Netherlands
The Journal of Medicine

ORIGINAL ARTICLE

No clear effect of diabetes education on glycaemic control for Turkish type 2 diabetes patients: a controlled experiment in general practice

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ABSTRACT

Background: In Turkish immigrant diabetics, problems with communication and cultural differences may hinder delivery of diabetes care.
Methods: In a prospective controlled study, the effect of an ethnic-specific diabetes education programme on glycaemic control and cardiovascular risk factors in Turkish type 2 diabetes patients was assessed, by comparing Turkish diabetics who were offered the education programme with Turkish diabetics offered routine care only (control group). From 16 general practices (31 GPs) in Rotterdam, 104 Turkish type 2 diabetes patients were recruited, 85 of whom could be assessed at one-year follow-up. Glycaemic control, lipid concentrations, blood pressure and body mass index were measured.
Results: Compared with the control group, mean HbA_{1c} in the intervention group decreased by 0.3% (95% CI -0.8 to 0.2). A significant decrease in HbA_{1c} was observed in women with HbA_{1c} >7% at baseline (-0.9%; 95% CI -1.73 to -0.09) but not in the other subgroups studied. Serum lipid concentrations, blood pressure and body mass index remained unchanged in the intervention group.
Conclusion: Ethnic-specific diabetes education by Turkish female educators has no obvious beneficial effect on glycaemic control or cardiovascular risk profile. More focus on specific patient selection and gender equality between educators/ patients may prove worthwhile.

KEYWORDS

Diabetes mellitus, education, ethnic groups

INTRODUCTION

Type 2 diabetes has a high prevalence among ethnic groups in Western society.[1-4] Together with ageing of the population, it is expected that the prevalence of type 2 diabetes will further increase in these groups in the coming decade. Diabetes education is an essential part of diabetes care.[5] Problems with communication and cultural differences may hinder delivery of optimal diabetes care to ethnic groups.[6]
The Turkish population is one of the largest ethnic minority groups in the Netherlands. Most of the older Turkish inhabitants are first-generation immigrants who came to the Netherlands in the 1960s and 1970s. They live in a relatively traditional manner and their proficiency in the Dutch language is limited. The available data show that the prevalence of type 2 diabetes in the Turkish population is about twice as high as that in the indigenous Dutch population and that compared with Dutch type 2 diabetes patients, glycaemic control in Turkish diabetics is poorer.[4,7]
We developed an ethnic-specific education programme: an education programme tailored to the traditions and

specific habits of the Turkish diabetes patients (treated by their GP in general practices) and also taking the low level of education in this group into account. The programme was carried out by Turkish female health educators. This study assessed whether the diabetes education programme has a beneficial effect on glycaemic control and cardiovascular risk factors in Turkish type 2 diabetes patients.

PATIENT AND METHODS

The study followed a prospective controlled experimental design. Turkish type 2 diabetes patients from seven practices (13 GPs) in the southern part of Rotterdam formed the intervention group and were offered routine care together with ethnic-specific diabetes education. For the control group Turkish type 2 diabetes patients were recruited from nine practices (18 GPs) located in a comparable ethnic and socioeconomic area in the northern part of Rotterdam, who were offered routine care only. All practices were fully computerised.
Approval for this study was obtained from the Ethics Committee of the Erasmus Medical Centre, Rotterdam.

Patients

An inventory of all type 2 diabetes patients who were treated for their diabetes by the GP exclusively was made from the computer-based patient records and, if present, disease register. Patients were identified as type 2 diabetics if they were specifically marked in the patient records as having type 2 diabetes, or using oral antidiabetic medication or insulin. Patients were considered Turkish on the basis of their surname, as assigned by a Turkish assistant.[7] All Turkish type 2 diabetes patients younger than 75 years and treated for diabetes by their GP were eligible. Excluded were patients who, according to their GP, were too ill to follow the intervention programme, and patients planning to go abroad for more than six months during the study period. A Turkish-speaking assistant, who was not aware of which group the patients were allocated, approached the patients to invite them to participate. After informed consent and baseline measurements, patients were informed by letter whether they were allocated to the intervention or the control group.

Intervention

The two Turkish health educators, both of Turkish origin, who spoke both Turkish and Dutch fluently, were regarded as representatives of the target population (peers). They were trained educators and had experience in educating in a primary care setting. They received an additional training about diabetes management. Because of their Turkish background, the educators could be seen as peers and were thought able to translate advice on diabetes into understandable and (culturally) acceptable (ethnic-specific) advice for Turkish diabetes patients.[8] The health educators were supervised by a Dutch psychologist, both individually and together with other to health educators.
A new diabetes programme was developed, based on basic elements of known Dutch diabetes education programmes (e.g. what is diabetes, general advice on diet, physical exercise and self-care), taking the characteristics of this specific group of Turkish diabetes patients, such as low education and a traditional way of living, into account. The planned nine-month programme included seven individual educational sessions and three group sessions. The individual sessions consisted of four sessions with the educator and patient together and three 'triangle' sessions with the GP, educator and patient present, to discuss the three-monthly assessment of the glycaemic control and cardiovascular risk factors. Patients were encouraged to have one of the individual sessions with the dietician and one with the partner present, although this was not obligatory. Afterwards, the educator and patient discussed the triangle sessions. During the intervention, group sessions were organised separately for men and women. The educators were allowed to adjust the number of the education sessions according to the needs of the individual patient. Individual and group sessions took place in the general practice.
The programme was based on three principles: peer education, tailoring, and the Health Education Model.[9] Education focused on attainment of self-care skills and behavioural change strategies. During the individual sessions the educators were assigned to investigate the patient's attitude regarding important diabetes-related behaviour (e.g. diet, exercise and medical drug compliance) according to the model, in order to prioritise the therapeutic goals. During the individual sessions patients were invited to arrange an appointment together with a dietician to discuss dietary rules and the patient's partner to discuss social support. In each session, the therapeutic goals were re-evaluated and adjusted to the patient's personal experiences and problems hampering attainment of the goals. The first group session was mainly to discuss experiences and the patients received general information about diabetes. During the second group session the treatment of diabetes and self-care behaviour were discussed. Main topics in the third group session were prevention of diabetes-related complications and care of the feet (this intervention and also the results on behavioural outcome measures are described in detail elsewhere).[8,10]

Outcome measures

Plasma glucose, total cholesterol, HDL cholesterol, and triglyceride were measured every three months with the 950 AT ORTHO diagnostics. Glycated haemoglobin was determined by the Variant-1 Biorad. LDL cholesterol was calculated using the Friedewald formula.[11] All blood samples were taken in the fasting state using venous blood samples. The research assistants were instructed to measure systolic and diastolic blood pressure (Korotkoff V) on the left arm of the seated patient twice with a two-minute interval using a mercurial blood pressure monitor and calculate the mean of the two measurements. Weight and height were measured to calculate the body mass index (BMI).

Since allocation to the intervention or control group was not random, differences in diabetes care between the two groups were considered as a potential confounder. In order to adjust for this confounder, features of diabetes care in the participating practices were assessed by analysing the medical records of all listed Turkish diabetes patients (including patients not in this study) in the participating practices, as described in a previous study.[7] From an inventory of all type 2 diabetes patients made from a computer-based patient record, and if present, disease register, all Turkish patients were selected who had been treated exclusively by the GP and were known to have had diabetes for at least 3.5 years and who could be followed for two years before the intervention took place. Indicators of diabetes care were: 1) the mean number of recommendations from the Dutch GP guidelines on diabetes that were carried out (maximum 8), 2) the number of diabetes-related referrals of Turkish diabetes patients, and 3) the percentage of medication adjustments within three months after registration of increased plasma glucose levels (fasting ≥8.0 mmol/l, nonfasting ≥10.0 mmol/l).[12]

Statistical analysis

The main effect parameter was change in HbA_{1c} between baseline measurement and one-year follow-up. Power calculations were based on the assumption that the study should be able to detect a clinically relevant improvement in HbA_{1c} of 0.6% in the intervention group, based on an intention-to-treat analysis. With a 5% significance level and a power of 90%, 50 patients were required in each group.
To adjust for potential confounding, multivariate linear regression analyses were carried out with change from baseline as outcome variable, and HbA_{1c} at baseline, gender, age, years since diagnosis, mode of treatment, and the indicators of diabetes care as potential confounders. Because essential data were missing for some patients due to loss to follow-up, we first carried out an intention-to-treat analysis, followed by an intention-to-treat analysis on the dataset obtained by multiple imputation for missing data. Multiple imputation for non-response replaces each missing value by two or more plausible values.[13]

Subgroup analyses

To acquire additional information we decided in advance to perform subgroup analyses for patients with HbA_{1c} ≤7% (good glycaemic control) and HbA_{1c} >7 at baseline, and for male and female patients separately.

RESULTS

Table 1 gives the baseline characteristics of the 104 patients included in the study: 38% were men, mean age was 52 (SD 6.0) years, mean number of years since diagnosis of diabetes was 6.0 (SD 4.6), and mean HbA_{1c} was 8% (SD1.6). There were no significant differences between the intervention and control group.

Features of care for in the intervention and control practices (before the intervention)

Analysis of the medical records of all listed Turkish diabetes patients yielded the following results. The mean number of guideline recommendations carried out (maximum 8) in the intervention practices was 2.0 (SD 2.0) per patient *vs* 2.7 (SD 1.7) per patient in the control practices. During the two-year registration before the intervention, 25% of the Turkish diabetes patients in the intervention practices were referred for diabetes treatment to hospital-based diabetes clinics *vs* 9.6% in the control practices. Within three months after measuring poor plasma glucose, medication was adjusted in 75% of the cases in the intervention practices *vs* 57% of the cases in the control practices.

Loss to follow-up

Of the 104 patients who signed informed consent, five patients (three in the intervention and two in the control group) did not attend the laboratory for baseline measurements and dropped out before the intervention. Another 14 patients (12 in the intervention and two in the control group) were lost to follow-up. Reasons for not completing the follow-up measurements were: refused (5), stayed abroad for a longer period (4), moved or changed physician (4), unable to be contacted (1) (*figure 1*).

The intervention

The mean number of education sessions visited by 38 patients with known baseline and follow-up measurements was 9.3 (SD 3.9) of the ten planned sessions. Ten of the 38 patients had a session with the dietician present.

Glycaemic control

Table 2 shows change in glycaemic control and cardiovascular risk factors after one year. There were no significant differences in the change in HbA_{1c} and fasting plasma between patients in the intervention and control group.

Table 1 *Patient characteristics and baseline measurements of type 2 diabetes patients in the intervention (I) and control (C) group; data are mean (SD), or number of patients (percentage)*

	n (I/C)[1]	Intervention group	Control group
Age (years)	53/51	50.6 (9.3)	53.5 (6.2)
Men (number)	53/51	21 (40)	19 (37)
Years of education	37/41[2]		
• No education		14 (38)	14 (34)
• One to six years		20 (54)	22 (54)
• More than six years		3 (8)	5 (12)
Income	38/39[2]		
• <1000 €/month		26 (68)	32 (82)
• >1000 €/month		12 (32)	7 (18)
Number of years since diagnosis	53/51	6.0 (4.2)	6.1 (5.0)
Body mass index (kg/m^2)	48/47[2]	32.8 (5.2)	31.6 (4.5)
Smokers (number)	48/46[2]	10 (21)	9 (20)
Treatment for diabetes (number)	53/50		
• Diet		9 (17)	5 (10)
• Sulphonylureas		23 (43)	21 (42)
• Metformin		6 (11)	9 (18)
• Combined oral hypoglycaemic agents		13 (25)	15 (30)
• Insulin		2 (4)	- (0)
HbA_{1c} (%)	50/49	8.2 (1.7)	7.9 (1.6)
Fasting plasma glucose (mmol/l)	50/49	10.4 (3.0)	9.8 (3.3)
Total cholesterol (mmol/l)	50/49	5.3 (1.1)	5.5 (1.0)
HDL cholesterol (mmol/l)	50/49	1.1 (0.4)	1.0 (0.3)
LDL cholesterol (mmol/l)	49/43[3]	3.1 (1.0)	3.4 (0.9)
Triglyceride (mmol/l)	50/49	2.5 (1.8)	2.7 (1.5)
Blood pressure (mmHg)			
• Systolic	48/48[2]	136 (17)	141 (22)
• Diastolic	48/48[2]	88 (10)	89 (10)
Urinary albumin (number)	48/49[2]		
• >50		10 (21)	8 (16)
• >300		5 (10)	2 (4)

[1]Baseline laboratory data were obtained from 50 patients in the intervention group and from 49 patients in the control group, and were missing in five patients (3 intervention, 2 control) who signed informed consent. [2]Missing data due to incomplete dataset. [3]Due to high triglyceride level (>4.5 mmol/l) the LDL cholesterol could not be calculated in eight patients.

Compared with the control group, mean HbA_{1c} in the intervention group decreased by 0.3% (95% CI -0.8 to 0.2) and fasting plasma glucose decreased by 0.9 mmol/l (95% CI -2.2 to 0.3). Adjustment for baseline value (HbA_{1c}), patient features (age, gender, years since diagnosis and use of medication) or practice features did not substantially alter these findings.

Table 3 gives the results of subgroup analyses for change in HbA_{1c} after one year for patients with baseline HbA_{1c} ≤7% (good glycaemic control) and patients with baseline HbA_{1c} >7%, for all patients, and for males and females separately. A significant effect of the intervention was only seen in women with increased plasma glucose levels (0.87%; 95% CI -1.73 to -0.09).

Figure 1 *Flow chart*

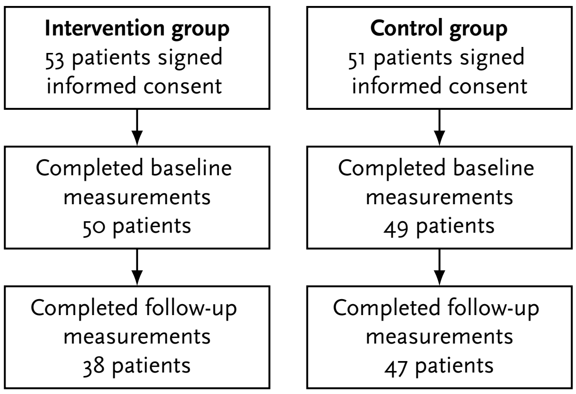

Table 2 *Glycaemic control and cardiovascular risk factors in 85 Turkish diabetes patients with completed datasets: outcome measurements at baseline, and one year after baseline measurements, and mean change from baseline measurements in both groups*[1]

	Intervention group (n=38)			Control group (n=47)			Mean differences (95% CI)
	Baseline	After 1 year	Change from baseline	Baseline	After 1 year	Change from baseline	
HbA_{1c} (%)	7.9 (1.4)	7.6 (1.2)	-0.3 (1.3)	8.0 (1.6)	8.0 (1.5)	0.03 (0.9)	-0.3 (-0.8 to 0.2)
Fasting plasma glucose (mmol/l)	10.1 (3.0)	8.8 (2.9)	-1.3 (3.2)	9.9 (3.3)	9.7 (2.8)	-0.4 (2.5)	-0.9 (-2.2 to 0.3)
Total cholesterol (mmol/l)	5.1 (1.0)	5.0 (1.0)	-0.1 (0.7)	5.5 (1.0)	5.5 (1.0)	-0.1 (0.6)	-0.1 (-0.4 to 0.2)
HDL cholesterol (mmol/l)	1.2 (0.3)	1.1 (0.3)	-0.1 (0.2)	1.0 (0.3)	1.1 (0.3)	0.1 (0.1)	0.1 (0.05 to 0.2)
LDL cholesterol (mmol/l)	3.0 (0.9)	3.0 (0.9)	-0.1 (0.8)	3.4 (0.9)	3.3 (0.9)	-0.2 (0.7)	0.1 (-0.2 to 0.5)
Triglycerides (mmol/l)	2.3 (1.9)	2.0 (1.1)	-0.3 (1.3)	2.7 (1.6)	2.5 (1.9)	-0.2 (1.2)	0.17 (-0.7 to 0.4)
Body mass index (kg/m^2)	33.0 (5.7)	32.3 (4.9)	-0.2 (1.7)	31.7 (4.5)	30.9 (4.4)	-0.5 (1.1)	0.3 (-0.3 to 1.0)
Blood pressure (mmHg)							
• Systolic	136 (18)	131 (16)	-5 (13)	141 (22)	142 (25)	1 (22)	-6 (-15 to 2)
• Diastolic	88 (11)	85 (11)	-4 (8)	89 (10)	87 (12)	-2 (12)	-1 (-6 to 4)

Values are adjusted – for HbA_{1c} at baseline and patient characteristics (age, gender, years since diagnosis, mode of treatment: diet alone or use of oral hypoglycaemic agents – mean values (SD) and mean differences between changes from baseline in the intervention and control group (95% CI). [1]Fourteen patients (12 in the intervention and 2 in the control group) with completed baseline measurements were lost to follow-up. Reasons for this were: refused (5), stayed abroad for a longer period (4), moved or changed physician (4), unable to be contacted (1).

Cardiovascular risk factors
No significant differences in the changes of plasma lipid levels, blood pressure and BMI in favour of the intervention group were observed at one-year follow-up.

The analyses based on the 104 patients who entered the study with missing values imputed by means of multiple imputation yielded similar results for the outcome measurements HbA_{1c} and cardiovascular risk factors.

DISCUSSION

In this study targeting first-generation Turkish immigrants with type 2 diabetes, bicultural education in general practice had no obvious beneficial effect on either glycaemic control parameters or cardiovascular risk factors.
An improvement in HbA_{1c} of 0.6% in the intervention group, on which the power calculations were based, was not achieved; the study group was too small to detect an improvement as small as 0.3%. The expected larger improvement was based on the assumption that nearly all Turkish diabetes patients would have HbA_{1c} levels >7%. However, this was not the case in 26 (31%) of the 85 patients with completed datasets, which made an improvement of 0.6% more difficult to reach.
The finding that the intervention was slightly more effective in women warrants some discussion. Firstly, the low HbA_{1c} level at baseline in the male patients in both the intervention (HbA_{1c} 7.7%) and control group (HbA_{1c} 8.0%) with completed datasets, and the small number of men might explain why no significant decrease in HbA_{1c} in men could be shown. Secondly, the influence of gender inequality between the female educator and the male patients might explain the lack of effect in men. A former study showed the positive influence of gender equality on the effectiveness of health education.[14] In our study, both of the Turkish educators were female and (for cultural reasons) Turkish male patients may feel less inclined to take advice regarding behavioural changes from women. Indeed, another report of this study showed that the Turkish females experienced more change in behaviour than the Turkish men.[8] Attention to gender equality should be considered in future studies, possibly by making the contents of the message more gender specific. Although no studies have been performed to prove this, it seems quite possible that the susceptibility for behavioural advice differs between Turkish men and women.

Table 3 *Subgroup analyses for change in mean HbA_{1c} one year after baseline measurements in patients in the intervention and control group for patients with HbA_{1c} ≤7.0% at baseline (good glycaemic control) and for patients with HbA_{1c} >7.0% at baseline: in all patients, and in males and females separately*

Patient group	n	HbA_{1c} in % (SD) at baseline	HbA_{1c} in % (SD) at one year	Difference between intervention and control[1]	
				β	95% CI
All patients					
• Intervention	38	7.9 (1.4)	7.6 (1.2)	-0.30	(-0.74 to 0.14)
• Control	47	8.0 (1.6)	8.0 (1.4)		
Male patients					
• Intervention	14	7.7 (1.3)	7.6 (1.3)	-0.09	(-0.75 to 0.57)
• Control	19	8.0 (1.7)	7.9 (1.3)		
Female patients					
• Intervention	24	8.0 (1.5)	7.6 (1.1)	-0.49	(-1.11 to 0.13)
• Control	28	8.0 (1.5)	8.0 (1.6)		
Patients with HbA_{1c} ≤7%					
• Intervention	10	6.5 (0.5)	6.9 (0.9)	0.25	(-0.34 to 0.84)
• Control	16	6.7 (0.3)	7.0 (0.8)		
Patients with HbA_{1c} >7%					
• Intervention	28	8.4 (1.3)	7.9 (1.2)	-0.53	(-1.09 to 0.04)
• Control	31	8.6 (1.5)	8.5 (1.5)		
Male patients with HbA_{1c} >7%					
• Intervention	10	8.2 (1.0)	7.8 (1.3)	0.06	(-0.78 to 0.90)
• Control	14	8.6 (1.8)	8.2 (1.5)		
Female patients with HbA_{1c} >7%					
• Intervention	18	8.6 (1.4)	7.9 (1.1)	-0.87	(-1.73 to -0.09)
• Control	17	8.7 (1.4)	8.7 (1.5)		

[1]Adjusted for HbA_{1c} at baseline and patient characteristics (age, gender, years since diagnosis, mode of treatment: diet alone or use of oral hypoglycaemic agents).

The first methodological limitation of this study was the absence of randomisation, which was not possible for three reasons. First, the bicultural educators were already working in the participating intervention practices and Turkish patients were familiar with the facility; exclusion of diabetes patients from this facility for a longer period was not considered an option. Secondly, the number of patients per general practice would be too small to arrange group education within each general practice. Thirdly, the danger of contamination between patients of the control and intervention group was considered too large, particularly because older Turkish patients living in one district form close networks.

A second limitation concerns the dropout. Because we were unable to follow up 15 of the 53 patients who dropped out of the intervention, it was impossible to perform a traditional intention-to-treat analysis. Reasons for dropping out were diverse and many patients dropped out before or early on in the intervention, and only five patients dropped out for education-related reasons. We believe, however, that the possibility of bias induced by selective dropout is very limited. Importantly, this is illustrated by analysis of the dataset obtained by multiple imputation for missing data, which yielded similar results on both HbA_{1c} and cardiovascular risk factors.

To our knowledge this is the first study to assess the effect of ethnic-specific diabetes education on glycaemic control in Turkish diabetes patients. Although the results show that our educational approach has no clear effect on glycaemic control or cardiovascular risk factors, the study yielded some interesting findings. A substantial proportion of patients in good glycaemic control, the high dropout and the larger effect in women suggest an even more tailored approach. The fast growing numbers of diabetes patients from non-Western ethnic minority groups in West Europe, and the difficulty that physicians experience in treating these patients groups warrant further study.

REFERENCES

1. Marshall JA, Hamman RF, Baxter J, et al. Ethnic differences in risk factors associated with the prevalence of non-insulin-dependent diabetes mellitus. Am J Epidemiol 1993;137:706-18.
2. Carter JS, Pugh JA, Monterrosa MD. Non-insulin-dependent diabetes mellitus in minorities in the United States. Ann Intern Med 1996;125:221-32.
3. Weijers RNM, Bekedam DJ, Oosting H. The prevalence of type 2 diabetes and gestational diabetes mellitus in an inner city multi-ethnic population. Eur J Epidemiol 1998;14:693-9.
4. Uitewaal PJ, Manna DR, Bruijnzeels MA. Prevalence of type 2 diabetes mellitus, other cardiovascular risk factors, and cardiovascular disease in Turkish and Moroccan immigrants in North West Europe: a systematic review. Prev Med 2004;39:1068-76.
5. Elasy TA, Ellis SE, Brown A, Pichert JW. A taxonomy for diabetes educational interventions. Patient Educ Couns 2001;43:121-7.
6. Hawthorne K, Tomlinson S. Pakistani Moslems with type 2 diabetes mellitus: effect of sex, literacy skills, known diabetic complications and place of care on diabetic knowledge, reported self-monitoring management and glycaemic control. Diab Med 1999;16:591-7.
7. Uitewaal PJM, Bruijnzeels M, Bernsen R, Voorham T, Thomas S. Diabetes care in Dutch general practice: differences between Turkish immigrants and Dutch patients. Eur J Public Health 2004;14:15-8.
8. Voorham AJJ, Uitewaal PJM, Bruijnzeels M. Het effect van voorlichting in de eigen taal aan Turkse diabetespatiënten. Tijdschr Soc Gezondheidsz 2002;80:514-20.
9. De Vries H, Dijkstra M, Kuhlman P. Self-efficacy: the third factor besides attitude and subjective norm as a predictor of behavioural intentions. Health Educ Res 1988;3:273-82.
10. Uitewaal P, Bruijnzeels M, de Hoop T, et al. Feasibility of diabetes peer education for Turkish type 2 diabetes patients in Dutch general practice. Patient Educ Couns 2004;53:359-63.
11. Friedewald WT, Levy RI, Fredrickson DS. Estimation of the distribution of low-density lipoprotein cholesterol in plasma without the use of the preparative ultracentrifuge. Clin Chem 1972;18:499-502.
12. Rutten GEHM, Cromme PVM, Zuidweg J, Mulder JD. Huisarts en diabetes type 2: een verantwoording voor de NHG standaard. Huisarts Wet 1989;32:7-13.
13. Rubin DB, Schenker N. Multiple imputation in health care database: an overview and some applications. Stat Med 1991;10:585-98.
14. Voorham AJJ, Kocken PL. Kenmerken van de voorlichter bij het effect van seniorenvoorlichting. Tijdschr Soc Gezondheidsz 2000;78:303-8.