An educational programme for peer review groups to improve treatment of chronic heart failure and diabetes mellitus type 2 in general practice

Kasje, Willeke N.; Denig, Petra ; Stewart, Roy E.; de Graeff, Pieter A.; Ruskamp, Flora

Published in:
Journal of Evaluation in Clinical Practice

DOI:
10.1111/j.1365-2753.2005.00625.x

An educational programme for peer review groups to improve treatment of chronic heart failure and diabetes mellitus type 2 in general practice

Willeke N. Kasje PhD,[1,2] Petra Denig PhD,[1,2] Roy E. Stewart MSc,[2,3] Pieter A. de Graeff PhD[1,4] and Flora M. Haaijer-Ruskamp PhD[1,2]

[1]Department of Clinical Pharmacology, University of Groningen, The Netherlands
[2]Northern Center for Healthcare Research, University of Groningen, The Netherlands
[3]Department of Health Sciences, University of Groningen, The Netherlands
[4]Department of Internal Medicine, Groningen University Hospital, The Netherlands

Correspondence
Petra Denig
Department of Clinical Pharmacology
A.Deusinglaan 1
9713AV Groningen
The Netherlands
E-mail: p.denig@med.rug.nl

Keywords: family practice/ education, guideline adherence, health care, peer review, doctor's practice patterns

Accepted for publication:
27 April 2005

Abstract

Rationale, aims and objectives Peer review groups are considered helpful for quality improvement in primary care. An interactive educational programme for small peer groups was developed, focusing on the implementation of newly developed treatment guidelines. The aim is to evaluate the effect of the programme on adherence to treatment guidelines in general practice. **Methods** A cluster randomized trial using a balanced incomplete block design was used; one arm received a programme on treatment of chronic heart failure (CHF), the other on hypertension treatment in diabetes mellitus type 2 (T2DM). A random sample of 10 CHF and 10 T2DM patients per GP was drawn, for whom data were extracted from electronic patient records 1 years before and 6 months after the intervention. The outcomes were prescribing of ACE inhibitors, and antihypertensive treatment in T2DM. The effect was analysed separately for both programmes using multilevel regression models. **Results** All 27 peer review groups in one region in the Netherlands were randomized, of which 16 participated. No significant effects were observed in the CHF group or in the T2DM group. The opportunity for change was limited, as only 53% of the CHF patients and 60% of the T2DM patients had a contact with their GP between the intervention and follow-up measurement. **Conclusion** The peer review programme was not successful for changing the treatment of chronic patients, although the programme focused on dealing with barriers perceived by the participants. Not all problems perceived can be solved in a peer group discussion.

Introduction

Peer review groups or quality circles have gained popularity for quality improvement in primary care in Europe. They are seen as helpful, because they encourage professional autonomy and support critical insight in the care provided in daily practice (Beyer *et al*. 2003). A few studies evaluated the effect of peer review groups on treatment quality, showing mixed results (Smeele *et al*. 1999; Veninga *et al*. 1999, 2000; Van Eijk *et al*. 2001; Grol 2001; Gilbody *et al*. 2003; Madridejos-Mora *et al*. 2004). A combination of peer review and feedback aimed at clear actions appears to be the most promising approach.

Peer review groups focusing on pharmacotherapy exist nationwide in the Netherlands, supported by the Dutch Institute for Rational Drug Use since 1992. They consist of a small group of general

practitioners (GPs) and community pharmacists working together in a local area, meeting 5–10 times per year. All groups are self-supporting; most groups have educational meetings using audit and feedback, sometimes including explicit and monitored agreements on treatment choices (Van Dijk *et al*. 1999; De Groot & Cambach 2003). The approach used has met with success but has also shown a number of problems (Veninga *et al*. 1999, 2000; Van Eijk *et al*. 2001). In particular, it appeared difficult for GPs to 'translate' their own general prescription data to actual clinical problems and patients. Moreover, agreement between primary health care and secondary care on treatment issues is often problematic on health problems that are treated at the interface (Kvamme *et al*. 2001). In this study, we evaluate an interactive educational approach fitting in the existing national peer review system that addresses these two issues. In a regional effort, agreement between primary and secondary care doctors was reached on joint evidence-based guidelines for both GPs and specialists (Proeftuin Farmaceutische Zorg 2000). The Dutch Institute for Rational Drug Use developed an educational programme for peer review groups to implement these regional treatment guidelines in general practice. The programme focused on discussing and evaluating current treatment for a random sample of the GPs' own patients. Patient specific feedback was given by reviewing the treatment of individual patients of the participants, in contrast to other programmes that usually focus on the general management of a disease (Grimshaw *et al*. 2004). Problems and possible solutions with changing treatment for these patients were discussed in the groups. Two educational packages were made that fitted in the ongoing programme of the peer review groups, these packages are self supporting, reflecting the way the peer review groups normally function. One programme focused on the treatment of chronic heart failure (CHF) and the other on treatment of hypertension in type 2 diabetes mellitus (T2DM). The prevalence of these diseases in primary care is high. Most patients are treated in primary care and improvement in treatment is needed (Cleland *et al*. 2002; Berlowitz *et al*. 2003; Pont *et al*. 2003; Schaars *et al*. 2004).

A randomized study was conducted to evaluate the effect of this programme for small peer review groups on adherence to the regional treatment guidelines in general practice. A process evaluation was included to evaluate the perceived functioning of the programme (Flottorp *et al*. 2003).

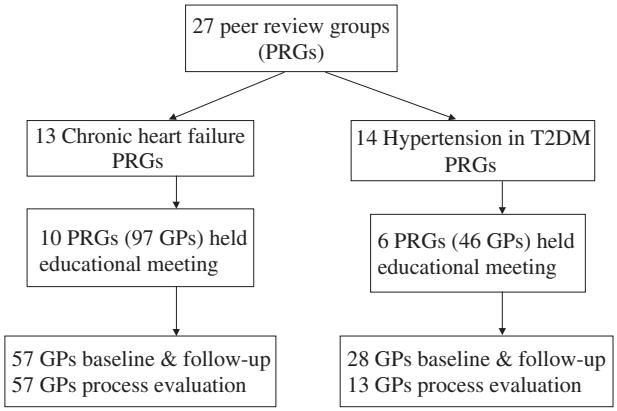

Figure 1 Process of participants through trial. GP, general practitioner; T2DM, diabetes mellitus type 2.

Methods

Study design

The effect was evaluated in a cluster-randomized trial using a balanced incomplete block design; one arm received the programme on CHF treatment, and the other arm on hypertension treatment in T2DM (Fig. 1). The groups were stratified on group size and on geographical region by the first author and randomized with a statistical programme that allocated the groups with I or II. Beforehand it had been decided that group I would receive the CHF, and II the T2DM programme. A survey was conducted among the GPs attending the educational meetings to evaluate the perceived usefulness of the programme and the GPs' barriers and intentions towards implementing changes.

Setting and study population

Regional evidence-based treatment guidelines had been developed and distributed in the Groningen region in 2001, based on national guidelines and recent evidence to improve both quality and efficiency in shared care. They were considered useful by more than 80% of the GPs in the region (Kasje *et al*.

2004). A regular meeting of the peer review groups in this region was chosen as setting for the educational programme. The contact persons of all 27 active peer review groups (245 GPs) in the region were invited to participate.

Intervention

The intervention was integrated in peer review groups' normal working procedure. Each group was asked to have one meeting on one of the two issues, to be randomly assigned to the groups. Usually peer review groups spend one meeting on one issue. To prepare for the meeting, the moderator received a package including the intended phases of the approach and the structure of the meeting (Box 1), supportive overhead sheets, and background material. The meetings lasted approximately 1 hour and were held in the late afternoon or at night.

Data collection

Individual GPs were approached for data collection. Baseline data were collected shortly before the intervention in 2001–2002; follow-up data were collected around 6 months after the intervention in 2002–2003.

Box 1 Educational programme

1. Start with an open discussion on the views of optimal treatment.
   Present and discuss the recommendations of the treatment guidelines:
   Heart failure
   - First choice treatment is an ACE-inhibitor
   - Dosage of ACE-inhibitor should be maximized

   Hypertension in patients with T2DM
   - First choice treatment is an ACE-inhibitor
   - Treatment should be intensified aiming at target blood pressure level of 135/85 mmHg
2. Next, each GP evaluates current management for a random selection of five of his patients; problems identified in light of the recommendations are discussed in the group.
3. List barriers for changing treatment on a white board, and ask participants to give possible solutions for these barriers.
4. Finally, ask participating GPs to formulate their personal intentions with regard to their patients on paper.

This time frame was chosen as chronic medication is dispensed for a maximum of three months in the Netherlands, and patients have to contact their GP for a repeat prescription every three months. Trained abstractors collected patient data from (electronic) medical records for a maximum of 10 randomly chosen CHF patients and 10 randomly chosen T2DM patients per GP. Patients were identified using computerized diagnosis codes or text indicating heart failure or diabetes mellitus type 2. GPs were asked to verify the diagnosis. Patients with both CHF and T2DM were excluded. T2DM patients were defined as having hypertension when this diagnosis was recorded in their medical record or when their average blood pressure during the previous year was higher than 135/85 mmHg. The inclusion criteria and data collection has been described in detail elsewhere (Schaars *et al*. 2004; Kasje *et al.* 2005). The follow-up comprised the same patients as at baseline.

For the process evaluation, a semi-structured questionnaire was administered asking the participating GPs to judge the four elements of the educational programme described in Box 1 as useful, not useful or not conducted. They were also asked to write down their perceived barriers and intentions for implementing changes.

Outcome measures

Outcome measures were based on the key recommendations in the guidelines (see also Box 1). For CHF, the first outcome concerned whether an ACE inhibitor was prescribed at follow-up. The second outcome was the average standardized dosage of the ACE inhibitors prescribed. ACE inhibitor dosages were converted to enalapril-equivalent dosages according to the target daily doses recommended for heart failure in the Dutch reference desk book (CVZ 2003). This method has been used before by Luzier *et al*. (1998), and uses enalapril 20 mg as reference dose with equivalent doses of captopril 150 mg, ramipril 10 mg, quinapril 20 mg, lisinopril 20 mg, fosinopril 40 mg, perindopril 4 mg.

Similarly, two outcome measures were selected regarding the treatment of hypertension in T2DM. The first was whether an ACE inhibitor was prescribed at follow-up. The second outcome was the number of antihypertensives prescribed, as in non-

responsive patients more than one antihypertensive is needed to lower the blood pressure (UKPDS 1998).

Other determinants

Several doctor and patient characteristics were included in the statistical analysis that were found to affect treatment at baseline (Schaars *et al*. 2004; Kasje *et al.* 2005). These concerned the GPs' gender and work experience (<10 years, 10–20 years and above 20 years). Patient characteristics taken into account were the patient's age and gender, and whether they had a documented contact with their GP (either face-to-face or telephone consultation) or with a specialist in the 6-month follow-up period. Furthermore, visits to an outpatient specialized clinic, such as a diabetic service or heart failure outpatient clinic, were included in the model.

Analysis

We conducted multilevel analysis because patients are nested within GPs (Snijders & Bosker 2002). The impact of doctor and patient characteristics was assessed simultaneously with that of the intervention. The baseline value of the outcome measure was included as covariate in all models. An interaction term between the intervention and the baseline value was included to assess whether the effect of the intervention was related to the baseline level of the outcome measure. A logistic regression model was applied to analyse the effect on ACE inhibitor use, while linear regression models were used to assess the effect on continuous outcomes, that is, the dosage of ACE inhibitors and the number of antihypertensives prescribed.

Results

Nine groups decided not to participate although some individual GPs were willing to do so. Another two groups were excluded from the analysis, because they were not able to incorporate the provided educational programme in their meetings during the study period. In the remaining 10 CHF groups, 57 of the 99 GPs (58%) could be visited both at baseline and follow-up for the medical record reviews; this was the case for 28 of the 46 GPs (61%) in the six T2DM groups (Fig. 1).

There were no differences between GPs from the two study arms regarding gender, age, working experience or practice type, but GPs in the CHF groups practised more often in an urban area than GPs in the T2DM groups (37% vs. 18%). There were no major differences in the patient characteristics between patients in the control and in the intervention group at baseline. More heart failure patients in the CHF intervention group, however, received diuretics at baseline (Table 1). Diabetic patients in the T2DM intervention group received more beta-blocking agents at baseline.

Effect on the treatment of CHF

Only half of CHF patients (54%) had a registered contact with their GP during the 6-month follow-up; this was comparable in the intervention (53%) and control group (55%). In general, only small changes were achieved in their treatment irrespective of the educational programme. In the intervention group, the percentage of patients receiving an ACE inhibitor increased with 5% to 53% at follow-up. In the control group, there was a 3% increase to 58% at follow-up. The average dosage of the ACE-inhibitor remained the same in the intervention group [13.0 mg (SD 10.0) at baseline vs. 13.2 mg (SD 10.5) at follow-up], but decreased in the control group [13.8 mg (SD 7.8) vs. 11.6 mg (SD 8.8) at follow-up].

The multilevel analysis did not show any significant overall effect of the educational programme on the treatment or the dosing of ACE inhibitors in CHF (Table 2). However, as the interaction term indicates, patients in the intervention group who received higher dosages at baseline remained on higher dosages at follow-up. One doctor characteristic had an impact on the change in quality of CHF treatment. Female GPs prescribed ACE inhibitors to more of their heart failure patients than male GPs after the intervention.

Effect on the treatment of hypertension in T2DM

More than half of the T2DM patients (60%) had a registered contact with their GP during the 6-month follow-up. This did not differ significantly between

Table 1 Patient characteristics in the intervention and control groups at baseline

	Heart failure patients		*Diabetes mellitus type 2 patients*	
Factors	*Intervention (n = 333)*	*Control (n = 175)*	*Intervention (n = 186)*	*Control (n = 285)*
Sex (male)	54%	56%	43%	43%
Age	76 (SD = 11.3)	75 (SD = 10.5)	69 (SD = 10.7)	68 (SD = 12.8)
Contact specialist	35%	32%	23%	18%
Outpatient clinic	2%	5%*	41%	39%
Hospitalization	17%	18%	7%	3%
Cerobrovascular diseases	8%	7%	8%	4%
Astma/COPD	34%	28%	13%	14%
ACE inhibitors	48%	55%	40%	32%
AII-antagonist	8%	13%	9%	9%
Beta-blockers	45%	45%	35%	25%*
Digoxin	28%	25%	–	–
Calcium antagonists	18%	13%	20%	20%
Diuretics	76%	63%*	39%	32%
Nitrates	21%	21%	1%	4%
Spironolactone	18%	13%	1%	1%
Insulin	–	–	19%	18%
Oral antidiabetics	–	–	74%	78%

SD, standard deviation; COPD, chronic obstructive pulmonary disease.
*$P < 0.05$.

Table 2 Effects on the use and dosage of ACE inhibitors in CHF patients

	Treatment with ACE inhibitor (n = 498) adjusted odds ratio (95% CI)	*Dosage ACE inhibitor (n = 216) regression coefficients (SE)*
Intervention	1.19 (0.52–2.69)	2.15 (1.08)
Interaction term between intervention and baseline	0.82 (0.22–3.11)	0.23 (0.10)*
Contact with GP (6 months follow-up)	1.05 (0.57–1.94)	0.07 (0.78)
Contact with specialist (6 months follow-up)	2.02 (0.99–4.11)	0.20 (0.88)
Outpatient heart failure clinic	0.38 (0.07–1.97)	0.84 (2.18)
Doctor characteristics		
Gender (female)	4.76 (1.64–13.84)*	3.29 (1.68)
Work experience <10 years	1.00	1.00
Work experience 10–20 years	1.17 (0.51–2.70)	–0.22 (1.38)
Work experience >20 years	1.83 (0.81–4.09)	2.28 (1.28)
Patient characteristics		
Gender	0.90 (0.49–1.66)	–0.09 (0.77)
Age	0.98 (0.96–1.01)	0.02 (0.04)

CHF, chronic heart failure; ACE, angiotensin converting enzyme; GP, general practitioner; SE, standard error.
*Significant with Wald test.

intervention (58%) and control group (61%). Small changes were observed in the treatment of hypertension in these patients after 6 months, but there was no significant effect that could be attributed to the educational programme. The percentage of patients receiving an ACE inhibitor increased with 4% to 44% at follow-up in the intervention group, and also with 4% to 36% in the control group. There was an

Table 3 Effects on the use of ACE inhibitors and number of antihypertensive drugs in hypertensive T2DM patients (*n* = 459)

	Treatment with ACE inhibitor adjusted odds ratio (95% CI)	*Number of antihypertensives regression coefficients (SE)*
Intervention	1.49 (0.63–3.53)	0.008 (0.07)
Interaction term between intervention and baseline	0.54 (0.12–2.34)	0.03 (0.06)
Contact with GP (6 months follow-up)	2.18 (1.05–4.52)*	0.15 (0.07)*
Contact with specialist (6 months follow-up)	0.76 (0.32–1.80)	0.13 (0.08)
Diabetes service	1.27 (0.62–2.59)	–0.10 (0.07)
Doctor characteristics		
Gender (female)	1.44 (0.47–4.43)	0.03 (0.11)
Work experience <10 years	1.00	1.00
Work experience 10–20 years	1.05 (0.40–2.74)	–0.09 (0.09)
Work experience >20 years	1.38 (0.58–3.26)	–0.01 (0.08)
Patient characteristics		
Gender	1.94 (0.96–3.93)	0.05 (0.06)
Age	1.00 (0.97–1.02)	0.007 (0.003)*

*Significant with Wald test.
T2DM, type 2 diabetes mellitus; ACE, angiotensin converting enzyme; GP, general practitioner; SE, standard error.

increase in the number of antihypertensives being prescribed in patients in both the intervention group [1.45 (SD 1.1) at baseline vs. 1.62 (SD 1.2) at follow-up] and in the control group [1.19 (SD 1.2) vs. 1.38 (SD 1.4) at follow-up].

Irrespective of the educational programme, contact with a GP during the 6-month follow-up contributed to a higher chance of receiving an ACE inhibitor or more antihypertensive drugs at follow-up (Table 3). Furthermore, older patients were more likely to get more antihypertensive drugs at follow-up.

Process evaluation of the educational programme

The attendance rate of the GPs at the educational meetings, which was reported in all but two groups, was 76% for the CHF groups and 67% for the T2DM groups. The process evaluation questionnaire was completed by 57 of the attending GPs in the CHF groups (response rate 86%), and 13 GPs in the T2DM groups (response rate 45%).

The programme was not fully conducted as intended. In all groups, the GPs' views on optimal treatment in relation to the treatment guideline recommendations were discussed. All 70 GPs that completed the process evaluation reported this to be a useful part of the programme. However, 20 GPs in the CHF groups and 10 in the T2DM-groups expressed that they had not received feedback regarding their own patients. For about half of the GPs, the researchers had collected material for a random sample of patients from the GPs' medical records before the educational meeting. This material included patient's age, sex, medication use, hospitalization and lab results, and was used by the GP to bring to the meeting. When this was not the case, the GPs were asked to extract data for five randomly chosen patients themselves before the meeting, but this was often perceived as too difficult or time-consuming. Of the 40 GPs that reported having received individual feedback, 37 rated it as useful. The formulation of personal intentions was conducted by 53 of the 70 GPs as part of the educational programme, but seen as not useful by six GPs in the CHF programme.

The barrier most often mentioned for changing the CHF treatment was related to perceived difficulties with changing treatment initiated by a specialist (Table 4). Furthermore, some GPs were hesitant to change the treatment of stable CHF patients who may be using already many different drugs. One-third of the GPs did not mention any barrier for changing their CHF prescribing in accordance with the guideline recommendations. Three quarters of the GPs expressed their intention after the meeting

Table 4 Perceived barriers to implement recommendations from guidelines

Heart failure (n = *57*)		*Hypertension in T2DM* (n = *13*)	
Problems with ACE inhibitors		**Problems with ACE inhibitors**	
Side effects	(*n* = 9) 16%	Side effects	(*n* = 1) 8%
Difficult to titrate dose	(*n* = 5) 9%		
Other drug problems		**Other drug problems**	
Changing stable patients	(*n* = 8) 14%	Polypharmacy & compliance	(*n* = 6) 46%
Motivating & compliance patients	(*n* = 8) 14%		
Polypharmacy & complexity	(*n* = 6) 11%		
Digoxine (place & dosing)	(*n* = 2) 4%		
Diuretics (stopping)	(*n* = 1) 2%		
Organizational problems		**Problems with target level**	
Changing cardiologist's therapy	(*n* = 11) 19%	Difficult to reduce tension	(*n* = 4) 31%
Tracing problem patients	(*n* = 6) 11%	Dangerous for elderly	(*n* = 2) 15%
Renal function check	(*n* = 2) 4%		
None	(*n* = 19) 33%	**None**	(*n* = 1) 8%

T2DM, type 2 diabetes mellitus; ACE, angiotensin converting enzyme.

that they were going to be more alert on using ACE inhibitors for their CHF patients, and increase the dosage more often.

A barrier mentioned by almost half of the GPs that completed the questionnaire on the hypertension in T2DM programme, concerned expected problems with compliance in patients already on many drugs (Table 4). Furthermore, several GPs perceived problems with one of the messages in the programme. They felt that the target blood pressure level of 135/85 mmHg was too stringent and difficult to reach. Despite this fact, 75% of the GPs mentioned as intention after the meeting that they were going to try aiming for the target blood pressure level in more of their diabetic patients.

Discussion

A self-supporting educational programme for peer review groups was developed to implement treatment guidelines in an existing setting of peer review groups on pharmacotherapy. This programme had no significant effect on quality of prescribing in the two chronic diseases studied. There were also no clear associations between doctor or patient characteristics and improvements in treatment outcomes. Treatment quality did improve somewhat for both diseases regardless of the intervention. Several factors can be pointed out that might explain the lack of effect of this educational programme.

First, not all parts of the programme were conducted as intended. Incomplete use of an intervention programme to implement guidelines has been identified before as possible explanation for its lack of effect (Flottorp *et al*. 2003). In most groups, there had been a discussion of the optimal treatment, as well as of barriers to change treatment in line with the recommendations of the guidelines. The idea was that by sharing experiences and learning from peers, possible solutions to perceived barriers might be offered. Although this discussion was considered useful, it was not sufficient to overcome all barriers. The educational programme did not provide the GPs with supportive material or resources to deal with specific barriers. Especially, dealing with treatments initiated by a specialist for heart failure or motivating diabetic patients for additional hypertensive medication was still considered problematic at the end of the meetings.

Evaluations of the GPs' own patients at the peer review meetings were seen as useful, but there were problems to conduct this part without external support. As a consequence, a substantial number of GPs did not get any feedback on their own patients. In addition, the programme was set up to evaluate a random selection of patients, so that the GPs would

learn how to identify patients in need for change. This implied that some of the patients discussed at the meeting did not have any problems, which might have been considered as less useful. For the GPs it is probably more efficient when a selection of not optimally treated patients is made for them. Such an approach has shown to increase adherence to guideline recommendations for patients with type 2 diabetes (Grant *et al*. 2003).

Many participating GPs formulated intentions or a change plan at the end of the meeting, such as prescribing ACE inhibitors in higher dosages or trying to aim for the target blood pressure, but their actual behaviour after 6 months did not indicate that they followed those plans. They only conducted face-to-face or telephone consultations with half of the patients during the 6 months of follow-up, whereas the other patients received repeat prescription without a direct contact being initiated by the GP. The patient–doctor contact was an important factor explaining improvements in hypertensive treatment in T2DM patients. In CHF patients, a contact with the specialist seemed to influence the treatment more than a contact with the GP, indicating that the GP may often not have the first responsibility for the treatment of these patients. This limits the effect of an intervention that is only aimed at the GPs.

Furthermore, one meeting may not be enough to actually change treatment, although that is the usual procedure in the peer review groups. Behavioural theories stress the importance of repetition, especially for changing routine behaviour.

A last factor that may have contributed to the lack of effect was our focus on changing the treatment in chronic patients. It is possible that the programme did have some effect on the treatment of newly diagnosed patients, as it is easier to start a new treatment policy in such patients than to change long-term medication in already treated patients (Veninga *et al*. 2000).

Limitations

The high rate of non-participants in the T2DM programme is a matter of concern. Although this did not lead to clear differences in the patient population studied, it may have lead to differences in the GP population. GPs participating in the T2DM programme worked more in rural areas, and appeared to prescribe already more in adherence to the treatment guidelines, both regarding treatment of hypertension and treatment of heart failure. These baseline differences in prescribing were taken into account in our statistical models. We conducted the evaluation on an intention-to-treat basis. Previous studies indicated that it is possible that also non-attenders learn about the key messages addressed at the peer review meeting from their peers or from minutes send to them after the meeting (Veninga *et al*. 1999, 2000).

The evaluation of the programme was conducted in a selection of the GPs and their patients. Part of this selection was due to logistic problems with collecting data from the practices in time. However, a third of the GPs were not visited because the GP did not have the time or willingness for this data collection. We consider it unlikely that the educational programme would have had more effect in this less motivated group of GPs.

In conclusion, an interactive programme for small peer review groups focusing on education, individual feedback, identification of barriers and social influence was not successful in changing the treatment of chronic patients. This type of education might be considered as a starting point for change, but a more active approach assisting the review and recall of individual patients in need for change seems necessary for the GPs to move from plans to making actual changes.

Acknowledgements

No ethical approval is needed for this type of study in the Netherlands. We thank the GPs for their participation. The study was funded by the University of Groningen.

References

Berlowitz D.R., Ash A.S., Hickey E.C., Glickman M., Friedman R. & Kader B. (2003) Hypertension management in patients with diabetes: the need for more aggressive therapy. *Diabetes Care* **26** (2), 355–359.

Beyer M., Gerlach F.M., Flies U., Grol R., Krol Z., Munck A., Olesen F., O'Riordan M., Seuntjes L. & Szecsenyi J. (2003) The development of quality circles/peer review groups as a method of quality improvement in Europe: results of a survey in 26 European countries. *Family Practice* **20** (4), 443–451.

Cleland J.G., Cohen-Solal A., Aguilar J.C. *et al.* (2002) Management of heart failure in primary care (the IMPROVEMENT of Heart Failure Programmeme): an international survey. *Lancet* **360** (9346), 1631–1639.

CVZ (National Health Insurance Board). (2003) *Desk Reference Book (Farmocotherapeutisch Kompas)*. CVZ, Utrecht.

De Groot J. & Cambach W. (2003) Peer review groups; more than noncommittal (De vrijblijvendheid voorbij. Farmacotherapiegroepen kunnen beter functioneren). *Medisch Contact* **38** (3), 102–104.

Flottorp S., Havelsrud K. & Oxman A. (2003) Process evaluation of a cluster randomized trial of tailored interventions to implement guidelines in primary care – why is it so hard to change practice? *Family Practice* **20** (3), 333–339.

Gilbody S., Whitty P., Grimshaw J. & Thomas R.E. (2003) Educational and organizational interventions to improve the management of depression in primary care: a systematic review. *JAMA* **289**, 3145–3151.

Grant R.W., Hamrick H.E., Sullivan C.M., Dubey A.K., Chueh H.C., Cagliero E. & Meigs J.B. (2003) Impact of population management with direct physician feedback on care of patients with type 2 diabetes. *Diabetes Care* **26** (8), 2275–2280.

Grimshaw J.M., Thomas R.E., MacLennan G. (2004) Effectiveness and efficiency of guideline dissemination and implementation strategies. *Health Technology Assessment* **8** (6), iii–iv, 1–72.

Grol R. (2001) Successes and failures in the implementation of evidence-based guidelines for clinical practice. *Medical Care* **39** (8), II46–II54.

Kasje W.N., Denig P., de Graeff P.A. & Haaijer-Ruskamp F.M. (2004) Physicians' views on joint treatment guidelines for primary and secondary care. *International Journal for Quality in Health Care* **16** (3), 229–236.

Kasje W.N., Denig P., Stewart R.E., de Graeff P.A. & Haaijer-Ruskamp F.M. (2005) Physician, organizational and patient characteristics explaining the use of angiotensin converting enzyme inhibitors in heart failure: a multilevel study. *European Journal of Clinical Pharmacology* **61** (3), 145–151.

Kvamme O.J., Olesen F. & Samuelsson M. (2001) Improving the interface between primary and secondary care: a statement from the European working party on quality in family practice (EQuiP). *Quality in Health Care* **10**, 33–39.

Luzier A.B., Forrest A., Adelman M., Hawari F.I., Schentag J.J. & Izzo J.L. Jr (1998) Impact of angiotensin-converting enzyme inhibitor underdosing on rehospitalization rates in congestive heart failure. *American Journal of Cardiology* **82** (4), 465–469.

Madridejos-Mora R., Amado-Guirado E. & Perez-Rodriguez M.T. (2004) Effectiveness of the combination of feedback and educational recommendations for improving drug prescription in general practice. *Medical Care* **42** (7), 643–648.

Pont L.G., Sturkenboom M.C., Van Gilst W.H., Denig P. & Haaijer-Ruskamp F.M. (2003) Trends in prescribing for heart failure in Dutch primary care from 1996 to 2000. *Pharmacoepidemiology and Drug Safety* **12** (4), 327–334.

Proeftuin Farmaceutische Zorg. (2000) *The Groningen Transmural Guidelines* ('Op weg naar het Groninger transmuraal formularium'). 1 ed. Groningen.

Schaars C.F., Denig P., Kasje W.N., Stewart R.E., Wolffenbuttel B.H.R. & Haaijer-Ruskamp F.M. (2004) Physician, organizational, and patient factors associated with suboptimal blood pressure management in type 2 diabetic patients in primary care. *Diabetes Care* **27** (1), 123–128.

Smeele I.J., Grol R.P., van Schayck C.P., van den Bosch W.J., van den Hoogen H.J. & Muris J.W. (1999) Can small group education and peer review improve care for patients with asthma/chronic obstructive pulmonary disease? *Quality in Health Care* **8** (2), 92–98.

Snijders T. & Bosker R. (2002) *Multilevel analysis. An Introduction to Basic and Advanced Multilevel Modeling*. SAGE, London.

UKPDS 38. UK Prospective Diabetes Study Group. (1998) Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes. *British Medical Journal* **317** (7160), 703–713.

Van Dijk L., Barnhoorn H. & De Bakker D. (1999) *Peer Review Groups on Pharmacotheray in 1999* (In Dutch: Het Farmaco Therapie Overleg in 1999). NIVEL, Utrecht.

Van Eijk M.E., Avorn J., Porsius A.J. & de Boer A. (2001) Reducing prescribing of highly anticholinergic antidepressants for elderly people: randomised trial of group versus individual academic detailing. *British Medical Journal* **322** (7287), 654–657.

Veninga C.C., Denig P., Zwaagstra R. & Haaijer-Ruskamp F.M. (2000) Improving drug treatment in general practice. *Journal of Clinical Epidemiology* **53** (7), 762–772.

Veninga C.C., Lagerlov P., Wahlstrom R., Muskova M., Denig P., Berkhof J., Kochen M.M. & Haaijer-Ruskamp F.M. (1999) Evaluating an educational intervention to improve the treatment of asthma in four European countries. Drug Education Project Group. *American Journal of Respiratory and Critical Care Medicine* **160** (4), 1254–1262.