>Gastrointestinal drugs</td>
<td>58.5</td>
<td>65.4</td>
<td>1.12 (1.02–1.23)</td>
</tr>
<tr>
<td>Psychotropic drugs</td>
<td>67.4</td>
<td>74.1</td>
<td>1.16 (1.07–1.26)</td>
</tr>
<tr>
<td>Analgesics</td>
<td>74.2</td>
<td>77.8</td>
<td>1.12 (1.06–1.19)</td>
</tr>
</tbody>
</table>
of observations. However, the findings should be interpreted in the context of the project, in which quality circles were actually delivered at this large scale and prescription costs were increasing at the time of the study in Germany. Absolute effects of multifaceted interventions tend to be between 5% and 10% in controlled trials, as shown by Grimshaw et al. (2002), which is more than found in our study. This illustrates the assertion that effectiveness of interventions is higher in trials compared to actual practice, as discussed by Eccles et al. (2003). The effects in our study may be perceived as small, but their actual impact was substantial because these were actually achieved in large numbers of patients. For instance, the 0.8% lower percentage of patients who received a prescription in the intervention group referred in this project to 420 patients. In the quality circles group the prescription costs increased in real terms only by 1.3 euro in 3 years. As doctors in the intervention group were recruited particularly because of their high volume and costs of prescribing, they might have increased prescription costs even more if they had not been in the quality improvement programme.

The study had some methodological limitations. Patient characteristics and clinical outcomes were not available, except for patient age and sex in patients who received a prescription. Therefore we could not control for the differential case mix across doctors. The mean figures at one point in time reflect prescribing routines as well as the composition of patient samples in terms of age, sex and illness. In addition, doctors were not allocated randomly to the two study groups but they actually differed from each other. Therefore the analysis focused on the differential changes between study groups rather than the absolute scores at specific points in time.

The explorative analyses identified areas where further improvement may be possible, such as diabetes drugs. The increase of prescription costs in young and middle-aged patients who receive a prescription may be another area for improvement. Although prescription costs were highest for the elderly, the increases were highest in the younger groups. The younger patients may be more demanding or the practitioners may be more responsive to pharmaceutical marketing targeted at these patients. The overall positive effect of the intervention on mean prescription costs per patient is based on the more modest increase in the remaining patients (children, adolescents and the very old) as well as on the intervention effect that less patients in the intervention group received a prescription at all.

The findings should also be interpreted in the context of the specific features of primary medical care in Germany, which were not favourable for improvement of prescribing decisions, as described by Sauerland (2001). In particular, doctors faced competition, which might have provided an incentive to give in to patients’ wishes for prescriptions. The quality circle concept assumes intrinsic motivation of doctors to improve their professional performance through interactive learning activities with colleagues, as described by Bahrs et al. (2001). This concept proved to be attractive to many primary care doctors, similar to many other countries which have different health care systems (Beyer et al. 2003), as about 50% of primary care doctors in Germany have currently participated in quality circles.

Future studies could explore how quality circles

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Intervention group</th>
<th>Control group</th>
<th>Intervention effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>Post-intervention</td>
<td>Baseline</td>
<td>Post-intervention</td>
</tr>
<tr>
<td>0–19 years (n = 10 791)</td>
<td>27.4</td>
<td>35.6</td>
<td>26.4</td>
</tr>
<tr>
<td>20–39 years (n = 13 985)</td>
<td>49.9</td>
<td>64.2</td>
<td>48.0</td>
</tr>
<tr>
<td>40–59 years (n = 26 476)</td>
<td>108.0</td>
<td>127.5</td>
<td>104.8</td>
</tr>
<tr>
<td>60–79 years (n = 69 973)</td>
<td>153.3</td>
<td>167.1</td>
<td>143.1</td>
</tr>
<tr>
<td>80+ years (n = 19 142)</td>
<td>161.7</td>
<td>170.9</td>
<td>153.7</td>
</tr>
</tbody>
</table>
can be made more effective and efficient by exploring possible determinants of their effectiveness. For instance, how does the number and format of the quality circle sessions influence their effectiveness? What characteristics of the participants and the groups are associated with the effects? We have planned studies to identify such factors in order to optimize the effectiveness of large-scale programmes of quality circles. Quality circles effectively influence prescribing decisions in primary medical care, also if delivered through a large-scale programme, in a health care system, which is characterised by competition between different care providers.

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References


