Type 2 Diabetes Mellitus and Turkish Immigrants:

an educational experiment in general practice

Diabetes mellitus type 2 en Turkse immigranten:

Een educatief experiment in de huisartspraktijk

Proefschrift

ter verkrijging van de graad van doctor aan de Erasmus Universiteit Rotterdam op gezag van de Rector Magnificus

Prof.dr.ir. J.H. van Bemmel

en volgens besluit van het College voor Promoties.
De openbare verdediging zal plaatsvinden op

woensdag 5 november 2003 om 11:45 uur

door

Paulus Joannes Maria Uitewaal
geboren te Utrecht

Promotiecommissie

Promotoren:	Prof.dr. S. Thomas Prof.dr. A.W. Hoes
Overige leden:	Prof.dr. M. Berg Prof.dr. G.E.H.M. Rutten Prof.dr. J.P. Mackenbach
Copromotor:	Dr. M.A. Bruijnzeels

General introduction And Research questions

General introduction

As a result of the ever-increasing numbers of immigrant groups, the Western world is facing numerous new problems related to this development. One problem of special interest is the consequence for public health. Immigrants not only have different health problems rare to the native population of North West European countries, e.g. sickle cell disease and thalassaemia, but also the epidemiology of known diseases may differ. Studies have shown differences between immigrant groups and the native population in the prevalence of diabetes [1-3], and cardiovascular diseases.[4-6] These differences are attributed to genetic, environmental, social and cultural factors.[7-10]

Prevalence of type 2 diabetes and immigrants

The prevalence of type 2 diabetes has increased significantly in recent years across the entire world.[11] Environmental changes related to the urbanisation and/or Westernisation processes across all populations of the world have been proposed to play a major role in the diabetes epidemic. Numerous studies showed that after migration from a non-Western to a Western country the prevalence of diabetes increases dramatically in various ethnic groups.[12] However, after migration diabetes prevalence can vary between different ethnic groups, and also within ethnic groups.[13] This has been well documented for several ethnic groups over the world, including Africans, Hispanics, Japanese and South Asians, but much less is known about other large immigrants groups in North West Europe, such as the Turks and Moroccans.

Diabetes-related complications

Type 2 diabetes is not only a chronic disease with numerous micro-vascular complications, but is also strongly associated with cardiovascular disease and, therefore, increasingly seen as a major cardiovascular risk factor.[14] Diabetes treatment and control aims at preventing both micro and macro-vascular complications. Evidence shows that the prevalence of complications varies between ethnic groups.[5, 15] For example Africans and South Asians seem to be more vulnerable for diabetic nephropathy [16, 17], whereas the prevalence of macro-vascular complications as myocardial infarction is lower in persons from black African descent compared to South Asians and Caucasians.[5] Again, for Turks and Moroccans who migrated to North West Europe, data on these risks are scarce.

Information on the relationship between diabetes and its complications is important in order to develop screening programs and treatment guidelines. For instance, cut-off points to diagnose diabetes are also based on the risk of complications of the disease.[17] Knowledge of differences between the various ethnic groups can help to make these screening programs and treatment guidelines more tailored to ethnic groups.

Chapter 2 of this thesis presents the results of a literature review conducted to establish current knowledge on the prevalence of diabetes and diabetes-related complications in Turkish and Moroccan immigrants living in North West Europe. The study in Chapter 3 compares differences between Turkish and Dutch type 2 diabetes patients with regard to the prevalence of cardiovascular risk factors and the 10-year absolute risk for coronary heart disease.

Diabetes management and Turkish type 2 diabetes patients

In the last four decades numerous immigrant workers from Morocco and Turkey settled in the Netherlands, and Turkish immigrants now form the largest immigrant group in the Netherlands. Most of the first-generation immigrants were initially foreign workers (or "guest workers") and it was assumed that they would return to their home country in due course. Therefore, at first it did not seem essential for them to learn the Dutch

language, and little effort was made by the workers themselves, or by the employers or the politicians, who created the conditions for the immigration process. However, the majority of the foreign workers stayed in the Netherlands and were followed by family members. About 30% of the Turkish immigrants (mostly women) have no education or only a few years at primary school, and about 50% finished primary school and have no further education.[18, 19] Because they are not used to learning and tend to live among fellow immigrants, even after two to three decades in the Netherlands, often they are not fluent in the Dutch language [19] and tend to stay within their own culture. Language problems and cultural differences can cause serious difficulty in treating patients from immigrant groups.[20]
Due to their migration history the number of elderly immigrants is still small, but will increase considerably in the coming decades. Therefore, the number of immigrants suffering from age-related chronic diseases such as diabetes and cardiovascular diseases will increase exponentially.
In the Netherlands, treating type 2 diabetes patients is primarily the responsibility of the GP. Particularly GPs working in the inner cities are confronted with a growing number of immigrant diabetes patients. Diabetes management alone can be awkward and frustrating because patients often do not closely follow the therapeutic and life-style advice, and in order to obtain optimal care effective communication between physician and patient is crucial.[21] Education about diabetes is an essential part of its management as it can improve the patient's insight in the reasons for the therapeutic guidelines, and increase the patient's self-care possibilities. Effective communication and certainly diabetes education is expected to be more difficult in immigrant patients due to language barriers, cultural differences and educational level. [22, 23] Therefore, it is questionable whether the GP alone is able to overcome all these problems. Chapter 3 addresses two related topics: Whether diabetes care currently offered by the GP to Turkish diabetics differs from that for Dutch diabetics, and the outcome of care in Turkish and Dutch type 2 diabetes patients exclusively treated by their GP.

Ethnic- specific diabetes education programme

Turkish immigrants experience a poorer health condition than the Dutch indigenous population, and more often seek professional medical care.[18] Immigrants have a relatively larger need of health education, whereas

communication with Dutch GP is often more laborious.[24] To optimise the communication between GP and immigrant patients the Rotterdam Area Health Authority developed a project in which bicultural educators were active in primary care. One of the topics most frequently mentioned by the educators working in this project was "knowledge about chronic disorders" (15% of all the topics mentioned), including diabetes.[25] After this experiment, the next step was to evaluate the effects on patients' health of the efforts of these bicultural educators. For this goal a structured diabetes education programme was developed for Turkish diabetics. Type 2 diabetes was chosen because it was the most encountered chronic problem by the educator, it is an important health problem in ethnic minorities, diabetes education forms an essential part of the diabetes therapy, and evaluation of the effects of the education (as indicated by the glycaemic control) is measurable. Turkish patients were chosen because the Turkish population is the largest ethnic minority group in Rotterdam.

Chapter 4 to 7 we investigate whether such a programme contributes to improved diabetes management and better glycaemic control without an unacceptable imposition on the GP's time, and how such a programme would be received by the Turkish patients.

Research questions

This thesis has two main objectives: to acquire epidemiological data on type 2 diabetes in Turkish immigrants, and to assess the results of an experiment on ethnic-specific diabetes peer education in general practice. For this, the following research questions were generated: (1) Are Turkish immigrants with type 2 diabetes mellitus comparable to Dutch diabetes patients, and (2) What are the effects and the applicability of an ethnic-specific peer-led education programme in Turkish type 2 diabetes patients? These two topics are further explored based on the following questions:

1. What is known about the prevalence of type 2 diabetes, diabetes-related complications, cardiovascular risk factors and cardiovascular mortality in Turkish and Moroccan immigrants in North West Europe, and what are the differences compared with the indigenous population (**Chapter 2**)
2. Are there differences in the prevalence of cardiovascular risk factors and 10-year absolute risk for coronary heart disease between Turkish and Dutch type 2 diabetes patients? (**Chapter 3**)
3. Are there differences in GPs' adherence to the Dutch national guidelines on type 2 diabetes and differences in the outcome of care in terms of glycaemic control between Turkish and Dutch patients with type 2 diabetes? (**Chapter 4**)
4. What are the effects of an ethnic specific diabetes education programme in primary care on: Glycaemic control and cardiovascular risk factors in Turkish type 2 diabetes patients? (**Chapter 5**)
5. What is the feasibility of a 9-month education diabetes programme (tailored to Turkish patients, provided by Turkish female bicultural educators) in primary care, in terms of drop-out rate, patient and GP satisfaction, and GP's perceived workload? (**Chapter 6**)
6. Which characteristics of Turkish type 2 diabetes patients are associated with the level of compliance (non-compliance, compliant and over-compliant) to an ethnic-specific diabetes education facility in primary care? (**Chapter 7**)

References

1. Brancati FL, Kao WH, Folsom AR, Watson RL, Szklo M. Incident type 2 diabetes mellitus in African American and white adults: the Atherosclerosis Risk in Communities Study. JAMA 2000; 283 :2253-9.
2. Davies MJ, Gujral J, Burden AC. The prevalence of diabetes in the adult Caucasian and Asian population in Leicester. Diabetic Med 1996; 13: S37.
3. Riste L, Khan F, Cruickshank K. High prevalence of type 2 diabetes in all ethnic groups, including Europeans, in a British inner city. Diabetes Care 2001; 24: 1377-83.
4. Khattar RS, Swales JD, Senior R, Lahiri A. Racial variation in cardiovascular morbidity and mortality in essential hypertension. Heart 2000; 83: 267-71.
5. Chatuvedi N, Jarrett J, Morrish N, Keen H, Fuller JH. Differences in mortality and morbidity in African Caribbean and European people with non-insulin-dependent diabetes mellitus: results of 20 year follow up of a London cohort of a multinational study. BMJ 1996; 313: 848-52.
6. UK Prospective Diabetes Study (UKPDS) group. Effect of intensive blood-glucose control with metformin on complications in overweight patients with type 2 diabetes (UKPDS 34). Lancet 1998; 352: 854-65.
7. Joffe B, Zimmet P. The thrifty genotype in type 2 diabetes: an unfinished symphony moving to its finale? Endocrine 1998; 9: 139-41.
8. Warram JH, Kopczynski J, Janka HU, Krolewski AS. Epidemiology of non-insulin-dependent diabetes mellitus and its macrovascular complications. A basis for the development of cost-effective programs. Endocrinol Metab Clin North Am 1997; 26: 165-88.
9. Bhopal R, Unwin N, White M, et al. Heterogeneity of coronary heart disease risk factors in Indian, Pakistani, Bangladeshi, and European origin populations: cross-sectional study. BMJ 1999; 319: 215-20.
10. Zimmet P, Alberti KG, Shaw J. Global and societal implications of the diabetes epidemic. Nature 2001; 414: 782-87.
11. Abate N, Chandalia M. The impact of etnicity on type 2 diabetes. J Diabetes Complications 2003; 17: 39-58.
12. Zimmet P. Type 2 (non-insulin-dependent) diabetes – an epidemiological overview. Diabetologica 1982; 22: 399-411.
13. Stern MP. Do non-insulin-dependent diabetes mellitus and cardiovascular disease share common antecedents? Ann Intern Med 1996; 124: 110-16.
14. Anonymous (U.K. Prospective Diabetes Study Group). The incidence of myocardial infarction in white, South Asian, and Afro-Caribbean patients with type 2 diabetes (U.K. Prospective Diabetes Study 32). Diabetes Care 1998; 21: 1271-7.
15. Brancati FL, Whittle JC, Whelton PK, Seidler AJ, Klag MJ. The excess incidence of diabetic

end-stage renal disease among Blacks. A population-based study of potential explanatory factors. JAMA 1992; 268: 3079-84.

16. Chandie Shaw PK, Vandenbroucke JP, Tjandra YI, Rosendaal FR, Rosman JB, Geerlings W, de Charro FT, van Es LA. Increased end-stage diabetic nephropathy in Indo-Asian immigrants living in the Netherlands. Diabetologia 2002; 45: 337-41.
17. Wareham NJ, Griffin SJ. Should we screen for type 2 diabetes? Evaluation against National Screening Committee criteria. BMJ 2001; 322: 986-8.
18. Uniken Venema P. Toen ik hier kwam was ik kerngezond; de gezondheid van Turken in Nederland (I was healthy when I came here; the health situation of Turks in the Netherlands). PhD thesis Erasmus University Rotterdam, 1989.
19. Martens EP. Minderheden in beeld, SPVA-98. Instituut voor sociologisch-economisch onderzoek (ISEO), Rotterdam 1999.
20. Pachter LM. Culture and clinical care: folk illness beliefs and behaviours and their implications for health delivery. JAMA 1994; 271: 690-4.
21. Wieringen van JCM, Harmsen JAM, Bruijnzeels MA. Intercultural communication in general practice. Eur J Public Health 2002; 12: 63-8.
22. Naish J, Brown J, Denton B. Intercultural consultations: investigation of factors that deter non-English speaking women from attending their general practitioners for cervical screening. BMJ 1994; 309: 1126-8.
23. Ryn van M, Burke J. The effect of patient race and socio-economic status on physicians' perceptions of patients. Soc Sci Med 2000; 50:813-28.
24. Bruijnzeels MA, de Hoop T, Swart W, Voorham AJJ. Etnische herkomst van patiënten en de werkdruk van de huisarts (Ethnic background of patients and general practitioners' work load). Huisarts Wet 1999; 42: 254-8.
25. Bruijnzeels MA, Voorham AJJ, de Hoop T. Migrantenvoorlichting in de huisartspraktijk. Resultaten van een procesevaluatie (Peer health education for ethnic minorities in general practice in Rotterdam. Results of a process evaluation). Huisarts Wet 1999; 42: 307-10.

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

PJM Uitewaal, DR Manna , MA Bruijnzeels, AW Hoes, S Thomas.

submitted

Abstract

Subject. The prevalence of diabetes, other cardiovascular risk factors, and cardiovascular morbidity and mortality varies between immigrant groups in Western societies. Interestingly, for some of the largest immigrant groups in North-West Europe, such as Turks and Moroccans, epidemiological data on these topics are scarce. A systematic review was therefore performed to study these topics in Turkish and Moroccan immigrants in North-West Europe.
Methods. Medline and Embase were searched for studies containing data on the prevalence of diabetes, cardiovascular risk factors, and cardiovascular morbidity and mortality in Turkish or Moroccan immigrants living in North-Western European countries.
Results. A total of 17 studies was identified. Corresponding findings in all studies were a high prevalence of type 2 diabetes in Turkish and Moroccan immigrants (1.3-3.2 times higher than in the indigenous population), a high prevalence of smoking among Turkish men (49-69% versus 39-50% in the Dutch population), and a very low prevalence of smoking in Moroccan women (1-3% versus 31-47% in Dutch women). Because of lack of valid studies, no definite conclusions could be drawn for the cardiovascular risk factors; in particular blood pressure and lipids. One German study showed exceptionally lower cardiovascular mortality rates in Turkish immigrants.
Conclusion. The reviewed studies yielded insufficient evidence for a good

quality comparison of the cardiovascular risk profile between Turkish and Moroccan immigrants and indigenous populations. Diabetes mellitus was more prevalent in Turkish and Moroccan immigrants, smoking more prevalent in Turkish males, and very rare in Moroccan females. Cardiovascular mortality rates were lower in Turkish immigrants and Moroccan male immigrants (one study); this finding, however, warrants further study.

Introduction

The prevalence of diabetes and other cardiovascular risk factors, and the incidence cardiovascular disease, varies between ethnic groups [1-4] and is influenced by genetic, environmental, social and cultural factors.[5-10] This has been well described for ethnic minority groups of Black African or South Asian descent living in Western countries [11-17], but for other large ethnic minority groups living in West-European countries, such as Turks and Moroccans, knowledge on these topics is limited.
Studies have shown that populations in European Mediterranean countries (Italy, Portugal, France, Yugoslavia, Greece and Spain) have a lower mortality rate from ischaemic heart disease compared to northern European countries.[18,19] Although Turkey and Morocco are also Mediterranean, a Turkish study reported that coronary death rates in Turkey can be ranked among the highest in Europe. [20] It is, however, unknown whether cardiovascular risk factors and the cardiovascular death rates are influenced by migration of Turks and Moroccans to western European countries. Given the increasing number of elderly amongst the Turkish and Moroccan immigrant populations, it is important to have some prognosis concerning cardiovascular morbidity and mortality in these groups in the near future. To gain insight on this topic we performed a systematic review to establish the prevalence of diabetes and other cardiovascular risk factors in Turkish and Moroccan immigrants in western European countries, and to determine what is known about cardiovascular mortality in these groups.

Methods

Study selection
Analogue searches were made in Medline (1985-2003) and Embase (1985-2003) using the terms shown in Box 1. We included studies that reported prevalence data on diabetes and other cardiovascular risk factors (including hypertension, lipids, smoking, obesity), and cardiovascular morbidity and mortality on samples of Turkish or Moroccan adults living in a North-West European country. Studies based on children and published studies before 1985 were excluded. In addition we checked the reference lists from selected publications to collect missed publications. We also used the references of a recent report by the Dutch National Institute for Public Health and the Environment [21], which investigated Dutch reports on cardiovascular risk factors in ethnic minorities in the Netherlands.
The selection was independently performed by two persons (PU & DM). In all cases of disagreement consensus was reached.

Study selection and data extraction
The following methodological characteristics of the cross-sectional studies with prevalence data on diabetes and cardiovascular risk factors were evaluated: study population, sampling method (random versus non-random), sample size by ethnic group, age of the studied groups, response rate, and the methods used to identify patients and measuring cardiovascular risk factors and mortality.

Results

The searches on Medline and Embase yielded 354 papers. From these papers 20 were selected based on title or abstract; there was disagreement on 1 of the 20 papers (95% agreement). Ten of these studies had original prevalence data and were included in this review. Checking the references lists yielded an additional 8 studies. Thus, finally 18 publications were reviewed. Of these 18 reports, 16 had data on Turkish and 10 on Moroccan individuals.
Of the 18 selected studies, 12 were cross-sectional studies with prevalence data on diabetes and cardiovascular risk factors, 4 studies had data on incidence of cardiovascular disease, and 2 on cardiovascular mortality. Eleven studies were based in community settings and 5 in general practice or

hospital. Most studies were specifically designed to focus on the prevalence of diabetes or other cardiovascular risk factors compared with the general or indigenous population. One study was designed to describe the use of a sentinel practice network, and two studies to describe differences in diabetes-related complications between various groups. One study did not compare prevalence data [30], and one study used data on the indigenous population from other studies as a comparison. [14]
Table 1 [22-36] shows that all studies except one [30] were conducted in the Netherlands. Methods to establish the Turkish and Moroccan descent included: name analysis [24, 28, 32], country of birth [30], registered as having the Moroccan nationality [22], data from the municipal register (country of birth and parents' country of birth) [25, 27, 31 - 36], and as reported by the GP. [29] The method was not mentioned in one study. [26] The age range varied widely between studies. Response rates ranged from [43 27] to 83%. [24] In 6 studies the response rates were not mentioned, probably because data were extracted from an existing database.
Smoking behaviour was assessed by means of self-reports. Prevalence of hyperglycaemia was determined by self-reports in 3 studies [22, 25, 27], or blood samples. [30, 35] The presence of hypertension was assessed by self-reports in 3 studies [22, 24, 27], blood pressure measurement [22, 24], or medical record. [24] The lipid profile measurement was performed by taking blood samples. [28, 29, 30] The presence of coronary heart disease was assessed by self-reports [25, 27], from medical records [34], or based on ECG registrations. [30]

Prevalence of diabetes
Five studies had data on the prevalence of diabetes (Table 2). In four studies with an indigenous comparison group, the prevalence of diabetes was 1.3 to 2.8 times higher in Turks and 1.9 to 3.2 times higher in Moroccans. The available data did not show a clear gender difference. In the only German study [30] the age standardized diabetes prevalence rate in Turks was 7.8% in men, and 9.9% in women, which was comparable with the prevalence of diabetes in Turks in Dutch studies, but 30% lower than the prevalence in German women (compared to Turkish women).

Prevalence of cardiovascular risk factors
Hypertension
Five studies had data on the prevalence of hypertension in Turks and two studies in Moroccans (Table 2). The prevalence of hypertension in these

studies varied widely. Three studies, using self-reported data, revealed no clear differences in the prevalence of hypertension between the Turkish, Moroccan and the indigenous sample. [22, 24] One study with a small sample of Turkish males (using data from the medical record) showed a higher prevalence of hypertension in Turks, although the difference was not statistically significant. [29] Two studies, with blood pressure measurements, did not directly compare the prevalence of hypertension with the indigenous population, but one of these studies compared blood pressure levels between Turks and Dutch, and showed a higher mean blood pressure level in both Turkish men and women aged over 30 years. [28]

Plasma lipids

One Dutch study showed lower total cholesterols levels in Turkish persons than in the native Dutch population (mean total cholesterol in Turks 4.8 mmol/l versus 5.4 in Dutch) [28], whereas a German study showed comparable total cholesterol levels in Turks and Germans (mean level 6.1 mmol/l). [30] HDL-cholesterol levels in Turkish males were lower in both the Dutch and German studies compared to the indigenous population (mean HDL-cholesterol in Turkish and Dutch males 0.96 mmol/l versus 1.20 mmol/l in Dutch males [28], and 0.93 mmol/l in Turkish Germans [30]). One study compared total cholesterol levels in a small group of Turkish (n=50) and Moroccan (n=25) females with Dutch indigenous females.
The mean cholesterol level was 5.0 mmol/l in Turkish, 5.3 mmol/l in Moroccan versus 5.5 mmol/l in Dutch females ($p<0.05$ between the Turkish and Dutch females). In Turkish and Moroccan females 8% had a cholesterol level > 6.5 mmol/l versus 13% in Dutch females (NS). [23]

Smoking

The prevalence of smoking was reported in 7 studies (Table 2). The differences in the prevalence of smoking between men and women varied considerably between the ethnic groups. All studies show a higher prevalence of smoking in Turkish men (range 42% to 73%), compared to Dutch men (range 39% to 50%). [22, 27 - 29, 31, 32] The lowest prevalence was found in Moroccan women (range 1% to 3%). [22, 27, 31] The prevalence in other women ranged from 13% to 34% in Turkish [22, 27, 28, 30 - 32] and from 31% to 48% in Dutch women. [22, 27, 28, 31, 32]

Obesity

The prevalence of overweight and obesity was reported in 5 studies (Table 2). In three of these reports the prevalence was compared with the indigenous population. Overweight or obesity was more prevalent in Turks [24, 25, 29], equally or more prevalent in Turkish women than in Turkish men. Differences between Moroccans and the indigenous population (two reports) were less clear. [25, 29]

Cardiovascular disease and mortality

Table 3 shows the results of 6 studies with data on the prevalence of cardiovascular disease: 4 studies in the general population [25, 27, 30, 34], and of 2 studies in type 2 diabetes patients admitted to hospital. [26, 36] The prevalence of cardiovascular disease was comparable in Turkish immigrants and the Dutch or German indigenous population. [25, 27, 30, 34] In Turkish diabetes patients ischaemic heart disease was found less often than in Dutch diabetes patients (9% versus 23%; $p<0.02$). [26] Compared to the indigenous population all available data show lower prevalence of cardiovascular disease in Moroccans. [25, 27, 34] Three studies compared cardiovascular mortality in Turks [37, 39] or Moroccans [38] with the indigenous population in the Netherlands, Germany and France.

Cardiovascular mortality as a percentage of the overall mortality was higher in Turkish immigrants in the Netherlands, in particular in Turkish females. [37] Such a higher percentage in cardiovascular mortality in females was also found in the German. [39] However, age-adjusted cardiovascular disease mortality rates in Germany were 43% lower in Turkish men than in German men (period between 1981 – 1994), and in Turkish women the cardiovascular mortality rates were 21% lower than in German women (period between 1993 – 1994). [39] The French study showed that Moroccan men had a lower mortality risk than men in the general population, but that Moroccan women had a higher mortality risk compared to the French general population. [38]

Two reports had data on stroke in Turks or Moroccans and the indigenous population [27, 38], and no clear differences between the groups were observed.

Discussion

The reviewed studies proved only a limited number of valid estimates of cardiovascular risk in Turkish or Moroccan immigrants versus the indigenous population. Available evidence shows that diabetes mellitus is more prevalent in both Turkish and Moroccan immigrants, smoking more is prevalent in Turkish males, and less prevalent in Moroccan females. In addition, HDL-cholesterol seems lower in Turkish men, and the prevalence of obesity is higher in Turkish men and women. Data on cardiovascular death rates are rare: in one study, the rate was strikingly lower in Turkish German immigrants compared to the German population.

Study quality
To assess study quality, important indicators of quality are the methods to measure cardiovascular risk, the response rate and sample size. In most studies measurements were based on self-reports and are, therefore, inadequate for assessing the "true" prevalence of hyperglycaemia/ diabetes, hypertension and hypercholesterolaemia and the presence of cardiovascular disease. The response rate was often low (less than 70%) in 5 studies, and not even mentioned in 5 other studies. Therefore response could have biased the results. In addition the study sample size in about 50% of the studies was less than 250 persons and, due to the population structure of immigrant groups, the proportion of elderly immigrants in all study samples was very small. Because risk factors are related to aging [40, 41], larger numbers of elderly immigrants are needed in a study to allow valid conclusions to be drawn.

Prevalence of diabetes and other cardiovascular risk factors
Type 2 diabetes is more frequent among Turkish and Moroccan immigrants than among Europeans. A higher frequency of type 2 diabetes amongst immigrants was also reported in many other studies. [8, 10, 42, 43] This phenomenon can be explained by genetic susceptibility, which is unmasked by environmental factors such as nutritional factors, obesity, physical inactivity and stress. [10, 43] Obesity is strongly associated with type 2 diabetes [44, 45], and the high prevalence of diabetes may be caused by a high prevalence of obesity in Turks and Moroccans. [46, 47]
The prevalence of smoking in Turkish male immigrants is comparable to the reported prevalence among Turks in Turkey (58% versus 51%) and higher than in the indigenous population (44%). The prevalence of smoking in

Turkish female immigrants is, however, higher than reported among Turkish females in Turkey (24% versus 11%). [40] This might be explained by an unfavourable influence of Westernisation on smoking behaviour among Turkish women, but in particular not in Moroccan female immigrants, since smoking is rare in the latter group. However, this difference might also be due to selection of the migrant population.
For total cholesterol and hypertension the picture remains unclear. Studies including measurements in large samples in Turkish or Moroccan immigrants are rare, and produce contrasting results.

Cardiovascular disease and mortality
In one of the few available studies, the cardiovascular mortality rate in Turkish immigrants in Germany (both men and women) was lower than the rate in the German indigenous population, particular in men, while the proportion of all-cause mortality attributable to cardiovascular disease was somewhat higher in Turkish men, and evidently higher in Turkish females. The combination of a higher contribution of cardiovascular disease to mortality in Turkish immigrants and lower cardiovascular death rates can only be explained by an even lower overall mortality in Turks, particular in Turkish women, compared to the indigenous population. Low overall mortality rates in immigrants are found in Germany [48], and were also reported among Turkish and Moroccan immigrants in the Netherlands [49, 50], in Sweden [51] and North African immigrants in France. [52] Lower mortality rates among immigrants are often explained by "the healthy migrant effect", implying that migrants represent a relatively healthy selection from a population. The fact that in a French study, compared to French women, North African women had a higher risk of dying from a cardiovascular disease and a similar overall mortality risk is probably partly attributable by a lack of such a positive selection, since the reason for migration was not related to work. [52]
Other explanations for low overall mortality rates in migrants are also possible.
Firstly, the studied populations are not fixed, but are largely extended by newcomers. [53] Data on the Turkish population in Germany show a 27% increase of the Turkish population between 1981 and 1994, but the same data show that a large number (over 40%) of Turkish immigrants aged 35 years and older left Germany in this same period. [39] Thus low mortality rates in immigrants could be the result of loss to follow-up. Secondly, if data on re-

migration are not given to the national registration authorities, resulting in overestimations of the immigration population (i.e. the denominator of the mortality rate) resulting in lower mortality rates. Indeed, by trying to adjust for such an overestimation of the immigrant population, the mortality rates in immigrant Turks in Sweden increased. [51]

We conclude that in other minority groups in Western societies, type 2 diabetes in Turkish and Moroccan immigrants is more prevalent than among the indigenous population, smoking is more prevalent in Turkish men and rare in Moroccan women. The available data on the prevalence of the other cardiovascular risk factors (hypertension and lipid profile) and cardiovascular disease in these groups are, however, insufficient to allow definite conclusions. More studies using objective screening methods (such as ECG and blood samples), and well-standardized criteria for the diagnosis of cardiovascular disease are needed. The finding of lower cardiovascular mortality rates in a single study in Turkish men requires confirmation from future studies.

Table 1 Characteristics of 14 studies from the Netherlands (NL) and Germany (D) with data on the prevalence of diabetes, cardiovascular risk factors and cardiovascular disease in Turkish (T) and Moroccan (M) immigrants and the indigenous (I) population.

First author and publication year	study population	sampling method	age range (years)	sample size by ethnic group	response rate (%)	available data	method of data collection
Bleeker [22] (1998)	Amsterdam, Rotterdam, Utrecht, Gouda (NL)	random	12-69	T 1269 M 1266 I 1221	58	diabetes, hypertension smoking	patient interview
Brussaard [23] 1999	Amsterdam, Utrecht, Twente (NL)	random	24-58	T 50 M 25 I 79	15	cholesterol	actively measured
CBS [24] (1991)	general population (NL)	random	all ages	T 5306 I 15860	83	hypertension, obesity	patient interview
Dijkshoorn[25] (2002)	population Amsterdam (NL)	random	35-74	T 774 M 686 I 903	71	diabetes, obesity, smoking	patient interview
Dijkstra[26] (2002)	diabetes patients admitted to hospital (NL)	no sampling	not given	T 59 I 185	NR[a]	ischaemic heart disease	actively measured
Health survey the Hague [27] (2001)	population the Hague (NL)	random	16-75	T 287 M 147 I 867	43	diabetes, hypertension, smoking	patient interview
Köycü [28] (1997)	population Amsterdam (NL)	random	18-64	T 149 I 881	66 smoking	hypertension, obesity,	actively measured
Middelkoop [29] (1995)	14 general practices (NL)	no sampling (women not studied)	40-55	T 44 M 40 I 1961	NR[a]	hypertension, obesity, smoking	derived from medical records

First author and publication year	study population	sampling method	age range (years)	sample size by ethnic group	response rate (%)	available data	method of data collection
Porsch [30] (1999)	25 general practices[b] (D)	no sampling	>35	T 480 I not studied	NR[b]	hypertension, obesity, smoking	actively measured
Reijneveld [31] (1998)	population Amsterdam (NL)	random	16-64	T 118 M 176 I 2448	61	smoking	patient interview
Swinkels [32] (1992)	general population (NL)[c]	random	>16	T 3371 I 9634	83	smoking	patient interview
Uniken-Venema (1989)[33]	population Rotterdam (NL)	random	16-69	T 248 I 241	67	diabetes, hypertension	patient interview
Weide [34] (1998)	103 general practices (NL)	no sampling	18-65	T 1165 M 853 I 1471	NR[a]	cardiovascular disease	derived from medical records
Weijers [35] (1998)	population of one borough in Amsterdam (NL)	no sampling	28-84	T 1728 M 2021 I 8249	NR[a]	diabetes	actively measured
Weijers [36] (1997)	diabetes patients admitted to hospital (NL)	no	20-90	M 4113 I 603	NR[a]	cardiovascular disease measured	sampling actively

NR = not reported, a) all identified patients were included, no estimation was made of the proportion of non-identified patients, b) non random: patients voluntarily underwent a health check-up, and were not compared with the indigenous population, c) data derived from the CBS study, d) including other North African groups .

Table 2. Findings from 14 studies with data on the age and gender adjusted prevalence of diabetes, hypertension, smoking and overweight/ obesity in Turkish (T) and Moroccan (M) immigrants and indigenous (I) inhabitants in the Netherlands and Germany.

first author collection	method of data	Turks men	Turks women	Turks all	Moroccans men	Moroccans women	Moroccans all	Indigenous men	Indigenous women	Indigenous all	P-value for difference Turks/ Moroccan versus indigenous population
Prevalence of diabetes											
Bleeker [22]	self-reported,	-	-	5[a]	5	5	5	-	-	0,5[a]	NR
Dijkshoorn [25]	self-reported	-	-	3.8	-	-	3.8	-	-	2.0	NR
The Hague [27]	self-reported	-	-	4	-	-	7	-	-	3	NR
Porsch [30]	actively screened: fasting plasma (criteria not given),	7.8	9.9	-	not compared to the indigenous population						
Weijers [35]	actively screened whole blood glucose (WHO criteria '85),	12.3	9.9	10.9	11.9	14.2	12.4	4.0	3.6	3.8	p<0.001
Prevalence of hypertension											
Bleeker [22]	self-reported	-	-	41	7	98	-	-	-	5[a]	NR
CBS [24]	self-reported	3	3	3	(not studied)			3	3	3	NR
The Hague [27]	self-reported	-	-	10	-	-	8	-	-	11	NR
Köycü [28]	actively screened	15	22	17	not studied			NR			NR
Middelkoop [29]	data derived from medical records (hypertension defined as DBP >95)	17	-	-	-	-	-	9	-	-	not statistically significant
Porch [30]	actively screened, hypertension defined as SBP >160 or DBP >95 mm	12.2	10.3	-	not studied			not studied			

Prevalence of smoking											
Bleeker [22]	self-reported	56	21	40	34	2	17	49	38	43[a]	NR
Dijkshoorn [25]	self-reported	-	-	45	-	-	19	-	-	42	NR
The Haque [27]	self-reported	49	30	-	27	3	-	39	31	31	NR
Köycü [28]	self-reported	60	34	52	not studied			50	48	49	NR
Middelkoop [29]	data derived medical records	73	-	-	54	-	-	42	-	-	T-I: $p < 0.05$
Porsch [30]	self-reported	42	13	-	not studied			not studied			
Reijneveld [31]	self-reported	69	28	49	23	1	14	44	47	45	NR
Swinkels [32]	self-reported	58	22	42	not studied			44	37	41	NR
Prevalence of overweight or obesity											
CBS [24]	self-reported criterion obesity: BMI >30	10	20	-	not studied			4	5	-	NR
Dijkshoorn [25]	self-reported criterion overweight: BMI >25	-	-	54	-	-	36	-	-	30	NR
Köycü [28]	actively screened, criterion not defined (increased BMI)	60	60	-	not studied			not given			not given
Middelkoop [29]	derived from the medical record, criterion obesity: BMI >30	30	-	-	17	-	-	13	-	-	T-I: $p < 0.05$
Porsch [30]	actively screened, criterion obesity: BMI >30	21	48	-	not studied			not studied			

a: data on the Turkish and Dutch comparison groups originate from the CBS study

NR = not reported, DBP = diastolic blood pressure, SBP = systolic blood pressure, T-I = difference between Turkish and Indigenous population

Table 3. Data from the nine studies with data on the prevalence of, cardiovascular disease and cardiovascular mortality in Turkish and Moroccan immigrants and indigenous inhabitants in the Netherlands, Germany and France

		Turks	Moroccans	Indigenous population	p-value	Study
Cardiovascular disease **(general population)**						
Self reported (%)		28	17	21	NR	Dijkshoorn [25]
Self reported heart disease (%)		2	1	3	NR	The Hague [27]
Self reported stroke (%)		1	0	1	NR	The Hague [27]
Diagnosed by GP (OR[a] (95% CI))		0.85 (0.55-1.32)	0.46 (0.25-0.82)	reference	-	Weide [34]
Diagnosed (ECG) (men, women) (%)		10.4, 6.5		10.5, 7.2	NR	Porsch[b] [30]
Cardiovascular disease **(in diabetes patients)**						
Diagnosed (ECG) (%)		-	1.1	9.0	p<0.001	Weijers [36]
		9	-	29	p<0.02	Dijkstra [26]
	(age-adjusted odds ratio)	0.19 (0.06-0.65)		reference		Dijkstra [26]
Mortality from cardiovascular disease in the Netherlands, Germany and France						
Cardiovascular mortality **(percentage of all cause mortality)**						
Netherlands	25-44 years (m, f)	28, 19		22, 16	NR	Mackenbach [37]
	45-64 years (m, f)	48, 40		44, 28	NR	
Germany	25-64 years (m, f)	34, 27				
France	25 years and above					Khlat 38
	disease of the circulation system (m, f)		18, 26			
	of which: ischaemic heart disease (m, f)		7, 5			
	cerbrovascular disease (m, f)		4, 8			
	other vascular disease (m, f)		8, 14			
Cardiovascular Mortality **(death rates per 100,000)**						
Germany	25-44 years (m, f)	76, 41		107,44		Razum [39]
	45-64 years (m, f)	789, 498		1338, 747		
Mortality Risk **(relative risk)**[1)]						
France	Disease of the circulatory system (m, f)		0.71, 1.13	reference	p<0.01, p<0.01	Khlat [38]
	of which: ischaemic heart disease (m, f)		0.65, 0.93	reference	p<0.01, NS	
	cerebrovascular disease (m, f)		0.60, 0.98	reference	p<0.01, NS	
	other vascular disease (m, f)		0.83, 1.35	reference	p<0.01, p<0.01	

a: compared to the indigenous population, b: data on the German comparison group originate from a different study

m, f = male, female NR = not reported, NS not statistically significant

Box 1
Ethnic groups

1. Turks OR Turkish OR "Moroccan*" OR Arabs OR Arab OR "North African*"

North West European
2. Netherlands OR Dutch OR Belgium OR Belgian OR "German*" OR Denmark OR Danish OR UK OR English OR France OR "French*" OR Sweden OR Swedish OR Norway OR Norwegian OR Finland OR "Finn*" OR "North Europ*"
3. #1 AND #2

Diabetes mellitus type 2
4. "Diabetes mellitus", "Non-insulin-dependent" [MESH] OR NIDDM OR "Noninsulin dependent" OR "Non insulin dependent" OR "Non insulindependent" OR "Non-insulin-dependent" OR "Non-insulin dependent" OR "Type II diabetes" OR "Type 2 diabetes" OR "Diabetes type 2" OR "Diabetes type II"

Epidemiology
5. "Vital Statistics"[Mesh] OR Mortality OR Prevalence OR Incidence OR Morbidity

Risk factors
6. Smoking OR Smoking [MESH] OR Cholesterol OR Lipids [MESH] OR "Lipid*" OR "Cardiovascular risk factor*" OR "Risk factors"[MESH] OR Hypertension [MESH] OR Hypertension OR "Blood pressure"

Cardiovascular disease
7. "Cardiovascular Diseases"[MESH] OR "Vascular disease" OR "Coronary artery disease" OR "Coronary disease" OR "Coronary heart disease" OR "Myocardial infarction" OR Cardiovascular OR "Cerebrovascular accident" [Mesh] OR Stroke OR "CVA" OR "Transient ischemic attack" OR "TIA" OR "Cerebral hemorrhage" OR "Carotid stenosis"

8. #4 OR #5 OR #6 OR #7
9. #3 AND #8
10. (Limits: Adult: 19+ years; text word)

References

1. Khattar RS, JD Swales, Senior R, Lahiri A. Racial variation in cardiovascular morbidity and mortality in essential hypertension. Heart 2000; 83: 267-71.
2. Chaturvedi N, Jarrett J, Morrish N, Keen H, Fuller JH. Differences in mortality and morbidity in African Caribbean and European people with non-insulin-dependent diabetes mellitus: result of 20-year follow-up of a London cohort of a multinational study. BMJ 1996; 313: 848-52.
3. Anonymous (U.K. Prospective Diabetes Study Group). The incidence of myocardial infarction in white, South Asian, and Afro-Caribbean patients with type 2 diabetes (U.K. Prospective Diabetes Study 32). Diabetes Care 1998; 21: 1271-7.
4. Balarajan R. Ethnicity and variations in mortality from coronary heart disease. Health Trends 1996; 28: 45-51.
5. Joffe B, Zimmet P. The thrifty genotype in type 2 diabetes: an unfinished symphony moving to its finale? Endocrine 1998; 9: 139-41.
6. Bhopal R, Unwin N, White M, et al. Heterogeneity of coronary heart disease risk factors in Indian, Pakistani, Bangladeshi, and European origin populations: cross-sectional study. BMJ 1999; 319: 215-20.
7. Sundquist J, Winkleby M. Country of birth, acculturation status and abdominal obesity in a national sample of Mexican-American women and men. Int J Epidemiol 2000; 29: 470-7.
8. Zimmet P. Type 2 (non-insulin-dependent) diabetes – an epidemiological overview. Diabetologica 1982; 22: 399-411.
9. Cappucio FP, Cook DG, Atkinson RW, Strazullo P. Prevalence, detection, and management of cardiovascular risk factors in different ethnic groups in South London. Heart 1997; 78: 555-63.
10. Abate N, Chandalia M. The impact of ethnicity on type 2 diabetes. J Diabetes Complicat 2003; 17: 39-58.
11. Magnus MH. Cardiovascular health among African-Americans: a review of the health status, risk reduction, and intervention strategies. Am J Health Promot 1991; 5: 282-90.
12. Cappuccio FP. Ethnicity and cardiovascular risk: variations in people of African ancestry and South Asian origin. J Hum Hypertens 1997; 11:571-6.
13. Burden AC. Blood pressure control and cardiovascular risk in patients of Indo-Asian and African-Caribbean descent. Int J Clin Pract 1998; 52 (6): 388-94.
14. Brancati FL, Kao WH, Folsom AR, Watson RL, Szklo M. Incident type 2 diabetes mellitus in African-American and white adults: the Atherosclerosis Risk in Communities Study. JAMA 2000; 283 :2253-9.
15. Burden AC. Diabetes in Indo-Asian people. Practitioner 2001; 245: 445-51.

16. Cooper RS, Rotimi CN, Kaufman JS, Owoaje EE, Fraser H, Forrester T, Wilks R, Riste LK, Cruickshank JK. Prevalence of NIDDM among populations of the African diaspora. Diabetes Care 1997; 20: 343-8.
17. Agyemang C, Bhopal RS. Is the blood pressure of South Asian adults in the UK higher or lower than that in European white adults? A review of cross-sectional data. J Human Hypertens 2002; 16: 739-51.
18. Menotti A, Blackburn H, Kromhout D, Nissinen A, Adachi H, Lanti M. Cardiovascular risk factors as determinants of 25-year all-cause mortality in the seven countries study. Eur J Epidemiol 2001; 17: 337-46.
19. Kunst AE, Groenhof F, Mackenbach JP, and the EU Working Group on Socio-economic Inequalities in Health. Occupational class and cause-specific mortality in middle aged men in 11 European countries: comparison of population-based studies. BMJ 1998; 316: 1636-42.
20. Onat A. Risk factors and cardiovascular disease in Turkey. Atherosclerosis 2001; 156: 1-10.
21. Leest LATM, Dis SJ, Verschuren WMM. Hart- en vaatziekten bij allochtonen in Nederland (Cardiovascular disease in non-Western immigrants in the Netherlands). Bilthoven: RIVM rapport 261858006/2002, 2002.
22. Bleeker JK, Reelick NF. De gezondheid van Marokkanen in de randstad (Health in Moroccans living in the urban agglomeration of Western Holland). Rotterdam Area Health Authority, community interventions sector Health Promotion 1998.
23. Brussaard JH Brants HAM, Erp-Baart van AJM, Hulshof KFAM, Kistenmaker C. De voeding bij allochtone bevolkingsgroepen. Deel 3. Voedingsconsumptie en voedingstoestand bij Marokkaanse, Turkse en Nederlandse 8-jarigen en hun moeders TNO-rapport V99.855, Zeist 1999.
24. Centraal Bureau voor de Statistiek en Koninklijk Instituut voor de Tropen. Gezondheidsenquête Turkse ingezetenen in Nederland, 1989/90. Den Haag 1991.
25. Dijkshoorn H. Amsterdamse Gezondheidsmonitor (Amsterdam periodic health interview survey). Amsterdam Area Health Authority, cluster EDG 2002.
26. Dijkstra S, Klok M, Hoogenhuyze van D, Sauerwein HP, Berghout A. Ischaemic heart disease in Turkish migrants with type 2 diabetes mellitus in the Netherlands: wait for the next generation? Ned J Med 2002; 60: 21-4.
27. Stadsenquête Den Haag 2001 (City health interview survey the Hague 2001) Bestuursdienst Gemeente Den Haag, Municipality, the Hague 2001.
28. Köycü B, Kara T, Çamlidag O, Aydinli R, Verschuren WMM, Motfrans van GA. Risicofactoren voor hart- en vaatziekten bij Turken in Amsterdam en in Ankara (Risk factors for cardiovascular disease in Turks in Amsterdam and Ankara). Ned Tijdschr Geneeskd 1997; 141: 881-8.

29. Middelkoop BJC, Bohnen AM, Duisterhout JS, Hoes AW, Pleumeekers HJCM, Prins A. Rotterdam general practitioners report (ROHAPRO): a computerised network of general practices in Rotterdam, The Netherlands. J Epidemiol Comm Health 1995; 49:231-3.
30. Porsch-Oezcueruemez M, Bilgin Y, Wollny M, et al. Prevalence of risk factors of coronary heart disease in Turks living in Germany: the Giessen study. Atherosclerosis 1999; 144: 185-98.
31. Reijneveld SA. Reported health, lifestyles, and use of health care of first-generation immigrants in the Netherlands: do socio-economic factors explain their adverse position? J Epidemiol Community Health 1998; 52: 298-304.
32. Swinkels H. Smoking and drinking behaviour of Turkish inhabitants of the Netherlands, 1989/ 1990. Maandbericht gezondheid (CBS) 1992; 7: 5-17.
33. Uniken Venema P. Toen ik hier kwam was ik kerngezond; de gezondheid van Turkse in Nederland (I was healthy when I came here; the health situation of Turks in the Netherlands). Phd thesis, Erasmus University Rotterdam, 1989.
34. Weide MG, Foets M. Migranten in de huisartspraktijk: andere klachten en diagnosen dan Nederlanders. (Migrants in general practice: different from the Dutch in complaints and diagnosis). Ned Tijdschr Geneeskd 1998; 142: 2105-9.
35. 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.
36. Weijers RNM, Goldschmidt HMJ, Silberbusch J. Vascular complications in relation to ethnicity in non-insulin-dependent diabetes mellitus. Eur J Clin Invest 1997; 27: 182-8.
37. Mackenbach JP. Ziekte en sterfte onder Turken in Nederland. (Morbidity and mortality among Turks in the Netherlands). Ned Tijdschr Geneeskd 1992; 136: 1044 - 9.
38. Khlat M. Courbage Y. Mortality and causes of death of Moroccans in France, 1979-91. Population: an English Selection. Population 1996; 8: 59-94.
39. Razum O, Zeeb H, Gerhardus A. Cardiovascular mortality of Turkish nationals residing in West Germany. Ann Epidemiol 1998; 8: 334-41.
40. Satman I, Yilmaz T, Segül A, et al. Population-based study of diabetes and risk characteristics in Turkey. Diabetes Care 2002; 25: 1551-6.
41. Nanas S, Pan WH, Stamler J, et al. The role of relative weight in the positive association between age and serum cholesterol in men and women. J Chronic Dis 1987; 40: 887-92.
42. Riste L, Khan F, Cruickshank K. High prevalence of type 2 diabetes in all ethnic groups, including Europeans, in a British inner city. Diabetes Care 2001; 24: 1377-83.
43. Hara H, Egusa G, Yamakido M, Kawate R. The high prevalence of diabetes mellitus and hyperinsulinemia among the Japanese-Americans living in Hawaii and Los Angeles. Diabetes Res Clin Pract 1994; 24 suppl: S37-42.
44. Colditz GA, Willett WC, Rotnitzky A, Manson JE. Weight gain as a risk factor for clinical diabetes mellitus in women. Ann Intern Med 1995; 122: 481-6.

45. Ford ES, Williamson DF, Liu S. Weight change and diabetes incidence: findings from a national cohort of US adults. Am J Epidemiol 1997; 146: 214-22.
46. Erem C, Yildiz R, Kavgaci H, Karahan C, Deger O, Çan G, Telatar M. Prevalence of diabetes, obesity and hypertension in a Turkish population (Trabzon city). Diabetes Res Clin Pract 2001; 54: 203-8.
47. Kadiri, El Qazbani. Le diabete non insulino-dependant à safi. Dossiers population et Santé no 2. Royaume du Maroc Ministere de la santé publique 1994.
48. Razum O, Zeeb H, Akgün S, Yilmaz S. Low overall mortality of Turkish residents in Germany persists and extends into a second generation: merely a healthy migrant effect? Tropical Med Int Health 1998; 3: 279-303.
49. Uitenbroek DG, Verhoeff AP. Life expectancy and mortality differences between migrant groups living in Amsterdam, the Netherlands. Soc Sci Med 2002; 54: 1379-88.
50. Middelkoop BJC, Koolwijk van AFM. Sterfte naar etniciteit en sociaal-economische positie: gunstige cijfers voor de Hagenaars van mediterrane afkomst. (Mortality according to ethnicity and social economic position: favourable data in Hague inhabitants of Mediterranean descent). Epidemiol Bull 2002; 37: 15-24.
51. Ringbäck Weitoft G, Gullberg A, Hjern A, Rosén M. Mortality statistics in immigrant research: method for adjusting underestimation of mortality. Int J Epidemiol 1999; 28: 756-63.
52. Darmon N, Khlat. An overview of the health status in France, in relation to their dietary practices. Public Health Nutr 2001; 4: 163-72.
53. Centraal Bureau voor de Statistiek en Koninklijk instituut voor de Tropen. Bevolkingstrends, 1e kwartaal 2003 (Statistics Netherlands. Population trends). Voorburg: CBS, 2003.

Cardiovascular risk factors in Turkish immigrants with type 2 diabetes mellitus: comparison with Dutch patients

PJM Uitewaal, AN Goudswaard., LJ Ubink-Veltmaat, MA Bruijnzeels, AW Hoes, S Thomas.

Submitted

Abstract

Background. Based on recent epidemiological studies the need for a similar approach towards management of cardiovascular risk factors in type 2 diabetics with different ethnic background can be questioned. We compared the prevalence of cardiovascular risk factors and 10-year absolute risk for coronary heart disease between Turkish and Dutch type 2 diabetes patients.
Methods. A cross-sectional study was performed using databases from three Dutch studies on type 2 diabetes, comparing 147 Turkish to 294 Dutch diabetes patients, matched for age and gender. Main outcome measures were: total (t-) cholesterol, high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol, triglyceride, blood pressure, and smoking. The 10-year absolute risk for a coronary event was calculated by means of the Framingham risk equation.
Results. In Turkish diabetics total-cholesterol was lower than in Dutch patients (5.4 versus 5.9 mmol/l; $p<0.001$), in Turkish males HDL-cholesterol was lower than in Dutch male patients (0.94 versus 1.08 mmol/l; $p=0.04$). The total/HDL-cholesterol ratio in Turkish and Dutch diabetics was equal (5.4 versus 5.4). Of the Turkish men 29% smoked versus 20% of the Dutch men, and less Turkish than Dutch females smoked. (9% versus 23%; $p<0.01$). The 10-year absolute risk for a coronary event was 24% in both Turkish and Dutch male patients; the risk in Turkish and Dutch females was also comparable 13% versus 15%.

Conclusion. The absolute risk for coronary events in Turkish type 2 diabetes patients is similar to the risk in Dutch diabetes patients, although important differences in the risk profile exist, in particular, the lipid profile and smoking habits differ.

Introduction

In West European countries and the USA type 2 diabetes is more prevalent in immigrants than in the native population. [1,2] Mortality from coronary heart disease (CHD) in people with type 2 diabetes mellitus is higher than in the general population, thus an aggressive approach towards management of cardiovascular risk factors to reduce excess mortality is advocated.[3] However, the association between diabetes and CHD varies across ethnic groups or populations. The recent UKPDS study showed that Afro-Caribbean subjects with diabetes had a lower risk for myocardial infarction than whites or South Asians.[4] Some of this variation can be explained by differences in plasma lipid levels between ethnical groups.[5] Knowledge of the prevalence of the major risk factors for coronary disease in the various ethnic groups can guide cardiovascular risk management in ethnic groups, tailoring health programmes.
In he Netherlands, the Turkish population has grown to be the largest minority group and, although available evidence is relatively scarce, several studies showed that the prevalence of diabetes is 2 to 4 times higher among Turkish immigrants than among the Dutch population.[6,7] With the aging of the Turkish population in Western Europe, more insight in the cardiovascular risk profile is needed to support treatment decisions in Turkish diabetics.
In this study we compare the prevalence of cardiovascular risk factors in Turkish and Dutch type 2 diabetes patients. In addition, we compared the 10-year risk for coronary heart disease (CHD) in both groups.

Patients and Methods

We used data from three existing studies. Data from Turkish patients came from studies in Rotterdam and Zwolle, while data from a study in Utrecht provided reference data for Dutch diabetics. Inclusion criteria for all studies

were similar: type 2 diabetes patients, treated exclusively by their GP. Only patients with available dataset on smoking, blood pressure and blood lipids were included in the present study.
In nine districts of the inner city of Rotterdam, characterised by a high percentage of Turkish migrants (estimated mean 13%), 46 GPs working in 23 practices were approached, of which 31 GPs (16 practices) agreed to participate. As described in detail [8], Turkish patients were selected, and approached by a research assistant to participate in a diabetes education programme. Of the 180 eligible patients, 148 patients could be approached. Of 107 patients who signed informed consent, 102 had a complete dataset.
In the Zwolle Outpatient Diabetes project Integrating Available Care (ZODIAC)-study all the 61 approached GPs in the area participated. Data of all listed patients, registered as type 2 diabetes patient and treated by the GP exclusively, were collected. Terminally ill patients, or those mentally not able to participate in the project were excluded (6%). In this project diabetes specialist nurses supported the GPs. From the database of all included patients 55 Turkish patients were selected by surname, 4 patients were excluded and 1 patient refused to participate. Of the remaining 50 patients, 45 had a complete dataset.
The Dutch reference group was selected from general practices in the Utrecht region. Fifty-two of the 110 practices that were invited, were willing to participate.[9] From all patients listed as type 2 diabetes patients and treated by the GP exclusively (according to the GP), data were obtained from medical records, and in case of missing data patients were actively invited to the general practice for completing the dataset. Of the total of 1636 patients 1285 had a complete dataset.
For each Turkish patient two Dutch type 2 diabetes patients were included, matched for age (per year category) and gender.

Measurements
Measurement of total cholesterol, HDL-cholesterol, triglyceride, HbA1c and creatinine was performed in each patient by one of the three regional laboratories. LDL-cholesterol was calculated using the Friedewald formula [10] (only for patients with triglyceride < 4.5). Data on blood pressure, height and weight, smoking habits and medical history in the Turkish diabetes patients from Rotterdam and Zwolle were collected by a trained research assistant and a specialist diabetes nurse respectively. In the Dutch diabetes patients these data were collected from the medical records and if no recent data were

present (within the last 14 months), the GP completed the missing data after inviting the patient to the practice.
The 10-year risk for CHD disease risk for an individual diabetes patient was estimated by applying the CHD risk equation based on the Framingham Heart Study.[11] The equation includes gender and age, and the potentially modifiable risk factors: total cholesterol, HDL-cholesterol, blood pressure and smoking. Other potential risk indicators that were measured included glycaemic control (HbA1c), body mass index (BMI), and history of cardiovascular disease, but these indicators were not used to calculate the CHD risk.

To examine differences between the two ethnic groups in continuous and categorical variables, Student's t-test and Chi-square tests were applied, respectively. All statistical analyses were performed using SPSS software (version 10). P-values (two sided) of 0.05 or less were regarded as statistically significant.

Results

The mean age of the 147 Turkish and 294 Dutch diabetic patients was similar: 55.0 (SD 7.1) versus 54.9 (SD 7.3) years, and 41% of both Turks and Dutch patients were male.
The ratio between total cholesterol and HDL-cholesterol in Turkish patients was comparable to the ratio in Dutch patients, but total cholesterol in Turkish patients was lower than in Dutch patients (Table 1). A total cholesterol level ≥6.5 mmol/l was found in 13% of the Turkish patients and 32% of the Dutch patients. Of the patients with an increased cholesterol level, less Turkish than Dutch patients received lipid-lowering medication (18% versus 45%; p=0.04).
The prevalence of hypertension (> 140 mmHg systolic or > 90 mmHg diastolic blood pressure, or treated for hypertension) in Turkish and Dutch patients was 47% and 67% respectively. Of these patients with hypertension less Turkish than Dutch patients received anti-hypertension treatment (43% versus 66%; p=0.001). In the treated group 31% Turks (9 patients) and 41% Dutch (53 patients) had a blood pressure ≤ 140/90. A blood pressure ≥ 160/95 mmHg was measured in 21% of the patients (Turks 25% and Dutch 18%); in 16% of the non-treated group (19% in the Turks and 14% in the

Dutch), and in 28% of the treated group (52% Turkish and 24% Dutch; p=0.004).
Of the Turkish men 29% smoked versus 20% of the Dutch men. More Dutch (23%) than Turkish women (9%) with diabetes smoked (p=0.004).
Mean haemoglobin A1c was higher in Turks than in Dutch (8.0% versus 6.9%; difference 1.1% [95% CI 0.5 to 1.6]). The mean BMI in Turkish females was significantly higher than in Dutch females (BMI 34.1 versus 31.5 kg/m2; difference 3.6 kg/m2 [95% CI 0.3 to 4.1]). Creatinine in Turks was strikingly lower than in Dutch patients (71 versus 84 mmol/l; difference 13 mmol/l [95% CI 10-16].

The estimated absolute 10-year risk for CHD in Turkish male patients was comparable to the risk in Dutch males (24.2% versus 23.8%). In Turkish females the absolute risk was somewhat lower than the risk in Dutch females (13.4% versus 15.5%).
Table 3 shows the coronary event risk estimates for men and women in the different age groups. With increasing age, the coronary event risk in Turkish men becomes higher than in Dutch, which is mainly attributable to the less favourable lipid profile. Risk in Dutch women is higher in younger ages, which is mainly due to the higher prevalence of smoking. In older women, the risk in both Turks and Dutch becomes the same, because the benefit of the lower prevalence of smoking in Turkish women is offset by a more unfavourable lipid profile.

Discussion

In the present study investigating 441 Turkish and Dutch diabetes patients, the 10-year risk for CHD was similar, although some differences in individual risk factors exist; in particular, the lipid profile and smoking habits differ.

In our study fewer Turkish than Dutch women with diabetes smoke (9% versus 23%). Of the Turkish males 29% and of the Dutch males 20% reported to smoke. These percentages were lower compared to recent studies in the Netherlands in which percentages ranged from 13% to 17% in Turkish women and 32% to 42% in Dutch women, and 54% to 63% in Turkish men and 44% to 48% in Dutch men.[12,13] Apparently, smoking is less prevalent in

the somewhat older group of type 2 diabetes patients. Alternatively underreporting may play a role. After the age of 25 years an inverse relation between smoking and age was reported, in both Turks and the Dutch, this was most pronounced in Turkish women, where the percentage fell from 32.6% (25 to 35 years) to 9.0% (≥ 55 years).[13] Fewer Turkish women than men smoke, which can be seen as a part of the Turkish culture. In the past however this gender difference also existed in The Netherlands, and since already a higher prevalence of smoking in younger Turkish women is observed, an increase in the prevalence of smoking among Turkish women (similar to that observed in Dutch women in the past decades) might be expected.

Mean serum cholesterol levels increase with age in populations in modern western societies.[17] In diabetics, serum cholesterol levels seem to reach a plateau in middle-aged women and decrease in male patients above the age of 50 years.[18] Our findings in Dutch diabetes patients are in accordance with earlier studies. In the Turkish patients in our study, however, the total/HDL-cholesterol ratio increases sharply with age after 55 years, caused by an increase in LDL-cholesterol levels. Interestingly, increase in total cholesterol after 50 years was not observed in a population-based study in Turkey.[19] Migration seems to have an unfavourable influence on the serum cholesterol levels [12, 20] and possibly postpones the stabilisation of cholesterol levels in Turkish diabetic patients to a more advanced age.

Low HDL-cholesterol in Turkish immigrants, especially in males, has also been reported in earlier studies.[12,14-16] Obesity, physical inactivity, cigarette smoking and very low fat diets contribute to low HDL-cholesterol concentrations, but in Turks low HDL-cholesterol levels are more likely attributable to a genetic cause.[16] Low HDL-cholesterol levels apparently persist in Turkish male immigrants with diabetes and the relative contribution of cholesterol to the absolute risk for cardiovascular disease is determined more by low HDL-cholesterol than by high total cholesterol levels.

In this study obesity (BMI > 30 kg/m2) was observed in 78% of the Turkish versus 53% of the Dutch female diabetes patients, while the prevalence in male patients was comparable (39% of the Turks, 36% of the Dutch). High prevalence of obesity amongst Turkish females was reported in earlier studies

and can lead to a high prevalence of diabetes and hypertension.[14, 21] Obesity in Turkish female immigrants might be explained by a genetically determined predisposition worsened by environmental influences, such as over-eating, physical inactivity and stress associated with migration [22] and merits particular attention.

Glycaemic control in diabetics was poorer in Turkish than in the Dutch patients. Although hyperglycaemia is not an independent risk factor in the Framingham risk function, it may be associated with macro-vascular complications.[23] Poorer glycaemic control could be explained by communication problems in Turkish patients, which could result in less knowledge of diabetes and poorer patient compliance. [24] In addition biological factors such as higher insulin resistance in relation to obesity and an earlier onset of diabetes may play a role.

We applied the Framingham risk equation to estimate the risk for CHD in diabetes patients.
It is unknown, however, whether the Framingham risk function can be generalized to Turkish immigrants with diabetes. Some studies indicate that in Turkey, the Framingham risk functions seems to underestimate the risk for CHD for the general population. [25] Possibly the relative importance of CHD risk factors differs between Turkish and Dutch diabetics, and thus the Framingham coefficient for some individual risk factors can not be applied to Turks.

Several limitations of our study should be mentioned. Selection bias was possible because only the Rotterdam patients were asked to participate in an intervention study, whereas in Zwolle and Utrecht the GPs were asked to participate. In Rotterdam, however, there was no indication that the included group (with complete data sets) differed importantly from the not included group with regard to sex and age and relevant co-morbidity. In addition, both in Zwolle and Utrecht a complete data set was obtained from a high proportion of the patients. (90% and 79% respectively).
All three regional laboratories cooperated in a national quality network. This means that test result from the laboratory are regularly compared with one reference result. This made a comparison between the results from the three different laboratories feasible. There were small differences between lipid measurements of the three laboratories. Adjusting for these differences

increased the observed differences in total cholesterol and HDL cholesterol between Turkish and Dutch patients (observed difference versus adjusted difference: total cholesterol 0.5 mmol/l versus 0.76 mmol/l, and HDL-cholesterol 0.06 mmol/l versus 0.14 mmol/l). Thus, the differences in total cholesterol and HDL-cholesterol between Turkish and Dutch diabetes patients could not be explained by differences in test results between the laboratories.

We conclude that although relevant differences in individual risk factor levels exist, in Turkish type 2 diabetes patients the CHD risk is comparable to that in Dutch patients. This indicates that an equally aggressive approach is required in the management of cardiovascular risk factors in both Turkish and Dutch diabetics, particularly since poor glycaemic control and higher prevalence of obesity in Turkish immigrants with diabetes further increases the risk for coronary heart disease. However, whether the relation between risk factors and the incidence of cardiovascular disease in Turkish immigrant diabetics is comparable to the Dutch diabetics is unknown and requires further study.

Acknowledgements: We thank R van Oers and H Baadenhuijsen for their assistance in comparing the laboratory data, and JJ Schipperheijn for his advice in applying Framingham risk equations.

Table 1. Lipids, blood pressure and smoking habit in Turkish (T) and Dutch (D) type 2 diabetes patients. Data are means (SD) or number of patients (% of the total)

	Turks (n= 147)	Dutch (n= 294)	difference (T minus D)	95% CI or p-value
Lipids (mmol/l)				
Total cholesterol				
Male	5.3 (0.9)	5.9 (1.2)	-0.6	-1.0 to -0.3
Female	5.5 (1.1)	5.8 (1.3)	-0.3	-0.6 to -0.01
All	5.4 (1.04)	5.9 (1.3)	-0.5	-0.7 to -0.2
HDL-cholesterol				
Male	0.94 (0.26)	1.08 (0.27)	-0.14	-0.2 to -0.1
Female	1.18 (0.31)	1.19 (0.32)	-0.01	-0.1 to 0.1
All	1.08 (0.31)	1.14 (0.30)	-0.06	-0.1 to -0.003
LDL-cholesterol				
Male	3.12 (0.83)	3.78 (1.02)	-0.65	-1.0 to -0.4
Female	3.30 (1.03)	3.62 (1.13)	-0.33	-0.6 to -0.04
All	3.22 (0.95)	3.68 (1.09)	-0.46	-0.7 to -0.2
Triglyceride				
Male	3.00 (1.80)	2.59 (2.11)	0.44	-0.2 to 1.1
Female	2.38 (1.50)	2.44 (1.50)	0.05	-0.4 to 0.4
All	2.64 (1.66)	2.51 (1.78)	0.14	-0.2 to 0.5
Total/ HDL-cholesterol				
Male	5.96 (1.64)	5.71 (1.64)	0.24	-0.3 to 0.7
Female	4.96 (1.66)	5.19 (1.59)	-0.24	-0.7 to 0.2
All	5.37 (1.72)	5.41 (1.63)	0.04	-0.4 to 0.3
Blood pressure (mm Hg)				
Systolic				
Male	137 (19)	141 (18)	-4.0	-9.6 to 1.6
Female	141 (22)	141 (18)	-1.1	-6.3 to 4.1
All	139 (21)	141 (18)	-2	-5.8 to 1.7
Diastolic				
Male	88 (11)	84 (10)	3.9	0.8 to 7.0
Female	87 (12)	85 (9)	1.7	-1.0 to 4.4
All	87 (11)	85 (9)	3	0.7 to 4.7
Cigarette smoking				
Male	59 (29%)	116 (20%)		0.18
Female	80 (9%)	167 (23%)		0.004
All	139 (17%)	283 (22%)		0.23

Table 2 Differences in relevant characteristics between Turkish and Dutch type 2 diabetes patients by gender. Data are means(SD) or numbers with % in parentheses.

	Male					Female				
	Turks (61)	Dutch (122)	95% CI	p-value		Turks (86)	Dutch (172)	95% CI	p-value	
Age (years)	55.0 (7.1)	54.9 (7.3)	-2.1 to 2.3	0.912		50.4 (8.3)	50.6 (8.1)	-2.3 to 1.9	0.867	
Years since diagnosis of diabetes	5.0 (4.2)	3.5 (4.3)	0.2 to 3.0	0.025		5.8 (4.0)	3.3 (4.0)	1.4 to 3.5	<0.001	
HbA1c (%)	8.0 (1.7)	6.9 (1.9)	0.5 to 1.6	<0.001		8.0 (1.6)	7.2 (1.8)	0.5 to 1.6	0.001	
Body mass index (kg/m2)	29.3 (3.1)	28.9 (4.3)	-0.8 to 1.7	0.451		34.1 (4.9)	31.5 (7.1)	0.3 to 4.1	0.004	
Creatinine (µmol/l)	83.0 (12)	93.0 (15)	-14.0 to -5.0	<0.001		63.0 (12)	78.0 (12)	-18.0 to-12.0	<0.001	
Lipid lowering medication	3.0 (5%)	35.0 (29%)		<0.001		2.0 (2%)	28.0 (17%)		0.003	
Antihypertensive medication	15.0 (25%)	53.0 (43%)		0.016		14.0 (17%)	77.0 (45%)		<0.001	
Current diabetes treatment:										
Diet only	8.0 (13%)	31.0 (25%)				11.0 (13%)	43.0 (25%)			
Oral medication: SU*	31.0 (52%)	51.0 (42%)		0.172		38.0 (46%)	44.0 (26%)		0.013	
Metformin	6.0 (10%)	8.0 (7%)				7.0 (9%)	19.0 (11%)			
SU and metformin	11.0 (18%)	26.0 21%)				20 (24%)	43.0 (25%)			
Insulin	4 (7%)	3.0 (2%)				5.0 (6%)	12.0 (7%)			
Insulin & oral antidiabetic agent	-	3.0 (2%)				1.0 (1%)	11.0 (6%)			
Prior history CVD	11.0 (18%)	23.0 (19%)		0.077		5.0 (6%)	20.0 (12%)		0.115	
Heart disease	10.0 (17%)	18.0 (15%)				3.0 (4%)	11.0 (6%)			
Stroke/TIA**	-	2.0 (2%)				1.0 (1%)	7.0 (4%)			
Intermittent claudication	1.0 (1%)	3.0 (3%)				1.0 (1%)	2.0 (1%)			

* SU = sulfonyl urea derivatives **TIA = transient ischeamic attack.

Table 3 Ten-year absolute risk for coronary heart disease (in %) in Turkish and Dutch diabetics by gender and age. The risk consists of a non-modifiable and a modifiable part.

	Male							
Age group (years)	≤ 50		50-55		55-60		>60	
	Turks	Dutch	Turks	Dutch	Turks	Dutch	Turks	Dutch
No. of patients	15	30	14	28	19	38	13	26
Non-modifiable risk*	6.4	6.2	9.7	9.7	12.3	12.2	15.3	15.3
Modifiable risk**	8.2	8.2	9.5	14.6	14.8	15.3	21.1	14.3
Blood pressure	1.0	1.7	2.0	2.5	2.4	3.8	5.3	4.1
Total/HDL-cholesterol	4.6	3.4	4.5	8.0	8.4	6.6	9.0	5.2
Smoking	2.6	3.1	3.0	4.1	4.0	4.9	6.8	5.0
Total Absolute risk	14.6	14.4	19.2	24.3	27.1	27.5	36.4	29.6
	Female							
Age group (years)	≤ 50		50-55		55-60		>60	
	Turks	Dutch	Turks	Dutch	Turks	Dutch	Turks	Dutch
No. of patients	41	82	17	34	15	30	13	26
Non-modifiable risk*	5.0	5.2	8.6	8.7	10.5	10.5	12.0	12.0
Modifiable risk**	4.4	6.0	4.8	8.4	6.9	8.9	9.7	9.6
Blood pressure	1.9	2.0	2.2	2.9	3.8	3.2	3.4	4.7
Total/HDL-cholesterol	2.2	2.6	2.2	3.9	3.1	3.9	5.8	3.6
Smoking	0.3	1.4	0.4	1.6	0.0	1.8	0.5	1.3
Total Absolute risk	9.4	11.2	13.4	17.1	17.4	19.4	21.7	21.6

* Non-modifiable risk: absolute risk for coronary heart disease (%) based on age, gender and diabetes and fixed values on modifiable risk factors (total/HDL-cholesterol = 4.0, systolic blood pressure =120 mmHg and non-smoking). ** Modifiable risk is composed of the separate risks for systolic blood pressure, total/HDL-cholesterol and smoking.

references

1. Riste L, Khan F, Cruichank K. High prevalence of type 2 diabetes in all ethnic groups, including Europeans, in a British inner city: relative poverty, history, inactivity, or 21st century Europe? Diabetes Care 2001; 24: 1377-83.
2. Carter JS, Pugh JA, Monterrosa A. Non-insulin-dependent diabetes mellitus in minorities in the United States. Ann Intern Med 1996; 125: 221-32.
3. Roper N, Bilous RW, Kelly WF, Unwin NC, Connolly M. Excess mortality in a population with diabetes and the impact of material deprivation: longitudinal, population based study. BMJ 2001; 322: 1389-93.
4. U.K. Prospective Diabetes Study Group. The incidence of myocardial infarction in white, South Asian, and Afro-Caribbean patients with type 2 diabetes (U.K. Prospective Diabetes Study 32). Diabetes Care 1998; 21: 1271-7.
5. Summerson JH, Konen JC, Dignan MB. Racial differences in lipid and lipoprotein levels in diabetes. Metabolism. 1992; 41: 851-5.
6. 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.
7. Centraal Bureau voor de Statistiek en Konklijk Instituut voor de tropen. Gezondheidsenquete Turkse ingezetenen in Nederland, 1989/90 (Health interview Turkish inhabitants in the Netherlands, 1989/90) Den Haag, 1991.
8. Uitewaal PJM, Bruijnzeels MA, Bernsen RMD, Voorham AJJ, Hoes AW, Thomas S. Diabetes care in Dutch general practice: differences between Turkish immigrants and Dutch patients. Europ J Pub Health (accepted 2002).
9. Goudswaard AN, Lam K, Stolk RP, Rutten GEHM. Quality of recording of data from patients with type 2 diabetes is not a valid indicator of quality of care. A cross-sectional study. Fam Pract 2003; 20: 173-7.
10. 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.
11. Anderson KM, Odell PM, Wilson PWE, Kannel WB. Cardiovascular disease risk profiles. Am Heart J 1991; 121: 293-8.
12. Köycö B, Kara T, Çamlidag O, Aydinli R, Verschuren WMM, Montfrans van GA. Risk factors for cardiovascular disease in Turks in Amsterdam and Ankara. Ned Tijdschr Geneeskd 1997; 141: 882-8.
13. Swinkels H. Smoking and drinking behaviour of Turkish inhabitants of the Netherlands, 1989/1990. Maandbericht gezondheid (Central Bureau for Statistics) 1992; 9: 5-17.
14. Porsch-Oezcueruemez M, Bilgin Y, Wollny M, et al. Prevalence of risk factors of coronary heart disease in Turks living in Germany : the Giessen study. Atherosclerosis 1999; 144: 185-98.

15. Mahley RW, Pepin J, Palaoglu KE, Maloy MJ, Kane JP, Bersot TP. Low levels of high density lipoproteins in Turks, a population with elevated hepatic lipase. High density lipoprotein characterization and gender-specific effects of apolipoprotein E genotype. J Lipid Res 2000; 41: 1290-301.
16. Bersot TP, Vega GL, Grundy SM, et al. Elevated hepatic lipase activity and low levels of high density lipoprotein in normotriglyceridemic, nonobese Turkish population. J Lipid Res 1999; 40: 432-8.
17. Nanas S, Pan WH, Stamler J, Liu K, Deyer A, Stamler R, Schoenberger JA, Shekelle RB. The role of relative weight in the positive association between age and serum cholesterol in men and women. J Chronic Dis 1987; 40: 887-92.
18. U.K. Prospective Diabetes Study. Plasma lipids and lipoproteins at diagnosis of NIDDM by age and sex. Diabetes Care 1997; 20: 1683-7.
19. Onat A, _urdum-Avcı G, _enocak M, Örnek E, Gözükara Y. Plasma lipids and their interrelationship in Turkish adults. J Epidemiol Community Health 1992; 46: 470-6.
20. Onat A. Risk factors and cardiovascular disease in Turkey. Atherosclerosis 2001; 156: 1-10.
21. Ernst ND, Sempos CT Briefel RR, Clark MB. Consistency between US dietary fat intake and serum total cholesterol concentrations: the National Health and Nutrition Examination Surveys. Am J Clin Nutr 1997; 66(Suppl.): 965S-72S.
22. Rosmond R, Lapidus L, Bjorntorp P. The influence of occupational and social factors on obesity and body fat distribution in middle-aged men. Int J Obes Relat Metab Disord 1996; 20: 599-607.
23. Stratton IM, Adler AI, Neil HA, Matthews DR, Manley DR, Cull CA, Hadden D, Turner RC, Holman RR. Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study. BMJ 2000; 321: 405-12.
24. Pachter LM. Culture and clinical care. Folk illness beliefs and behaviors and their implications for health care delivery. Jama 1994; 271: 690-4.
25. Onat A, Dursuno_lu D, Sansoy V. Relative high coronary death and event rates in Turkish women. Relation to three major risk factors in five-year follow-up of cohort. Int J Cardiol 1997, 61:69-77.

Diabetes care in Dutch general practice: differences between Turkish immigrants and Dutch patients

PJM Uitewaal, MA Bruijnzeels, RMD Bernsen, AJJ Voorham, AW Hoes, S Thomas

European Journal of Public Health: in press

Abstract

Aim. To compare the adherence to clinical guidelines by GPs and glycaemic control in Turkish and Dutch type 2 diabetes patients.
Design. A retrospective cohort study. Search of general practice medical records for diabetes- related variables of Turkish and Dutch diabetes patients, stratified for age and gender.
Setting. Seventeen general practices (37 GPs) in the inner city of Rotterdam.
Subjects. 196 type 2 diabetes patients (106 Turkish and 90 Dutch), known with diabetes for at least 18 months, were followed for two years during the 1992-1997 period.
Main outcome measures: (1) Level of care as registered in the medical records based on eight quantifiable criteria derived from the national guidelines for GPs; and (2) glycaemic control (fasting and non-fasting blood glucose levels).
Results. Turkish patients visited the GP for periodic control more often than Dutch patients. The other seven criteria were followed in an equal number of Turkish and Dutch patients. Turkish patients had a higher mean non-fasting plasma glucose level (12.9 mmol/l) than Dutch patients (10.8) (p=0.001) during the two-year follow-up.
Conclusions. Although adherence to clinical guidelines as registered in

Turkish and Dutch type 2 diabetes patients is comparable, Turkish patients have higher mean non-fasting plasma glucose levels than their Dutch counterparts.

Introduction

Type 2 diabetes is more common among minority groups in Western societies.[1] A recent study showed that age-standardized prevalence rates for diabetes in minority groups in the Netherlands (predominantly Turkish, Moroccan, Surinamese and Dutch Caribbean) was 3–5 times higher than in Dutch inhabitants.[2] Several studies reported poorer glycaemic control of diabetes patients in ethnic minority groups.[3–5] Possible explanations mentioned for this poorer glycaemic control are differences in health care utilization [5] and patient related issues such as lack of understanding of the importance of diabetes care.[4]
In the Netherlands treatment of type 2 diabetes patients is primarily the task of the GP. Because of cultural and language differences many GPs experience difficulties in delivering optimal diabetes care to patients from minority groups. However, it is unknown whether these difficulties affect the level of diabetes care provided by the GP and lead to poorer glycaemic control in migrant patients.
The Turkish population is the largest minority group in the Netherlands. Most elderly Turkish inhabitants are first generation immigrants, who live rather traditionally and barely master the Dutch language. It is expected that cultural and language differences between the Turkish patient and the GP will have an adverse effect on the ability of the GP to make himself clear and to ensure the patients' compliance, resulting in a lower level of diabetes care and poorer glycaemic control in Turkish type 2 diabetics compared to their Dutch counterparts. In this study GPs' adherence to the Dutch national guidelines on type 2 diabetes in Turkish and Dutch patients known with type 2 diabetes is assessed and the glycaemic control in both groups compared.

Method

In nine districts of the inner city of Rotterdam (about 100,000 inhabitants) characterized by a high percentage of Turkish migrants (estimated mean

13%), 46 GPs working in 23 practices were approached. Nine GPs declined participation: four were not interested and five had no Turkish diabetes patients listed in their medical records.
An inventory of all type 2 diabetes patients, which 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 diabetics, or using oral anti-diabetic medication or insulin. Patients were considered Turkish on the basis of their surname, as assigned by a Turkish assistant; Dutch patients were identified by surname by a Dutch research assistant. Dutch patients were selected according to a stratified (according to age, gender and practice) sample scheme.[6] Ethnic assignment was checked by the GP, where the patient was listed. Because the elderly population among Turks in the Netherlands is small and diabetes tends to occur in ethnic minorities at a younger age,[1,2] it was decided to stratify the Dutch and Turkish samples on age (within a 5-year range), gender and practice.
From this first selection (259 patients) we included only those patients, known to have had diabetes for at least 1.5 years, and who could be followed for two years during the period January 1992 to December 1997 (196 patients = 76%). The period of 1.5 years after the initial diagnose was chosen, because the guidelines for type 2 diabetes assume that an optimal glycaemic control can be achieved within this period for newly diagnosed patients.[7] The medical records of these patients were searched manually and all diabetes–related variables were recorded.

GPs' adherence to the 1989 published Dutch national guidelines[7] was assessed by using recommendations that could be assessed quantitatively; i.e. frequency of consultation, frequency of laboratory tests including plasma glucose, total cholesterol, creatinine and frequency of physical examination including weight, blood pressure, foot and eye examination. Over the two-year period the total number of registered diabetes–related consultations and measurements was counted. Medication treatment aims at achieving normo-glycaemia, but according to national guidelines, fasting blood glucose levels < 8.0 mmol/l and non–fasting blood glucose levels < 10.0 mmol/l are acceptable. [7] Therefore fasting plasma glucose levels > 8.0 mmol/l and non-fasting plasma glucose levels > 10.0 mmol/l should be followed by a medication adjustment. Medication adjustments were counted that were

performed within three months after a poor glucose level was measured, only if in that period no acceptable plasma glucose level was registered. A period of three months was chosen to allow the GP to take measures other than adjusting the medication (e.g. advice on diet or medical compliance). A summary of relevant guideline recommendations are shown in table 2.
To measure glycaemic control, we assessed (1) the number of patients that reached acceptable blood glucose levels (fasting or non-fasting), (2) mean fasting and non-fasting blood glucose level, calculated as the weighted mean (weights are half the interval between former and next plasma glucose measurement), over the two-year follow-up period.
Differences in GPs' adherence to clinical guidelines for Turkish type 2 diabetes patients and Dutch patients were assessed by comparing percentages of Turkish and Dutch patients in which the targets according to the recommendations from the Dutch GP guidelines on diabetes care were achieved, using the Chi-square test. Fasting and non-fasting plasma glucose level were compared between Turkish and Dutch patients and statistically tested using the independent samples t-test.

Results

From the inventory of all diabetes patients 219 Turkish and 186 Dutch patients were identified. Of the 219 Turkish patients, 106 patients (48%) met the inclusion criteria of having 3.5 years diabetes (1.5 years after diagnosis and 2 years follow-up), treated exclusively by their GP. Of these 43% were male, the mean age was 50.5 (SD7.5) years, and the mean time since diagnosis at start of the follow-up 3.5 (SD3.1) years. Of the 186 Dutch patients 90 (48%) were included; 51% male, mean age 55.3 (SD8.2) years, mean time since diagnosis 4.6 (SD4.8) years. For 16 Turkish patients we were not able to select Dutch patients with corresponding age and gender in the same practice.
Table 1 shows the characteristics of the included Turkish and Dutch patients. The recommendation of four control visits a year was reached more often in the Turkish (51%) than in the Dutch patients (36%) (p=0.024). Regarding the other quantitatively assessed recommendations, no clear differences were observed between Turkish and Dutch patients.
The proportion of patients with a good or acceptable fasting blood glucose level, was similar in Turkish and Dutch patients. Fewer Turkish than Dutch

diabetes patients had good or acceptable non-fasting blood glucose levels (table 2). Furthermore, the mean non-fasting blood glucose level was poorer in Turkish than in Dutch patients (table 3).

Discussion

We expected that GPs would have more problems following guideline recommendations with Turkish diabetes patients than with to Dutch patients. Our results show that Turkish patients had more control visits than Dutch patients. Nevertheless, non–fasting blood glucose levels were poorer in Turkish than in Dutch patients. Since the Turks already had poorer blood glucose levels in the period before the follow–up period, this finding seems to be consistent and in line with earlier reports of poorer glycaemic control in ethnic minority groups. [3–5] It supports the experience of GPs that it is more difficult to control diabetes in ethnic minority patients effectively, and that this can not be attributed to poorer adherence to the guidelines alone.

Valid assessment of GPs' adherence to the guidelines is difficult. Given the retrospective approach we took, we could make use of quantifiable data, such as laboratory results, but we could not validly measure other recommendations directed towards patient education, medication compliance and lifestyle advice the GPs followed. These recommendations could be affected by communication problems, which could exist in elderly Turkish people, since many of them are poorly educated and, although living in the Netherlands for many years, do not master the Dutch language. Little is known about their knowledge or beliefs with regard to diabetes. Communication problems and lack of mutual understanding could result in poorer patient compliance [8], and also less knowledge of diabetes is likely to have consequences on the glycaemic control.[9]

Due to low number of Dutch patients in some practices, we were not able to identify an equal number of Turkish and Dutch patients in each gender and age category. Thus Turkish patients were somewhat younger than Dutch patients (50.5 (SD 7.5) versus 55.3 (SD 8.2) years) and the percentage of males in the Turkish group was somewhat lower (43.3% versus 51.1%). However, since the guidelines advises less strict glycaemic control only in patients over 75 years old, when life expectancy becomes significantly lower,[7]

we do not expect that the difference in age between Turkish and Dutch patients materially influenced our results. Also the lower percentage of Turkish males will not have influenced the results, since we did not observe any differences in actual delivered care between the sexes in our study.

Unfortunately, we were not able to use HbA1c as a measure for glycaemic control, since regular measurements of HbA1c levels was not very common among GPs before 1998. However, both fasting and non–fasting glucose measurements are good predictors for identifying poor glycaemic control [7] and it is reported that non-fasting blood glucose level is an even better marker of diabetic control [10] and a better predictor of mortality,[11] which means that our finding of a higher non–fasting blood glucose level, in Turks indicates poorer glycaemic control and probably even an increased mortality risk compared to Dutch patients.
No significant differences were observed in the percentage of Turkish and Dutch patients in which the guideline recommendations concerning laboratory measurements were followed, although some differences seem to exist in cholesterol (Turkish versus Dutch patients 7.5% versus 16.7%; p=0.07) and creatine (Turkish versus Dutch patients 14.2% versus 6.7%; p=0.11) measurements. In view, however, of the widely held belief that the guidelines should be followed in all patients, adherence can be qualified as poor in both Turkish as Dutch diabetics.

A problem in using registered data is incompleteness. Not fully recording the results of measurements and performances will give an underestimation of the actual delivered care.[12] However, since we expect that this will equally apply to both Turkish and Dutch patient groups, we assume that these problems did not influence our comparisons.

Providing good structural diabetes care will contribute to achieve good glycaemic control.[13] However, providing comparable diabetes care to Turkish and Dutch diabetes patients by GPs leads to poorer glycaemic control in Turks. Possible reasons for this finding are general practitioner factors (e.g. spending less time in the patient education because of communication problems), patient factors (non-compliance due to language/cultural problems so that the patient does not fully understand the importance of following the medical advice, or is not able to apply them), or biological explanations (different response to drug therapy). More insight in causative

factors is clearly needed. In order to improve glycaemic control in all diabetes patients, a more tailor-made diabetes care with respect to individual needs seems necessary.

Acknowledgments: we thank G. ten Bolscher, M. Dobbelsteen , R. Kerseboom, H. Tran, P. Visser, H.M. Willemsen for collecting the data.

Table 1 Characteristics of the Turkish and Dutch study population at the start of the 2-year follow-up period.

	Turkish patients	Dutch patients
Number of patients	106	90
Male (%)	43.3	51.1
Mean age in years (SD)	50.5 (7.5)	55.3 (8.2)
Mean number of years since diagnosis (SD)	3.5 (3.1)	4.6 (4.8)
Treatment received		
diet alone (%)	32.1	51.1
oral medication(%)	65.1	42.2
insulin(%)	2.8	6.7
Macrovascular complications		
cardiovascular disease (%)	20	22
stroke (%)	2	2
Microvascular complications		
retinopathy (%)	14	8
nephropathy (%)	8	8

Table 2 Delivered care as registered in the general practice medical records in 106 Turkish and 90 Dutch type 2 diabetes patients compared with the Dutch national guideline recommendations for type 2 diabetes (numbers are % of all patients).

Item	Guideline recommendations	percentage of patients in which the standard is reached		p-value
		Turkish patients	Dutch patients	
Frequency of control visits	4 times a year	no visits: 4.7 1 visit: 15.1 2 visits : 14.2 3 visits : 15.1 4 visits : 50.9 or more	10 20 20 14.4 35.6	0.024
Blood glucose	4 times a year	38.7	31.1	0.296
Total cholesterol	once a year	7.5	16.7	0.073
Creatinine	once a year	14.2	6.7	0.108
Weight	4 times a year	7.5	6.7	1.000
Blood pressure	once a year	26.4	24.4	0.870
Inspection feet	once a year	20.8	17.8	0.717
Retina inspection	once every two years	19.8	21.1	0.860
Medication adjustments [a]		27.6	28.3	0.998

a: Medication adjustments within 3 months after measuring a poor plasma glucose level as the percentage of the total number of (minimal) 3 months periods after measuring a poor plasma glucose level.

Table 3 Percentage of Turkish (T) and Dutch (D) patients in which good or acceptable blood glucose level is reached during the two-year follow-up and mean blood glucose levels (SD) in fasting and non-fasting capillary blood registered in (1) the period before the start of the two year follow-up, and (2) during the two-year follow-up period.

	Turkish (n=106)	Dutch (n=90)	Difference T/D (95% CI)
Patients with good or acceptable fasting blood glucose level (≤ 8 mmol/l) (%)	26.7	25.7	1.0 (-13.0 to 15.0)
Patients with good or acceptable non-fasting blood glucose level (≤ 10 mmol/l) (%)	17.7	33.3 -	-15.6 (-30.0 to -1.2)
Mean blood glucose level before start follow-up (1)			
Fasting blood glucose (mmol/l)[a]	10.0 (2.8)	9.0 (2.2)	1.0 (0.18 to 1.77)
Non-fasting blood glucose (mmol/l)[b]	12.5 (3.1)	10.9 (2.6)	1.6 (0.65 to 2.53)
Mean blood glucose level during follow-up (2)			
Fasting blood glucose (mmol/l)[c]	10.4 (3.3)	9.8 (2.6)	0.6 (-0.30 to 1.58)
Non-fasting blood glucose (mmol/l)[d]	12.9 (3.2)	10.8 (2.8)	2.1 (1.06 to 3.09)

Difference T/D (95% CI) = difference between % Turkish and % Dutch patients and 95% confidence interval. Missing values Turkish; Dutch patients: [a] 20;25 [b] 24;27 [c] 20;20 [d] 27;27

References

1 Carter J S, Pugh JA., Monterrosa A. Non-insulin-dependent diabetes mellitus in minorities in the United States. Ann Inter Med 1996; 125: 221-28.

2. 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.

3. Harris MI, Eastman RC, Cowie CC, Flegal KM, Eberhardt MS. Racial and ethnic differences in glycaemic control of adults with type 2 diabetes. Diabetes Care 1999; 22: 403-08.

4. Wisdom K, Fryzek JP, Havstad SL, Anderson RM, Dreiling MC, Tilley BC. Comparison of laboratory test frequency and test results between African-Americans and Caucasians with diabetes: opportunity for improvement. Diabetes Care 1997; 20: 971-77.

5. Eberhardt MS, Lackland DT, Wheeler FC, German RR, Teutsch SM. Is race related to glycaemic control? An assessment of glycosylated hemoglobin in two South Carolina communities. J Clin Epidemiol 1994; 47: 1181-9.

6. Bouwhuis CB. Determination of ethnicity in children: two methods compared. Paediatric Outpatient Care: Socio-demographics and health problems. Thesis Erasmus Medical Centre Rotterdam 2002: 122-7.

7. Rutten GEHM, Cromme PVM, Zuidweg J, Mulder JD. Huisarts en diabetes type 2: een verantwoording voor de NHG standaard (General practitioner and type 2 diabetes: a justification of the Dutch standard). Huisarts Wet 1989; 32: 7-13.

8. Pachter LM. Culture and clinical care. Folk illness beliefs and behaviors and their implications for health care delivery. JAMA 1994; 271: 690-4.

9. Weller SC, Baer RD, Pachter LM, Trotter RT, Glazer M, Garcia de Alba Garcia J, Klein RE. Latino beliefs about diabetes. Diabetes Care 1999; 22: 722-8.

10. Avignon A, Radauceanu A, Monnier L. Non-fasting plasma glucose is a better marker of diabetic control than fasting plasma glucose in type 2 diabetes. Diabetes Care 1997; 20:1822-6.

11. DECODE Study Group. Glucose tolerance and mortality: comparison of WHO and American Diabetes Association diagnostic criteria. Lancet 1999; 354:617-21.

12. Rutten G, Van Eijk J, Beek M, Van der Velden H. The quality of diabetes registration in eight general practices. Allgemeinmedizin 1990; 19: 68-72.

13. Sonnaville de JJJ, Bouma M, Colly LP, Devillé W, Wijkel D, Heine RJ. Sustained good glycaemic control in NIDDM patients by implementation of structured care in general practice: 2-year follow-up study. Diabetologia 1997; 40: 1334-40.

Ethnic-specific diabetes education for Turkish type 2 diabetics: a controlled study in general practice

PJM Uitewaal, AJJ Voorham, MA Bruijnzeels, A Berghout, AW Hoes, RMD Bernsen, PH Trienekens, S Thomas, F Sturmans.

Submitted

Abstract

Background. In Turkish immigrant diabetics difficulties with communication and cultural differences may hinder delivery of optimal diabetes care by their general practitioner.
Objective. To assess the effect of an ethnic-specific diabetes education program on glycaemic control and cardiovascular risk factors in Turkish type 2 diabetes patients.
Design. In a prospective controlled study, Turkish immigrant diabetics who were offered routine care plus ethnic-specific diabetes education given by bicultural Turkish female educators, were compared with Turkish diabetics offered routine care only (control group).
Setting. Sixteen general practices (31 GPs) in Rotterdam.
Participants. From December 1997 to December 1999, 104 Turkish type 2 diabetes patients were recruited, of which 85 could also be assessed at one-year follow-up.
Measurements. Glycaemic control, lipid concentrations, blood pressure and body mass index.
Results. Compared with the control group, mean HbA1c in the intervention group decreased by 0.3% (95% CI: -0.8 to 0.2). A significant decrease in HbA1c was observed in women with HbA1c > 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.
Conclusions. Ethnic-specific diabetes education by Turkish female educators has no obvious beneficial effect on glycaemic control or the cardiovascular risk profile. More focus on specific patient selection and gender equality between educators/ patients may prove worthwhile.

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] Difficulties 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. Although empirical data are scarce, the available data show that the prevalence of type 2 diabetes in the Turkish population is higher than in the indigenous Dutch population [4] and, that compared to Dutch type 2 diabetes patients, glycaemic control in Turkish diabetics is poorer. [7]
We developed an ethnic-specific, tailor-made education program for Turkish diabetes patients (treated by their GP in general practices) carried out by Turkish female educators. This study assessed whether the diabetes education program ha 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 socio-economic area in the northern part of Rotterdam, who were offered routine care only.
Approval for this study was obtained from the Ethics Committee of the Erasmus Medical Centre Rotterdam.

Patients
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 program, and patients planning to go abroad for more than 6 months during the study period.
A Turkish-speaking assistant, who was not aware to which group the patients were allocated, approached the patients to invite their participation. 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 educators spoke fluent both Turkish and Dutch and were regarded as representatives of the target population. They were trained educators and had experience in educating in a primary care setting. They received an additional training about diabetes management and were supervised to translate advice on diabetes into understandable and (culturally) acceptable (ethnic-specific) advice for Turkish diabetes patients.
The planned 9-month program included: seven individual educational sessions and three group sessions. The individual sessions consisted of four sessions with the educator and patient together (if necessary one session together with a dietician), and three "triangle" sessions with GP, educator and patient present, to discuss the three-monthly assessment of the glycaemic control and cardiovascular risk factors. Afterwards, the educator and patient discussed the triangle sessions. The 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.
Education was focused on attainment of self-care skills and behaviour change strategies, according to the ASE model. [8]

During the first individual session the educators were assigned to investigate the patient's attitude regarding diabetes-related behaviour (eating behaviour, exercise and medical compliance) according to the model, in order to

prioritise the therapeutic goals. The second individual session was the first triangle session. For the third individual session an appointment was arranged together with a dietician and the patient's partner to discuss dietary rules. The fourth individual session focussed on the patient's personal experiences and problems that hampered attainment of the goals. The fifth individual session was the second triangle session.
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. The sixth individual session, held after the three group sessions, was the third triangle session, followed by an evaluation of the group sessions focusing on the personal goals of the patient. During the seventh and final individual session (if possible together with the patient's partner) therapeutic goals were evaluated and the necessity of family support to reach and maintain the goals was discussed.

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. [9] 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 I-V) on the left arm of the seated patient twice with a 2-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] Indicators of diabetes care were: 1) the mean number of recommendations from the Dutch GP guidelines on diabetes [10] 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, non fasting ≥ 10.0 mmol/l).

Statistical analysis

The main effect parameter was change in HbA1c 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 HbA1c 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 HbA1c 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 data set obtained by multiple imputation for missing data. [11]

Subgroup analyses

To acquire additional information we decided in advance to perform subgroup analyses for patients with HbA1c ≤ 7% (good glycaemic control) and HbA1c > 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 HbA1c was 8% (SD 1.6). 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 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 versus 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 versus 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 versus 57% of the cases in the control practices.

Loss to follow-up
Of the 104 patients that signed informed consent, five patients (3 in the intervention and 2 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 2 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).

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 HbA1c and fasting plasma between patients in the intervention and control group. Compared with the control group, mean HbA1c 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 (HbA1c), 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 HbA1c after one year for patients with baseline HbA1c ≤ 7% (good glycaemic control) and patients with baseline HbA1c > 7%, for all patients, and for males and females separately. A significant effect of the intervention was seen only in women with increased plasma glucose levels (0.87%; 95% CI -1.73 to -0.09).

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 that entered the study with missing values imputed by means of multiple imputation yielded similar results for the outcome measurements HbA1c and cardiovascular risk factors.

Discussion

In this study targeting on 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 HbA1c 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 smaller than 0.3%. The expected larger improvement was based on the assumption that nearly all Turkish diabetes patients would have HbA1c levels >7%. However, this was not the case in 26 (31%) of the 85 patients with completed data sets, 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 lower HbA1c level at baseline in the male patients in the intervention group with completed data sets (HbA1c of 7.7% in the male intervention versus 8.0% in the male control group), and the small number of men might explain why no decrease in HbA1c in men could be shown, whereas men in the intervention group had an HbA1c level similar to the women at one-year follow-up (7.6% in both men and women). Secondly, the influence of gender inequality between the female educator and the male patients might explain the lack of effect in men. A recent study showed the positive influence of gender equality on the effectiveness of health education. [12] 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 a women. Indeed, another report of this study showed that the Turkish females experienced more change in behaviour than the Turkish men. [13] Attention to gender equality should be considered in future studies. Thirdly, the contents of the message should possibly be more gender specific. Although no studies were performed to prove this, it seems well possible that the susceptibility for behavioural advice differs between Turkish man and women.

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 drop-out. Because we were unable to follow-up 15 of the 53 patients that dropped-out 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 5 patients dropped-out for education-related reasons. Thus, the possibility of bias induced by selective drop-out is very limited. Importantly, this is illustrated by analysis of the data set obtained by multiple imputation for missing data, which yielded similar results on both HbA1c 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 clearly effect on glycaemic control or cardiovascular risk factors, our finding of a larger effect in women warrants further study.

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)[a]	Intervention group		Control group	
Age (years)	53/51	50.6	(9.3)	53.5	(6.2)
Men (number)	53/51	21	(40)	19	(37)
Number of years since diagnosis	53/51	6.0	(4.2)	6.1	(5.0)
Body mass index (kg/m2)	48/47[b]	32.8	(5.2)	31.6	(4.5)
Smokers (number)	48/46[b]	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)
HbA1c (%)	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 [c]	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 [b]	136	(17)	141	(22)
Diastolic	48/48 [b]	88	(10)	89	(10)
Urinary albumin (number)	48/49 [b]				
>50		10	(21)	8	(16)
>300		5	(10)	2	(4)

a: 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) that signed informed consent.

b: Missing data due to incomplete data set.

c: Due to high triglyceride level (>4.5 mmol/l) the LDL-cholesterol could not be calculated in 8 patients.

Table 2 Glycaemic control and cardiovascular risk factors in 85 Turkish diabetes patients with completed data sets: outcome measurements at baseline, after one year, and mean change from baseline measurements in both groups[1]. Values are adjusted mean values (SD) [2] and mean difference between change from baseline in the intervention and control group (95% CI).

	Intervention group (n=38)			Control group (n=47)			Difference between change from baseline in intervention and control group (95% CI)
	baseline	after one year	change from baseline	baseline	after one year	change from baseline	
HbA1c (%)	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)
Triglyceride (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 (-.7 to 0.4)
Body mass index (kg/m2)	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 (mm Hg)							
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)

1) 14 patients (12 in the intervention and 2 in the control group) with completed baseline measurements were lost to follow-up. Reasons for lost top follow-up were: refused (5), stayed abroad for a longer period (4), four moved or changed physician (4), unable to be contacted (1).

2) Adjusted for HbA1c at baseline and patient characteristics (age, gender, years since diagnosis, mode of treatment: diet alone or use of oral hypoglycaemic agents)

Table 3 Subgroup analyses for change in mean HbA1c one year after baseline measurements in patients in the intervention and control group for patients with HbA1c £ 7.0% at baseline (good glycaemic control) and for patients with HbA1c > 7.0% at baseline: in all patients, and in males and females separately.

Patient group	n	HbA1c at baseline % (SD)	HbA1c at one year % (SD)	Difference between intervention and control[a]	95% Confidence interval
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 HbA1c ≤ 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 HbA1c >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 HbA1c >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 HbA1c >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)		

a: Adjusted for HbA1c at baseline and patient characteristics (age, gender, years since diagnosis, mode of treatment: diet alone or use of oral hypoglycaemic agents)

References

1. Marshall JA, Hamman RF, Baxter J, Mayer EJ, Fulton DL, Orleans M, Rewers M, Jones RH. Ethnic differences in risk factors associated with the prevalence of non-insulin-dependent diabetes mellitus. Am J Epidemiol 1993; 137: 706-18.
2. Cowie CC, Harris MI, Silverman RE, Johnson EW, Rust KF. Effect of multiple risk factors on differences between blacks and whites in prevalence of non-insulin-dependent diabetes mellitus in the United States. Am J Epidemiol 1993; 137: 719-32.
3. Carter JS, Pugh JA, Monterrosa MD. Non-insulin-dependent diabetes mellitus in minorities in the United States. Ann Intern Med 1996; 125: 221-32.
4. 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: 693-99.
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 2003, in press.
8. Vries H de, 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.
9. 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.
10. Rutten GEHM, Cromme PVM, Zuidweg J, Mulder JD. General practitioner and type 2 diabetes: a justification of the Dutch standard [In Dutch: Huisarts en diabetes type 2: een verantwoording voor de NHG standaard.] Huisarts & Wetenschap 1989; 32: 7-13.
11. Rubin DB, Schenker N. Multiple imputation in health care database: an overview and some applications. Stat Med 1991; 10:585-98.
12. Voorham AJJ, Kocken PL. Kenmerken van de voorlichter bij het effect van seniorenvoorlichting (Characteristics of peer health educator and the effect of peer-led senior health education). Tijdschr Soc Gezondheidsz 2000; 78: 303-8.
13. Voorham AJJ, Uitewaal PJM, Bruijnzeels MA. Het effect van voorlichting in de eigen taal aan Turkse diabetespatiënten (Effects of a peer-led health education program aimed at Turkish diabetes patients). Tijdschr Soc Gezondheidsz 2002; 80: 514-20

Feasibility of diabetes peer education for Turkish type 2 diabetes patients in Dutch general practice

PJM Uitewaal, MA Bruijnzeels, T de Hoop, AW Hoes, S Thomas.

Patient education and counseling: in press

Abstract
The feasibility of a 9-months education diabetes programme (tailored to Turkish patients, provided by Turkish female bicultural educators) was assessed, in terms of dropout rate, patient and GP satisfaction, and GP's perceived workload. Results. Of the 54 Turkish patients (39% male) that signed informed consent, 45 actually started the education. Dropout rate during the programme was 41% (main reason: going abroad for a long period (18%)). The individual education sessions and the consultations with the GP were highly appreciated by 87% of the patients, the group sessions by 66%. Although all 9 interviewed GPs experienced a higher workload, overall appreciation of the programme was high in 6 GPs. Although implementation of an ethic specific diabetes programme in general practice is well appreciated by both patients and GPs, the high dropout rate indicates that the programme needs to be more finely-tuned to the individual patient.

Introduction

Type 2 diabetes mellitus is highly prevalent amongst immigrants in Western European countries.[1-3] Specific problems in this group such as language difficulties and cultural differences, as well as limited access to knowledge and low social economic status, are threats to optimal diabetes management.[4, 5] Education is a cornerstone in diabetes management. Ethnic-specific education, performed by ethnic linkworkers to bridge language and

cultural gaps between patient and physician has been advocated. [6] Features such as biculturalism [7], credibility of the educator [8] and tailoring [9] probably contribute to effective education in immigrant populations. However, interventions with these features are seldom carried out in immigrant populations. Moreover, data on the feasibility of such programmes are scarce [10], but are necessary to target these interventions.
In the Netherlands, type 2 diabetes is more prevalent amongst the largest immigrant populations (Turks, Surinamese and Moroccans) [1] and most type 2 diabetics are exclusively treated by their GP. To support the GPs in their care for immigrant diabetics a diabetes programme within the general practice was developed for Turkish diabetics. Turkish patients were chosen, as they are the largest first-generation immigrant group in the Netherlands with an accumulation of specific features: relatively low level of education, poor proficiency in the Dutch language, and a rather traditional way of living.

In this study we determine the feasibility of the implementation of a diabetes programme tailored to Turkish patients, given by peer educators in the general practice, in terms of dropout rate, patient and GP satisfaction and the perceived workload by the GP.

Methods

The tailor made (peer) diabetes programme
The programme was based on three principles: peer education, tailoring, and the Health Counselling Model. [11] Peer education was made operational by using educators with a Turkish background. The educators were: 1) trained medical educators, having received an informal in-house training on diabetes at the Municipal Health Service Rotterdam Area; 2) fluent in both the Turkish and Dutch language, and 3) regarded as representatives of the target population. An experienced psychologist supervised them during the programme.
Education of the patients focused on attainment of self-care skills and behavioural change strategies, according to the Health Counselling Model. This model assumes three stages in behavioural changes: 1) preparing to change the behaviour, 2) changing the behaviour, 3) and maintaining the behavioural change. Each stage has its own educational approach. The educators were assigned to investigate the patients' stage in relation to

important diabetic-related behaviour (e.g. diet, exercise or medical drug compliance) according to the model. The planned 9-month programme consisted of three individual educational sessions (if necessary one together with a dietician), three group sessions, and concluded with a fourth individual education session. A three-monthly assessment of the glycaemic control and cardiovascular risk factors was performed followed by a consultation with the educator, patient and GP together (Figure 1). Tailoring was made operational by adjusting the starting point and adjusting the number of educational sessions to the patients' needs. During the programme the GP delivered usual care as required. All education meetings took place in the GP's office.

Inclusion of practices and patients
The study was designed as a controlled experiment. Turkish type 2 diabetes patients from seven practices (10 GPs) in the South of Rotterdam formed the intervention group. All Turkish type 2 diabetes patients younger than 75 years and exclusively treated by the GP for their diabetes were eligible. Excluded were patients considered by the GP to be too ill to follow the intervention programme, and patients planning to go abroad for more than 6 months during the study period. A Turkish-speaking assistant asked the patients to participate. After informed consent and baseline measurements, patients were informed by letter whether they would be part of the intervention or the control group. Allocation of a patient to the intervention or the control group was simply based on the location of the GP's practice (i.e. South or North Rotterdam). Patients in the control group were offered usual care only. For the present study, only subjects allocated to the intervention group were included and reported here.

Measurements
All patients were interviewed at baseline and again after 12 months (i.e. after conclusion of the study). During the interviews, information on immigration history, literacy, communication with the GP, and satisfaction with the education and educator was obtained. Both educators kept a detailed schedule of all appointments with patients in which they noted the date, sort, aim, result and difficulties encountered during each education session. At the end of the programme a semi-structured interview with both peer educators about their patient contacts provided additional information on the patients' background, patients' difficulties in following the educational advice. Finally,

all participating GPs received a questionnaire that included questions on satisfaction (overall, quality, communication with the patients) and problems with the education and experienced workload. At the end of the programme, questionnaires were returned by 9 of the 10 GPs; one GP was no longer in practice and could not be traced.
The dropout rate was calculated as the number of patients that initially signed informed consent but did not complete the intervention programme (as reported by the educators). The main reasons for dropout were obtained from the interviews with the peer educators.
Patient satisfaction with the educational sessions (individual, group, GP consultation) was derived from the patient interviews. Patients judged the sessions as beneficial or pleasant if they scored "positive" (4) or "very positive" (5) on a 5-point Likert scale. Patients were considered satisfied with the regularity of the control visits, competence and approach of the educator, and the peer strategy if they scored "yes" on a 4-point Likert scale. Factors considered by the educators to hinder the education were derived from the semi-structured interviews with the educators.
GP satisfaction with the education and educator was assessed from a questionnaire in which GPs gave their opinion (using a 10-point score) about the educator's dedication, improvement in diabetes management, appreciation of the consultation with the educator and the patient, cooperation with the educator in general, perceived workload and time investment, possible limiting conditions (such as, making appointments with educators and availability of workspace), and overall appreciation. Subsequently, we grouped these scores as 1-4, 5-7 and 8-10 indicating poor, moderate and high GP satisfaction, respectively. GP satisfaction with the results of the education regarding improvement in communication, knowledge of the patients' social position, and the quality and regularity of the control visits was assessed by a dichotomous variable: "yes/ no".

Statistics
Because the education was given by two female educators, gender equality might have influenced the feasibility. [12] To determine possible differences in feasibility between patients aged ≤ 50 years and those aged over 50 years, and between men and women, separate Chi-square tests were used. In addition, also differences in migration history (years since migration), duration of diabetes and illiteracy were assessed.

Results

In Table 1 relevant characteristics of the 54 patients (21 males, mean age 53.5 (SD 7.4) years and 33 females, mean age 48.9 (SD 9.9) years) that entered the study are reported.
Illiteracy (unable to read or write Turkish or Dutch) was more prevalent in women (66%) than in men (20%). Many males (56%) and females (68%) experienced difficulties in communicating with the GP (males 61%, females 71%) (detailed percentages not shown in table).
Table 2 shows the number of educational sessions received and the dropout rate of the patients that signed informed consent. Of the 54 patients who signed informed consent, 9 did not start the education: 4 went abroad for a period exceeding 6 months, 2 were referred to secondary care (the latter two were initial exclusion criteria), and 3 were not able to follow the programme because of physical or psychological problems. Of the 45 patients that started the education, the educators reported that 19 (6 men and 13 women) dropped out from the programme. Both the number of dropouts and the reasons for dropout were similar between men and women. More older patients dropped out than younger patients (52% versus 29%, respectively; $p=0.14$). Going abroad for a longer period was the reason for dropout in 26% of the older and 10% of the younger patients ($p=0.25$). Finally, 26 patients (59%) completed the programme. A group of 11 women received more educational sessions (≥ 12) than originally planned. Migration history (years since migration), duration of diabetes and illiteracy were not associated with dropout.
Of the 45 patients that started the education, 36 (80%) were interviewed. The majority of patients was satisfied with the individual sessions (89%), the consultations with the GP (81%), and the group sessions (67%). Most patients felt that they were adequately controlled (89%) and were satisfied with being actively invited for a control visit (83%). Regular blood testing was felt to be a burden by 16 patients (44%). Overall, 92% of the patients was satisfied with the educators' competence and approach. The peer strategy was considered successful by most of the patients: 86% of the patients saw the educator as a good example and 94% appreciated that the educators spoke Turkish. However, 36% (31% of the men, 39% of the women) did not particularly identify themselves with the educator.

The educators felt that the effect of the education was hindered by several

patient-related factors, including personal problems (27%), family problems (23%), and patients' attitude such as secondary gain (11%) and disappointment with the results of the education (5%). Regular social visits and celebrations negatively influenced dietary advice in 18% of the patients. Physical complaints or refusal to go for a walk (without any purpose) hindered advice on exercise in 23% and 16% of the patients, respectively.

GP satisfaction with the education programme was high in 7 of the 9 GPs. One GP was dissatisfied with the education. Mean scores were: 7.2 (SD 2.8) for overall appreciation, 8.1 (SD 1.8) for the educators' dedication and 7.8 (SD 1.9) for the consultations with patient and educator (scale 1-10: low to high). Seven of the 9 GPs agreed that the quality of the control visits improved. Seven GPs felt they had an increased knowledge about the social conditions of the patient, and 8 of the 9 had a better understanding of what diabetes means to the Turkish patient. Only 5 GPs agreed that communication with the patient had improved (2 disagreed and 2 gave no opinion).
Although only 4 GPs thought that the patients were seen more frequently, all GPs experienced an increased workload (mean score 5.4; SD 2.0), for 2 GPs this increase was experienced as high.
Experienced problems with the education included difficulties in making appointments with the educator (2 of the 9 GPs). Finally, 5 GPs reported they would certainly make use of an educator in the future, 2 probably would and 1 certainly not.

Discussion and conclusion

Our peer diabetes programme was highly appreciated by most patients and most of the participating GPs. However, the dropout rate from the programme was high (41%) and all GPs perceived an increased workload. The main reason for dropout was going abroad for a longer period (18%).

The first principle of the education was tailoring, and the educators were allowed to adjust the length of the education to the needs of the patient. Interestingly, extension of the programme beyond the planned number of education sessions occurred in women only. An explanation for this could be that the educational sessions also provided some emotional support, since

the educators reported that the majority of these women lacked partner support and had personal problems. Although tailoring on the one hand is an important tool to link the education to the patient's needs, on the other hand the educational activity should remain focused on the behavioural aims. To determine the progress of the intervention and to decide whether to proceed or to cease the intervention, objective criteria related to behavioural aims of the intervention are needed.
The second principle of the education was peer education. This strategy tends to be most effective when age, beliefs and socio-economic status are similar to those of the target group. [10, 13] We could realize similarity in cultural background and language, but both educators were female, better educated and younger than the patients, and did not have diabetes themselves. Although the patients highly appreciated the cultural similarity and the shared language of the educators, they could not really identify themselves with the educators. Therefore, in this study, the educators are probably better described as bicultural educators.
The third principle was the use of the Health Counselling Model; this principle fits the first principle of tailoring. Although we did not explicitly evaluate the use of this model, the educators felt that use of the model formed a good basis to contact the patient, allowing them to take patients' knowledge and attitude into account.

The high dropout rate was caused in part by the patients going abroad for a longer period. In spite of the stated exclusion criterion "planning to go abroad for 6 months" a number of (particularly older) patients went to Turkey for longer than 6 months. We found only one other study (investigating Pakistani type 2 diabetics) that mentioned this specific reason for dropout. [4]
Considering the high dropout rate, we question whether the selection of the patients and length of the programme (maximally nine months) was optimal. Of the patients that dropped out after starting the education, 74% did so within the first 4 months. Therefore, we believe that starting the education with a run-in period, in which patients are fully screened on there ability and motivation to join the programme, will probably enable more effective selection of eligible patients for this intensive education, rather than shortening the programme itself.
The level of patient satisfaction was derived from the patient's interviews. Although the validity of their answers might be affected by

misunderstanding the questions and/or factors such as social desirability, there was no report of patients having difficulty in interpreting questions on patient satisfaction, and the result was not in conflict with the overall opinion of the educators.

The programme was developed for the primary care setting and was therefore restricted by the pre-limiting conditions such as available workspace, availability and cooperation of the GP. Although all GPs experienced a higher workload, this did not detract from their appreciation of the education programme. Improvement of the quality of the control visits and increased knowledge about Turkish diabetes patients seemed to compensate for the extra workload.
The dissatisfaction of one GP was partly caused by the feeling that the educator was 'used' by patients to raise new questions not specifically related to diabetes. This underlines the importance of carefully defining the tasks of the educator, and of a close cooperation between educator and GP.

Conclusions
We conclude that it is feasible to perform an education programme for diabetic immigrants in primary care. The ethic specific diabetes programme in general practice is well appreciated by both patients and GPs. However, the high dropout rate indicates that the programme needs to be more finely-tuned to the individual patient.

Implications for daily practice
This study was a first attempt to implement a structured ethnic-specific diabetes education programme in general practice. The GP is the first person to diagnose and treat uncomplicated diabetic patients. Because of the low threshold, the general practice is an appropriate place to reach diabetic immigrant patients. Although the present study is limited by a relatively small number of patients, the results are encouraging.
To reduce the dropout, the programme should be even more finely tuned, taking into account specific patient habits including e.g. a long stay abroad. In addition, starting the programme with a run-in period to more accurately select eligible patients for the intervention should be considered in the future. To control the time-span and the effectiveness of the intervention, objective criteria related to behavioural aims of the intervention are needed.

Figure 1. Flow chart of the intervention programme

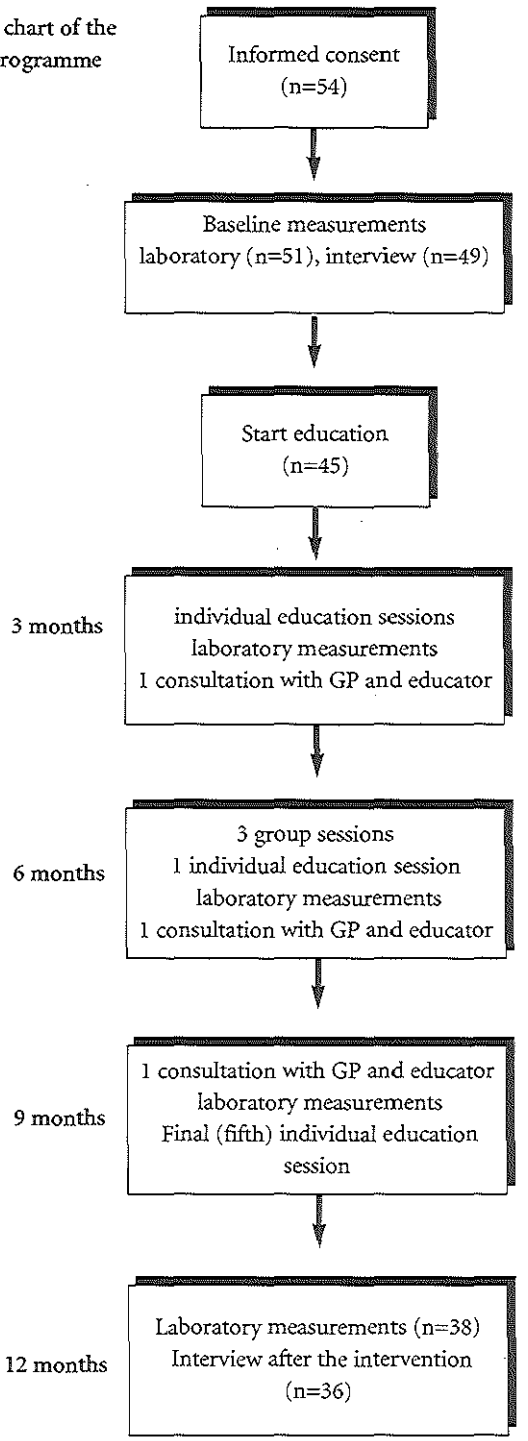


Table 1 Characteristics of the patients that signed informed consent. Data are mean (SD) or number of patients (% of the total). Except for age, all personal details are derived from the baseline interview.

	Male (n=21)	Female (n=33)	All (n=54)
Age (years)	53.5 (7.4)	48.9 (9.9)	50.7 (9.2)
Completed the baseline interview	20	29	49
Years since immigration	25.5 (6.7)	19.0 (5.0)	21.8 (6.5)
Years since diagnosis	5.3 (3.3)	6.2 (4.6)	6.0 (4.3)
Illiterate[1]	4 (20)	19 (66)	23 (47)
Cannot (or only poorly) read or write Dutch	19 (95)	25 (86)	45 (90)
Patient finds it difficult to understand the GP	10 (50)	20 (69)	30 (61)
Patient finds it difficult to ask GP questions	12 (60)	21 (72)	33 (67)

1) Illiterate: unable (or only poorly able) to read or write (Turkish or Dutch)

Table 2. Number of educational sessions received, and the dropout rate during the programme. Data are number of patients with % in parentheses.

	Male (n=21)	Female (n=33)	p-value*	All patients (n=54)
Received no education (dropped out before start)	5 (16)	4 (21)	0.26	9 (19)
Received education	16 (84)	29 (79)		45 (81)
Number of educational sessions and consultations received by the 45 patients that started the education				
Individual sessions				
1	1 (6)	6 (21)		7 (16)
2-3	3 (19)	5 (24)	0.17	8 (18)
4 (as planned)	8 (50)	6 (29)		14 (31)
>4	4 (25)	12 (57)		16 (36)
Group sessions				
0	6 (38)	10 (34)		16 (36)
1-2	2 (13)	4 (14)	0.98	6 (13)
3 (as planned)	8 (50)	15 (52)		23 (51)
Consultations with GP				
0-1	1 (6)	10 (34)		11 (24)
2	8 (50)	8 (28)	0.09	16 (36)
≥3 (as planned)	7 (44)	11 (38)		18 (40)
All educational session				
1-2	1 (6)	6 (21)		7 (16)
3-5	2 (13)	3 (10)		5 (11)
6-8	4 (25)	5 (24)	<0.01	9 (20)
9-11	9 (56)	4 (14)		13 (29)
≥ 12	0 (0)	11 (38)		11 (24)
Dropped out during programme	6 (38)	13 (45)	0.63	19 (41)
Reasons for dropout				
abroad for a longer period	3 (19)	5 (17)		8 (18)
education related	2 (13)	3 (10)	0.79	5 (11)
other reasons	1 (6)	5 (17)		6 (13)

* p-value for differences between men and women.

References

1. 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.
2. Middelkoop BJC, Kesarlal-Sadhoeram SM, Ramsaransing GN, Struben HWA. Diabetes mellitus among South Asian inhabitants of The Hague: high prevalence and age-specific socioeconomic gradient. Int J Epidemiol 1999; 28: 1119-23.
3 Riste L, Khan F, Cruickshank K. High prevalence of type 2 diabetes in all ethnic groups, including Europeans, in a British inner city: relative poverty, history, inactivity, or 21st century Europe? Diabetes Care 2001; 24: 1377-83.
4. Hawthorn K, Tomlinson S. One-to-one teaching with pictures – flashcard health education for British Asians with diabetes. Br J Gen Pract 1997; 47: 301-4.
5. Molokhia M, Oakeshott P. A pilot study of cardiovascular risk assessment in Afro-Caribbean patients attending an inner city general practice. Fam Pract 2000; 17: 60-2.
6. Brown SA, Garcia AA, Kouzekanani, Hanis CL. Culturally competent diabetes self-management education for Mexican Americans: the Starr Country border health initiative. Diabetes Care 2002; 25: 259-68.
7. Corkery E, Palmer C, Foley ME, Schechter CB, Frisher L, Roman SH. Effect of a bicultural community health worker on completion of diabetes education in a Hispanic population. Diabetes Care 1997;20: 254-7.
8. Milburn K. Critical review of peer education with young people with special reference to sexual health. Health Educ Res 1995; 10: 407-20.
9. Rakowski W. The potential variances of tailoring in health behaviour interventions. Ann Behav Med 1999; 21: 284-9.
10. Kocken P, Voorham A, Brandsma J, Swart W. Effects of peer-led AIDS education aimed at Turkish and Moroccan male immigrants in the Netherlands. A randomised controlled evaluation study. Eur J Public Health 2001; 11: 153-9.
11. Gerards F. Health Counseling: Damoiseaux V, Molen van der HT, Kok GJ (eds) Gezondheidsvoorlichting en gedragsverandering. Assen: van Gorcum 1993, 353 – 63.
12. Voorham AJJ, Kocken PL. Kenmerken van de voorlichter bij het effect van seniorenvoorlichting (characteristics of peer health educator and the effect of peer-led senior health education). Tijdschr Soc Gezondheidsz 2000; 78: 303-8.
13. Rogers E.M. Diffusion of innovations. 3d ed. New York: Free Press, 1983.

Ethnic specific diabetes education for Dutch-Turkish immigrant diabetics: predictors of compliance

Uitewaal PJM, Bruijnzeels MA, Hoes AW, Thomas S

Submitted

Abstract

Objectives. A study on the effect of ethnic specific diabetes education in Turkish diabetics indicated a beneficial effect on glycaemic control on female Turkish type 2 diabetes patients with increased HbA1c, but also substantial problems with compliance. The cost effectiveness of such a programme would improve if patients most likely to dropout or overuse the education facility could be identified. This issue is addressed here by assessing patient's related determinants of non-compliance, compliance and over-compliance to the education facility.
Design. Turkish type 2 diabetic patients from 7 general practices who formed the intervention group of a controlled experiment, and received an ethnic specific education programme by Turkish bicultural educators, were categorized into three groups: non-compliers, compliers and over-compliers. Patient characteristics including glycaemic control, diabetes-related complaints, literacy, stress and determinants of behavioural change (attitude, self-efficacy, social attitude) were measured.
Results. Compared to the compliers, non-compliers had a longer history of diabetes (odds 4.0; 95% CI [0.9 to 18.0]) and poorer knowledge of diabetes (odds 5.0; 95% CI [0.9 to 28.6]), whereas the over-compliers were more often younger (odds 7.9; 95% CI [1.4 to 45.8]), female, scored low on attitude (odds 5.0; 95% CI [0.9 to 26.8]) or self-efficacy towards behavioural change

(odds 4.7; 95% CI [0.8 to 28.0]), and experienced more stress (odds 7.3; 95% CI [0.8 to 68.9]).
Conclusion. Turkish patients having diabetes for a longer period and those with poor knowledge of diabetes are at risk to dropout from the ethnic specific diabetes education programme, while younger Turkish females scoring low on attitude or self-efficacy towards behavioural change as well as those with more stress, are more likely to over-use the education facility.

Introduction

Diabetes education can be considered a cornerstone in diabetes management. Education offered to immigrant populations with diabetes is troublesome and requires specific attention. [1,2] Between 1997 and 1999 we developed and evaluated a tailor-made diabetes programme for Turkish immigrants with type 2 diabetes within the general practice. The main result of this controlled experiment was a modest improvement in HbA1c in favour of the intervention group, which was most pronounced in women with an increased HbA1c level at baseline. [3] In addition, patients in the intervention group appreciated the education programme. Interestingly, however, we observed a group of patients that over-used the education facility (over-compliers), and a substantial dropout (41%) during intervention. [4] Both dropout and over-use affect the efficiency of the education programme. Identifying patients prone to dropout or over-use the facility would enable more specific tailoring the intervention to the patients' needs and thus consequently improve the benefits of such a programme. This issue is addressed by studying which patient characteristics are associated with non-compliance, compliance and over-compliance to the education facility.

Methods

Inclusion of practices and patients
The study, performed between 1997 and 1999, was set up as a controlled experiment. Turkish diabetes patients from seven practices (13 GPs) in the southern part of Rotterdam formed the intervention group. The control group comprised Turkish diabetics from nine practices (18 GPs) in the northern part of Rotterdam. Included were Turkish type 2 diabetes patients

younger than 75 years that were treated exclusively by their GP. Excluded were patients too ill to follow the intervention programme according to the GP, and patients planning to go abroad for more than 6 months during the study period.

Intervention programme
The programme was based on three principles: peer education, tailoring, and the Health Counselling Model. [5] The appointed Turkish educators were trained medical educators and were fluent in both the Turkish and Dutch language.
The planned programme consisted of a total of 10 educational interventions: four individual sessions, three group sessions and three 3-monthly consultations (with the educator, patient and GP present) in a maximally nine-month period. The educators were allowed to adjust the number of individual educational sessions to the patients' needs, but patients were expected to attend at least a total of 6 educational sessions. Apart from the regular consultations, the GP was asked to deliver usual care. All educational meetings took place in the GP's office.

Measurements
Compliance to the education facility was assessed by the total number of individual and group educational sessions and consultations together with educator and GP, and categorized into non-compliers (less than a total of 6 sessions), compliers (6 to 11 sessions), and over-compliers (12 or more sessions).

Patient characteristics studied included: age, gender, years since onset of diabetes, education (dichotomised as "at least finished primary school" and "no education"), illiteracy (categorised as not able to, or able to read or write either Turkish or Dutch), income, "stress" (positive if a patient agreed that any financial or personal problems hindered their diabetes self-care), glycaemic control at baseline (categorised as good (Hba1c $\leq$ 7%), moderate (7% < HbA1c < 8.5%) or poor (HbA1c $\geq$ 8.5)), diabetes related knowledge, three determinants of behavioural change (attitude, self-efficacy and social attitude) 6 and diabetes-related complaints.
Glycaemic control (HbA1c) was determined from a venous blood samples (fasting state) determined by the Variant-1 Biorad.
Diabetes-related knowledge was assessed using 31 questions derived from the

Dutch "general knowledge of diabetes mellitus questionnaire" (AKDM). [7] Attitude was assessed by using 10 questions on dietary habits, exercise and medication. Self-efficacy was assessed using a scale for self-efficacy for type 2 diabetes. [8] Social attitude was assessed with 10 questions on the patients' perceived opinion on eating behaviour, exercise and medication. The Type 2 Diabetes Symptom Checklist (DSC-type 2) [9] was used to measure the frequency and perceived burden of diabetes-related symptoms.
Patients were interviewed at baseline and again after one year. Data on patient characteristics were obtained from the baseline interview.

Data analysis
We assessed the influence of the baseline patient characteristics on the use of the education facility by means of a polytomous logistic regression model. The odds in this model express the odds of non-compliers and over-compliers, respectively, for several patient characteristics, using the compliers as the reference group.

Results

The intervention group consisted of 45 patients: 12 non-compliers, 22 compliers and 11 over-compliers.
Table 1 shows the influence of baseline characteristics on the use of the education facility. Patients having diabetes for more than 5 years (OR 4.0; 95% CI [0.89 to 18.0]), and patients scoring low on knowledge of diabetes (OR 4.95; 95% CI [0.86 to 28.6]) were more likely to be non-compliers. Patients younger than 50 years (OR 7.9; 95% CI [1.4 to 45.8]), scoring low on attitude (OR 5.0; 95% CI [0.93 to 26.8]) and self-efficacy (OR 4.7; 95% CI [0.78 to 28.0]) and patients experiencing stress (7.3; 95% CI [0.8 to 69]) were more likely to overuse the facility (over-compliers). The group over-compliers contained exclusively female patients.

Discussion

Our study shows that Turkish patients having diabetes for a longer period and those with relatively poor knowledge are at risk to dropout of the education programme, while Turkish female patients younger than 50 years,

and female patients scoring low on attitude or self-efficacy (i.e. low belief in their capability to organize and execute the course of action required to deal with prospective situations [7]) and those experiencing high "stress" (defined as: financial or personal problems hindering diabetes self-care, according to the patient), are more likely to overuse the educational facility.
Before discussing these results, some methodological remarks should be made. The study comprised a limited number of patients. The 95% CI is rather wide and therefore less weight should be given to exact odds ratios. Categorisation of the compliance is arbitrary because we did not know the optimal number of educational sessions. We decided that patients receiving less than a total of 6 educational sessions (non-compliers) missed a substantial part of the planned educational sessions. The educators were allowed to extend the number of education sessions beyond the planned number, e.g. if a patient has difficulty with learning or applying a specific behaviour. The programme as planned did not support the content of the extra sessions, thus there was a risk that the objectives for these extra sessions were not sufficiently clearly defined.
We assessed the crude effect of the education programme on the change of HbA1c after 12 months only adjusted for baseline value, using the control group (not exposed to the intervention) as a reference, and found a statistically significant improvement of the glycaemic control (0.6%; 95% CI [0.04 to 1.1]) only in the group "compliers" (data not shown). Apparently, overusing the facility is not associated with a greater effect on glycaemic control, suggesting the need of an upper limit to the number of educational sessions.
Although these findings must be interpreted carefully, since randomised comparison was not possible, they do emphasize the importance of the aim of this study. Knowing the most important characteristics of patients can help to render a more effective programme.

All intervention studies on diabetes education state the reasons for individual dropout, but very few studies on diabetes intervention programmes or ethnic minority groups attempt to relate patient characteristics with compliance. We observed a relationship between dropout and poor knowledge of diabetes, but as also reported in an earlier study [10], not with literacy or educational level.
Our study also shows a relationship between dropout and the duration of diabetes, suggesting that Turkish patients with a longer history of diabetes are

more difficult to motivate to complete an educational programme. This lower motivation may be due to previous experiences and failed attempts of behavioural change, which has been associated with increased guilt and behavioural relapse. [11]

Turkish female patients characterised by younger age, scoring low on attitude and self-efficacy, more often experiencing "stre ¨ and attending more educational sessions than originally planned, constitute a special group in our study. In terms of improvement of glycaemic control these women seem not to benefit more from the programme. This does not mean, however, that these women gain no benefit at all from the programme (e.g. the sessions may have helped with other problems), but these women may better be served by a programme more specifically tailored to their particular needs (e.g. stress management, which can positively influence long-term glycaemic control [12]). In the present study, the educators were specifically trained to deliver a diabetes education programme. However when the aims of the programme are hindered by personal problems or specific needs of the patient (such as social support), it is perhaps preferable for the educators to end the education programme, rather than trying to deal with the patients' personal problems or needs by merely extending the number of educational session.

Table 1 Influence of patient characteristics on the use of the education facilities, expressed as odds-ratio with a 95% confidence interval, calculated by polytomous logistic regression using the group "compliers" as reference.

		Use of the education facility				
	All (n=45)	Non-compliers (n=12)		Over-users (n=11)		p-value for difference between groups
	n	OR	[95% CI]	OR	[95% CI]	
Age ≤ 50 years	21	0.88	0.20 to 3.85	7.88	1.35 to 45.83	0.02
Male	16	0.23	0.05 to 1.10	NC	0.00 to 0.00	<0.01
Years since onset [a]						
> 5 years	19	4.0	0.89 to 18.0	1.60	0.32 to 7.91	0.17
Education [d]	26	1.78	0.36 to 8.81	2.00	0.32 to 12.5	0.66
Illiteracy [b]	24	0.56	0.09 to 3.41	0.66	0.10 to 4.24	0.78
Income						
(<864 euro) [e]	17	1.33	0.29 to 6.04	1.00	0.18 to 5.63	0.93
Stress [b]	23	0.52	0.12 to 2.32	7.27	0.77 to 68.9	0.04
HbA1c						
Good control ≤7%	11	1.14	0.17 to 7.48	0.95	0.17 to 5.28	0.89
Poor control ≥8.5%	14	0.61	0.08 to 4.53	0.39	0.06 to 2.64	
Diabetes-related complaints [c]						
Lowe score	25	0.51	0.11 to 2.36	0.54	0.11 to 2.72	0.62
Knowledge [b]						
Low score	24	4.95	0.86 to 28.6	1.38	0.29 to 6.60	0.15
Attitude [b]						
Low score	18	3.0	0.66 to 13.7	5.0	0.93 to 26.8	0.11
Self-efficacy [b]						
Low score	21	1.11	0.26 to 4.82	4.67	0.78 to 28.0	0.18
Social attitude [a]						
Low score	19	1.2	0.27 to 5.36	0.80	0.18 to 3.65	0.90

NC = can not be computed because of empty cells
Missing values: a = 3; b = 4; c = 5; d = 6; e = 7.

References

1. 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.
2. Simmons D, Shaw L, Kenealy T, Scott D, Scragg R. Ethnic differences in diabetes knowledge and education: the South Aukland Diabetes Survey. N Z Med J 1994; 107: 197-200.
3. Uitewaal PJM, Voorham AJJ, Bruijnzeels MA, Berghout A, Hoes AW, Bernsen RMD, Trienekens PH, Thomas S, Sturmans F. Effectiveness of diabetes education for Turkish type 2 diabetes patients on glycaemic control: a controlled experiment in general practice. Submitted.
4. Uitewaal PJM, Bruijnzeels MA, Hoop de T, Hoes AW, Thomas S. Feasibility of diabetes peer education for Turkish diabetes type 2 patients in Dutch general practice. Patient Educ Couns: In press.
5. Gerards F. Health Counseling: Damoiseaux V, Molen van der HT, Kok GJ (eds) Gezondheidsvoorlichting en gedragsverandering. Assen: van Gorcum 1993, 353 – 363.
6. Ajzen I. The theory of planned behaviour. Organ Behav Hum Decis Process 1991; 50: 179-211.
7. Pennings van der Eerden LJM, Ripken ThMJ, Heijst van PJM, Schrijvers AJP. Evaluation of the impact of a patient education programme for NIDMM patients on knowledge, self-care behaviour, metabolic control and lipid profiles. Gedrag en Gezondheid 1991; 19: 246-260.
8. Bijl JV, Poelgeest-Eeltink AV, Shortridge-Baggett L. The psychometric properties of the diabetes management self-efficacy scale for patients with type 2 diabetes mellitus. J Adv Nurs 1999; 30: 352-359.
9. Grootenhuis PA, Snoek FJ, Heine RJ, Bouter LM: Development of a type 2 diabetes symptom checklist: a measure of symptom severity. Diabetic Med 1994; 11: 253-261.
10. Corkery E, Palmer C, Foley ME, Schechter CB, Frisher L, Roman SH. Effect of a bicultural community health worker on completion of diabetes education in a Hispanic population. Diabetes Care 1997; 20: 254-257.
11. Krug LM, Haire-Joshu D, Heady SA. Exercise habits and exercise relapse in persons with non-insulin-dependent diabetes mellitus. Diabetes Educ 1991; 17: 185-188.
12. Surwit RS, van Tilburg MA, Zucker N, McCaskill CC, Parekh P, Feinglos MN, Edwards CL, Williams P, Lane JD. Stress management improves long-term glycaemic control in type 2 diabetes. Diabetes Care 2002; 25: 30-34.

General Discussion

The first aim of the studies included in this thesis is: To determine whether Turkish immigrants with type 2 diabetes mellitus are comparable with Dutch diabetes patients. This topic was further explored based on the question: Do Turkish type 2 diabetes patients have a similar risk for cardiovascular heart disease as the indigenous Dutch population? The results of the systematic review (Chapter 2) demonstrated that only limited knowledge is available on the prevalence of cardiovascular risk factors and the prevalence and incidence of cardiovascular disease in Turkish immigrants, and definitive conclusions cannot be drawn. The study in Chapter 3 showed that Turkish and Dutch diabetics have a similar absolute risk for coronary heart disease Calculated by means of the Framingham risk equation, but that individual risk factor levels differ. Yet the few available mortality studies show lower mortality rates from cardiovascular disease in Turkish immigrants than in the West European population.

The second aim of the studies presented in this thesis is to assess the effect and feasibility of an ethnic-specific peer-led education programme in Turkish type 2 diabetes patients. The study showed that such an education programme has no clear beneficial effect on glycaemic control or other cardiovascular risk factors in Turkish diabetes patients (Chapter 5), but the programme itself is highly appreciated by most patients and most of the participating GPs (Chapter 6), The studies also provided interesting insights on some problems related to diabetes management in primary care in general, and treatment problems related to the Turkish immigrant population in particular.

This thesis offers one of the first attempts to gain insight in the field of diabetes and cardiovascular disease in non-Western ethnic minority groups. In the remainder of this thesis four propositions will be presented and discussed related to this field, based on earlier studies and those reported in this thesis.

Proposition 1

Monitoring of the prevalence of diabetes and other cardiovascular risk factors, and the prevalence/ incidence of cardiovascular disease among non-Western immigrants living in the Netherlands is required to formulate target screening and treatment strategies.

Chapter two showed that the number of reports describing the prevalence of cardiovascular risk factors and the incidence of cardiovascular disease amongst non-Western migrant groups in the Netherlands is very limited, and the quality of most epidemiological studies performed is insufficient to estimate the current, let alone future, incidence of cardiovascular disease amongst non-Western migrant groups in the Netherlands. Since the number of non-Western immigrants in the Netherlands (particularly the number of elderly non-Western immigrants) will continue to grow (Figure 1) [1], the health burden related to diabetes and cardiovascular disease in non-Western immigrants will become increasingly important in the coming decades. Recently more and more information becomes available that the relation between diabetes and other cardiovascular risk factors, and the occurrence of cardiovascular morbidity and mortality also depends on ethnicity. [2-4] In people of African ancestry diabetes, hypertension and obesity are highly prevalent [5, 6], but cholesterol concentrations seems more favourable [4, 7] as in the white indigenous population. Based on the prevalence of diabetes and cardiovascular risk factors cardiovascular heart disease (CHD) rates are unexpectedly low in Africans, who seems to enjoy a certain protection from heart disease. [3, 4]

In people from South Asia, diabetes and obesity are also highly prevalent, but cholesterol concentrations are less favourable as in the Africans, and hypertension is less prevalent. [8] Opposite to this, the prevalence of CHD in South Asians is even higher as can be predicted based on the prevalence of the cardiovascular risk factors, and South Asian origin seems to be an independent predictor of cardiovascular mortality. [2]

Additional, the incidence of diabetes-related complications and the risk for cardiovascular disease varies not only between, but also within, immigrant groups. [9-15] Differences in background and culture, and also in the ability to cope with changes associated with immigration, will vary between countries and, evidently, individuals. There will be differences in the reasons for migration, i.e. selective forces on migration, effects of exposure (including

culture and lifestyle from the old country), and characteristics of the new country (e.g. social class system, living conditions, health care system). Therefore, it is difficult to apply data to the Dutch situation. For instance, African Americans have different migration histories, cultural values and positions in the American society, than African-Surinamese persons migrated to the Netherlands. African descent can, therefore, not be seen as one uniform ethnic group, which means that, for example, differences in cardiovascular risk factors and cardiovascular disease between these "African" groups can be expected. Indeed, substantial variation in cardiovascular mortality rates within the Black population, even in America has been reported. [9] Therefore, data from ethnic groups living in the Netherlands are necessary to formulate adequate screening and treatment guidelines. In particular cohort studies on the incidence of type 2 diabetes, the prevalence of other cardiovascular risk factors and prevalence/ incidence of cardiovascular disease amongst members of non-Western ethnic groups, living in the Netherlands, would be of value. Because the composition of the group non-Western immigrants will continue to change [1], not only should largest immigrant groups such as the Turks and Moroccans be studied, but also growing immigrant groups such as the Asians, who are expected to become the largest immigrant group in the Netherlands in the future. [1] The stream of new immigrants, and the influence of the Dutch environment on the immigrants, will cause continuous changes in cardiovascular risk profile of the migration groups. This implies that regular monitoring of the cardiovascular risk factors and cardiovascular diseases is required among these immigrant groups.

Proposition 2

The higher prevalence of type 2 diabetes in non-Western ethnic minorities does not justify screening for diabetes.

The number of people in the Netherlands that can be considered as members of non-Western ethnic minorities will increase from 0.97 million in 2002 to 1.45 million in the year 2030 (i.e. approximately 8% of the Dutch population in 2030) (Figure 1a). [1] The number of elderly (65+) persons in non-Western minority groups is still very small compared to the total number of elderly (40,000 or 1.8% of the total number of elderly), but will increase to 270,000

in the year 2030 (7.1% of the total number of elderly) (Figure 1b). The prevalence of diabetes in Turkish and Moroccan immigrants is 1.3 to 3.9 higher than in the Dutch indigenous population, but a high prevalence of diabetes is also found in other ethnic minority groups living in the Netherlands, such as in Surinamese and South Asians. [16, 17] Chapter 3 of this thesis, and also other epidemiological studies, have shown that a young onset of type 2 diabetics (< 50 years) is common in several ethnic minority groups in the Netherlands 16-19, but an other study in ethnic minority groups reports that the higher prevalence is consistent in all age groups. [20] Diabetes prevalence in Dutch persons aged over 60 years is around 16%. [21] If indeed the prevalence of diabetes in ethnic minority groups is 1.3 to 3.9 higher, this will mean that as much as 20% to 60% of the persons from these groups will develop diabetes.

Undiagnosed diabetes is a common condition because up to 50% of those with the disease are undiagnosed. [22-24] Undiagnosed type 2 diabetes is a serious condition since there is evidence that microvascular complications start to develop at least 7 years before the clinical diagnosis, and also patients with undiagnosed type 2 diabetes are at significantly increased risk for macrovascular disease. Diabetes-related complications and hospitalisation are important determinants of the medical costs attributable to type 2 diabetes that currently already contribute 3.4% of the total health costs in the Netherlands. [25] Prevention of disease progression and complications are important to prevent unaffordable high costs and to improve the patient's quality of life. [26] These, perhaps, impressive figures, however, do not necessarily imply that screening for diabetes mellitus in ethnic minorities is cost-effective.

The, classical, ten criteria presented by Wilson and Jungner in 1968 [27] would serve as a guide in deciding whether screening is appropriate. In view of these criteria, an American expert committee recommends to consider testing for diabetes in all individuals aged 45 years and older, and at an even younger age in members of high-risk ethnic minorities. [23] Targeted screening in specific subgroups is also advocated by Wareham and Griffin [28] and, thus, screening for diabetes in high-risk non-Western immigrants on diabetes could be advocated. However, the benefits of early detection and treatment of undiagnosed diabetes have not been proven, and the effectiveness of screening for diabetes and treating hyperglycaemia to reduce diabetes-related complications depends on the prevalence of undiagnosed diabetes, the background cardiovascular risk, and the reduction of cardiovascular events

in those screened and treated. [28] Before screening in ethnic minorities in the Netherlands can be considered, some important issues should be clarified.
First: Diagnostic cut-off points for diabetes are also based on the risk of the complications of the disease. As discussed in Chapter 2, for ethnic minority groups living in the Netherlands it remains unclear to what extent hyperglycaemia is related to diabetes-related complications; therefore, more research is necessary to establish which groups are at risk for diabetes-related complications.
Second: Which minority groups should be targeted? Should second or third generation immigrants be included as well and, if so, how can we efficiently detect these persons without infringement of the privacy laws and without stigmatising them? Before a screening programme is considered, a clear definition of the target group is required.
Third: Although the incidence of diabetes-related complications can be postponed or complications can be treated early, when diabetes patients are strictly controlled [29], it may be difficult to reach such a strict control of hyperglycaemia. As was shown in Chapter 5, even an intensive diabetes programme was not able to improve clearly glucose metabolism and other cardiovascular risk factors in Turkish diabetes patients. It is unlikely that GPs in inner cities (who already overloaded) will be prepared to cope with an increased demand for diabetes care caused by effective screening. Therefore diabetes management for diabetes patients from non-Western ethnic groups should be optimised, perhaps by means of bicultural workers, before a screening programme is considered.

Proposition 3

The general practitioner is not sufficiently equipped to provide adequate diabetes management for patients from non-Western ethnic minority groups with type 2 diabetes.

The GP's perspective
In the Netherlands, as in many other countries, uncomplicated type 2 diabetes patients are primary managed by GPs. This policy offers many advantages. In the Netherlands, the patient and often their relatives, are enlisted with one general practice. Such a physician-patient relationship usually lasts for many years and enables the GP to provide personal and

continuing care, which has high priority in patients. [30] The GP is easily accessible and available and treatment by the same physician is attractive to most patients. [30] Because of these conditions, the general practice is an adequate setting for the management of chronic disorders such as type 2 diabetes. Indeed some reports show that GPs are capable of providing equally high quality care for type 2 diabetics as hospitals [31, 32], and diabetes care further improves if the GP is able to structure that care. [33-35] On the other hand, GPs also experience difficulties in helping diabetes patients to change their lifestyle, and finding enough time to achieve these goals. [36]

In non-Western ethnic minority groups, language difficulties and the cultural gaps will further aggravate these before mentioned difficulties in diabetes management. This was confirmed by the results of an interview we conducted among the GPs participating in our study. The three most often mentioned difficulties that GPs experienced in treating Turkish diabetics were: lack of patient understanding concerning the illness and its treatment (45% of the GPs), communication problems (33% of the GPs), and non compliance to, or non acceptance of dietary advice (52% of the GPs). Members of non-Western ethnic groups do not always share the beliefs and values inherent to Western culture and the biomedical model in particular. Undesirable behaviour and ignorance about the patient's underlying beliefs and values may lead to irritations [37], and GPs should be aware to developing a fatalistic attitude toward immigrant patients, thinking that nothing they do will change the patient's behaviour. [38] Indeed, some of the GPs that refused to participate in our study, remarked that Turkish patients simply do not want to follow dietary advice and other treatment instructions.
Results of a meta-analysis on diabetes education suggested that interventions must meet the individual needs of patients. [39] To provide culturally competent diabetes care and to meet the individual needs of immigrant patients a particular set of skills is required, including: adapting communication patterns, modifying diabetes education programmes (learning style, reading level, patient education materials), and eliciting information about the patient's logic of non-compliance. [38] However, due to lack of time and resources, it is difficult for GPs to learn these skills. As shown in Chapter 4, GPs working in inner city areas show poor adherence to the diabetes guidelines in both Turkish and Dutch patients. Notwithstanding this similar (although rather far from ideal) care offered to Turkish and Dutch type 2 diabetes patients, glycaemic control in Turkish immigrant

diabetics is poorer. GPs in the inner city apparently need more support to provide adequately diabetes care, meeting the individual needs of different ethnic groups.

The patient's perspective
Patient compliance is essential for good quality diabetes management. In particular in older Turkish immigrant patients, non-compliance is associated with: 1) language or communication barriers, 2) cultural barriers, 3) education level, and 4) psychological/ social problems.

1) Language or communication barriers
Language barriers contribute to miscommunication and inappropriate treatment plans, often resulting in decreased client and provider satisfaction, poorer client understanding of the disease, and poorer compliance. [38, 40] For such a complex and life-long treatment as in diabetes, overcoming language barriers is crucial. Patients must be fully informed about their treatment, and should not be left with uncertainties and unanswered questions.

2) Cultural barriers
Mutual understanding is not only explained by understanding the language. It appeared that in patients with traditional (non-Western) beliefs and values there was less mutual understanding between GP and patient. Less mutual understanding is associated with non-compliance [34]; in other words the cultural distance between GP and patient does matter. Patients with type 2 diabetes are supposed to alter their diet, most of them should lose weight, need to engage in regular exercise, and use medications. They must become familiar with the concept of having a chronic disease and of preventive medicine. All of these issues are culturally bound. Advice that do not correspond with the beliefs of the patient will probably not be followed. If, for example, a Turkish patient does not feel ill, they will have difficulty accepting that they have a chronic disease. The advice to exercise at least 30 minutes per day is not likely to be followed by older Turkish women, who refuse to walk without a specific purpose, and whose regular social visits and celebrations may negatively influence compliance to advices on dietary habits (Chapter 6). The care provider should understand these cultural barriers and, if possible, advice should aim to make use of cultural elements rather than negate them. This can only work if diabetes treatment is made culturally "sensitive", rather than culturally "neutral".

3) Education
Most of the older Turkish immigrants have a low level of education (three years at primary school or less). In our study, as much as 50% of the patients was illiterate. This has major implications for the learning capacity of the patients. Most of the education materials are developed for patients able to read and write, and able to understand abstract figures. Advice must therefore be concrete. Different education methods include making use of flash cards [42] , group education, peer education. In addition story telling , and making use of metaphors may increase the success rate.

4) Psychological or social problems
Turkish immigrants less often report they are in good health than the indigenous population. [43, 44] Stress and depression seem more prevalent particularly among female immigrants [45] and are associated with poor glycaemic control. [46] Problems related to migration and the poor socio-economic position of the immigrant are cited as probable causes of this perceived poor health status. [43, 47] Isolation, lack of support, and fear to discuss problems with relatives often leave little opportunity to share problems or to obtain support. Other problems can further hinder diabetes treatment, in Chapter 7 it was shown that in Turkish diabetes patients, personal and family problems frequently hampered the education offered. When patients are so involved with too many problems, little opportunity remains to absorb new information. Stress was seen by most Turkish women in the intervention group of our study as the most important factor causing diabetes and poor glycaemic control. In some of these women, the education seemed to be used to discuss problems in general rather than to focus on diabetes management (Chapter 7). Although solving or coping with the problems is important for both the well-being of the patient and for the improvement of glycaemic control, there is a danger of losing sight of the educational goals.

Proposition 4

High quality diabetes care is based on teamwork, which should include the support of a bicultural worker for the care of diabetes patients from non-Western minorities.

As outlined above it may be questioned whether the GP currently is the best equipped health care professional to provide diabetes care, in particular to patients from an ethnic minority group. In view of this GPs try to restructure diabetes management: they organise special diabetes office hours, delegate aspects of diabetes management to their assistant, or employ practice nurses to organise diabetes care. Also outside the general practice office, regional laboratories offer to take over periodic diabetes control. How will these developments affects the care for ethnic minority groups?
Based on experience and the available knowledge, an attempt was made to assess the capability of various health care providers in primary care to deliver high quality of care in different aspect of diabetes management for immigrant patients (Table 1).

General practitioner
As mentioned before the GP holds an ideal position to provide care for chronic disease, including diabetes. Language difficulties, however, may prevent immigrant patients from adequately expressing themselves, and important complaints might be overlooked by the GP. Studies have shown that routine check-ups in all diabetes patients are performed less often by the GP than recommended in the guidelines. [48, 49] Interviews with GPs showed that most do not systematically invite their diabetes patient for regular screening visits. Although most GPs to can delegate routine check-ups, the GP remains responsible for treatment decisions in primary care, including medication adjustments. If the GP does delegate some aspects of the total diabetes care, optimal communication with the other care providers is necessary to maintain this responsibility.

Diabetes specialist nurses
In recent years several experiments with diabetes specialist nurse for the treatment of type 2 diabetes patients in primary care were performed. [16, 50] Participating GPs receive support from a diabetes specialist nurse for practical implementation of existing guidelines with respect to performing

the annual check-ups and education in patients with diabetes. Diabetes specialist nurses seem very well capable to provide high quality a diabetes care. [51, 52] However, a recent systematic review shows that the presence of a diabetes specialist nurse may improve patient' diabetic control over short time periods, but the effects over longer periods are not evident. [50] So the costs-effectiveness of the diabetes specialist nurse remains questionable. Given enough time, these nurses may perform the several tasks related to the periodic check-ups as well as provide diabetes education. A study in which diabetes nurses offered culture-specific diabetes care showed an improvement in glycaemic control in patients with a HbA1c level above 7.5%. [16] However, those patients with the lowest level of education were not reached in this intervention. [53] Another special education study for illiterate South Asian diabetes patients also reported difficulties in improving HbA1c level. [42] Whether diabetes specialist nurses can overcome communication and cultural barriers in these low educated illiterate patients from ethnic minority groups in particular, remains questionable.

Nurse practitioner

A recent development in Dutch general practice is the support of the GP by a nurse practitioner. Some small reports showed positive results of the help of a nurse practitioner in diabetes care, by organizing the diabetes care in special diabetes office hours. [54] Organizing diabetes care in such way increases the opportunity to have an adequate overview of the diabetes population and also facilitates regular invitation of patients to visit the GP office. Nurse practitioners are trained to perform routine medical check-ups including blood test and physical examination, and to monitor patients for complaints and compliance. They provide dietary advice, but are currently not allowed to adjust the medication without consulting the GP. They have no special training to cope with patients from ethnic minorities, and therefore have the same shortcomings in providing diabetes care to migrant patients as the diabetes specialist nurses (and physicians alike). It is unknown whether the support of these nurse practitioners is cost-effective, but studies on this subject in the Netherlands are currently conducted.

Physician's assistant

Many GPs delegate routine aspects of diabetes care to their assistants. This has relieved the GP in the tasks of providing diabetes care, and may have improved the quality of the regular check-ups. [55] Most assistants are able to

perform a blood test and simple physical examination and, if diabetes care is organised in special diabetes office hours, this enables better monitoring of patients. Whether these aims have been achieved is not yet known, because controlled studies have not been performed. Physician's assistants are not allowed to make treatment decisions, and are not explicitly trained to educate patients. They will usually provide "ethnic neutral" diabetes care, with all limitations associated with such diabetes care for patients from ethnic minorities. Although not yet studied, their help may well be cost-effective, because this work is usually incorporated in the normal working day and thus could have a positive outcome on the quality of diabetes care.

Regional laboratory
GPs usually send patients for monitory of plasma glucose or HbA1c levels to regional laboratories, which are well equipped to invite patients for regular check-ups. Some regional laboratories have broadened their service to include a dietician and a diabetes specialist nurse, and offer to take over the periodic diabetes check-ups. Whether such visits for the regional laboratory also includes monitoring of complaints and compliance is unclear.
Until now this kind of diabetes care is ethnic neutral, but bicultural educators (see below) could be appointed to help patients from ethnic minority groups. This would allow to reach all immigrant patients in a large area, and not only those from a few general practices. In addition more people from one ethnic group could undertake group education, which is less costly and probably more effective than individual education.
However, since the GP remains responsible for therapeutic decisions, communication and feedback between laboratory and GP are essential to adjust therapy. Patients must be aware (and well informed) of this dichotomy between periodic check-up and treatment decisions. If not, there is a risk of under-treatment if the patient does not keep the appointment for check-up, or fails to contact the GP after the control visit to the laboratory, which might be even more a point of concern in patients from ethnic minorities.

Bicultural educator
Recently professional bicultural educator were introduced in primary care. Including such an educator in the primary health care team offers many opportunities: education is highly accessible for patients from the same ethnic group as the bicultural educator, the continuity of care can be guaranteed, the educators can be closely supervised by the GP, and

consultations with both GP and educators are easy to arrange. This, however, can only flourish if the educator can works on a regular basis, which means that the practice must offer a sufficient number of patients from the same ethnic group. Such a condition can only be fulfilled in areas with a high concentration of persons from one ethnic minority group, and cooperation between GPs. The task of the bicultural educator usually is limited to asking the patient about his/ her complaints and monitoring compliance, educate and support patients in behavioural changes. Due to their own cultural background the educator is qualified to provide ethnic-specific diabetes care, without language barriers. Bicultural educators usually do not perform physical examinations, take blood samples, or make treatment decisions. Assigned to the general practice they are well appreciated by most patients and GPs (Chapter 7), but have no clear beneficial effect on the glycaemic control (Chapter 5). Whether education by bicultural workers is also cost-effectiveness is currently studied in several trials. One trial focuses on the cost-effectiveness of intensive treatment of patients at (high) risk for a cardiovascular disease by a primary health care team including a bicultural worker, and another trail studies the cost-effectiveness of the support of bicultural educators in educating female Turkish diabetes patients in poor glycaemic control (HbA1c ≥ 8.0%).

Peer educator (immigrant diabetes patient)
Learning from peers many advantages; there are no cultural or language barriers, and the patient can recognize their own situation via the peer, making it easier for the patient to follow behavioural advice. Compliance to behavioural advice and some parts of the education is an important aspect of diabetes care that can be stimulated or taught by peers. However, because the peer is not a professional worker and is not equipped to perform medical tasks, he or she can only support diabetes care. There are some promising reports on peer education imbedded in a diabetes care programme, reporting that a diabetes programme supported by peers was culturally relevant and acceptable and had better outcome. [56-59] Therefore, it is worthwhile to further study the possibilities of peer support in ethnic-specific diabetes education. Table 1 shows an assessment of the capability to provide different aspects of diabetes care by the (possible) providers of primary diabetes care in the immigrant patient. It also shows that there is insufficient evidence to assess the cost-effectiveness of these possible care suppliers, and further studies are essential to make such assessment possible.

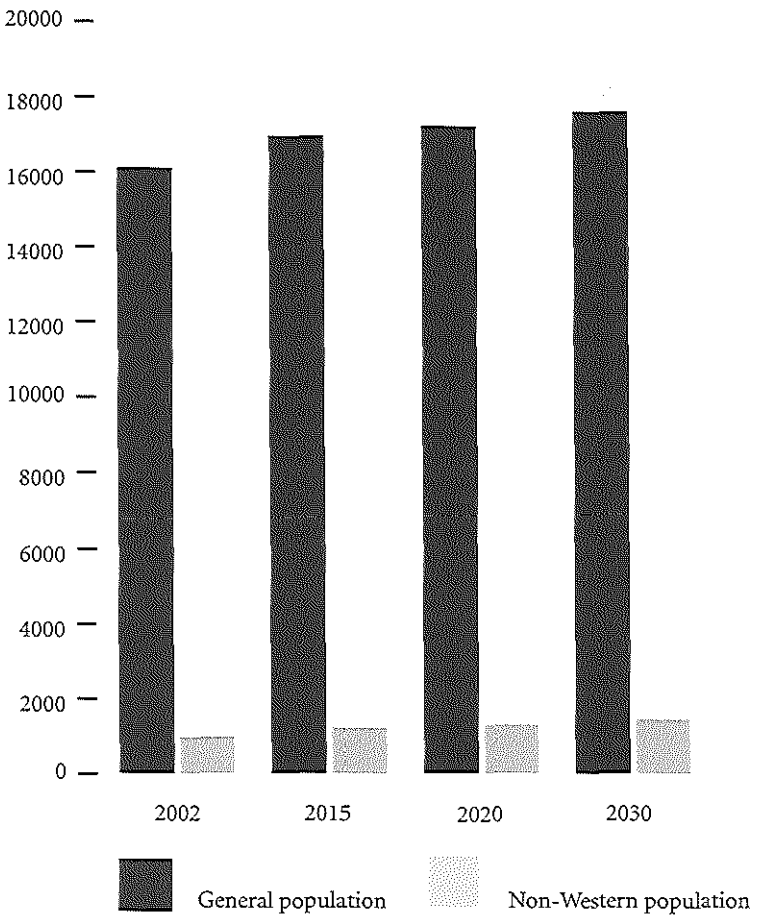
Based on the assessments shown in Table 1 the best conditions to provide good diabetes care to immigrant patients, who often do not master the Dutch language, are:

- the GP receives support for the routine diabetes check-ups from a diabetes specialist nurse, or a nurse practitioner, and the physician's assistant
- the regional laboratory invites the patients for the periodic blood test (HbA1c, plasma glucose and lipid measurements)
- a bicultural educator supports the patient with ethnic specific diabetes education in their preferred language, and supports the GP in bridging the language and cultural gap between GP and patient during consultations between GP and patient.

However, if communication fails between the care providers there is a risk that treatment decisions, routine controls and education and patient support will be insufficiently geared to one another, resulting in even poorer treatment results. Good diabetes care should be based on good teamwork, and this applies even more so in the case of poorly educated immigrant diabetics, since this group will have more difficulties in communication and to stand up for them-self.

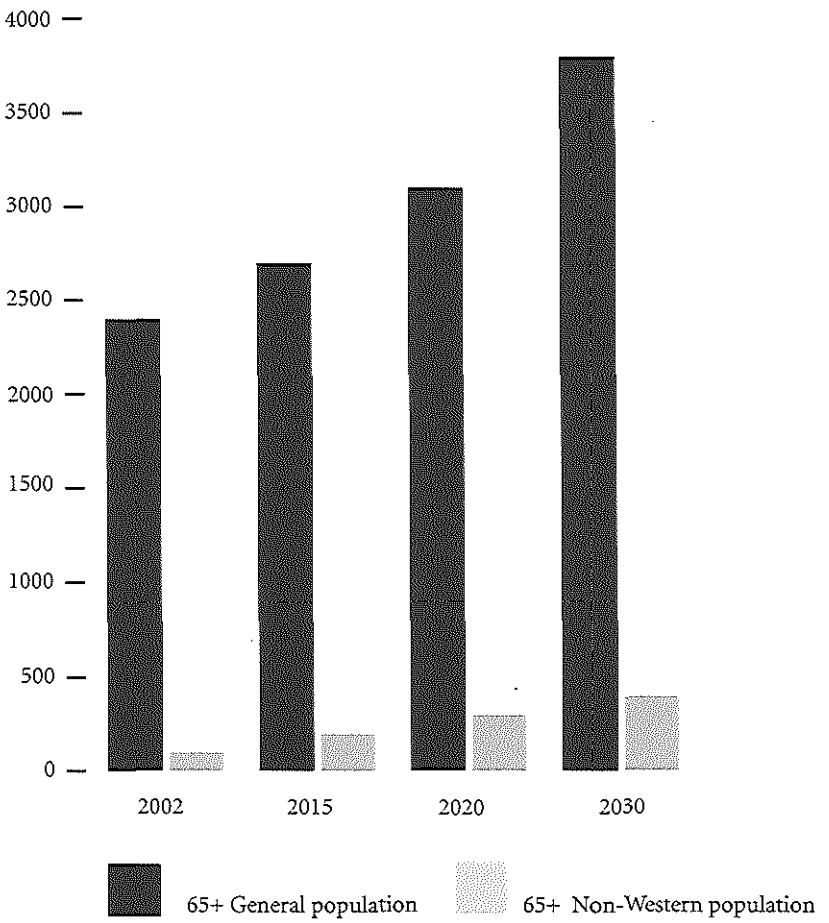
Future intervention studies on diabetes care are necessary and should not only focus on the contribution of one new element in diabetes care, but also take into account the quality of the cooperation between the various care providers.

Figure 1a Demographic prognosis 2002-2030 of the Dutch general population and the non-Western population (numbers x 1000).



Data from CBD 2003[1]

Figure 1b Demographic prognosis 2002-2030 of the elderly (aged 65+ years) Dutch general population and the elderly non-Western population (numbers x 1000).



Data from, CBS 2003[1].

Table 1. Assessment of the capability to provide different aspects of diabetes care by the (possible) providers of primary diabetes care in the immigrant patient.

Primary diabetes care providers by	Aspects of diabetes management							
	Periodic diabetes control						patient education	cost-effectiveness
					anamnesis			
	blood test	physical exam	treatment decisions	inviting the patient	complaints	compliance		
GP	+	++	++	•	+	•	•	reference
Diabetes specialist nurses	+	++	+	+	+	•	•	?
Nurse practitioner	+	+	--	+	+	•	•	?
Physician's assistant	+	+	--	+	+	•	•	?
Bicultural educator	--	--	--	+	+	++	++	?
Peer educator	--	--	--	?	--	+	+	?
Laboratory	++	?	--	++	?	?	--	?

++ very good
+ good
• moderate
- poor
-- not able/ not allowed
? unknown

References

1. Centraal Bureau voor de Statistiek (CBS). Bevolkingstrends: kerncijfers voor de allochtonen prognose 2002-2050, 18 maart 2003. (Statistics Netherlands, March 2003). Khattar RS, JD Swales, Senior R, Lahiri A. Racial variation in cardiovascular morbidity and mortality in essential hypertension. Heart 2000; 83: 267-71.
2. Chaturvedi N, Jarrett J, Morrish N, Keen H, Fuller JH. Differences in mortality and morbidity in African Caribbean and European people with non-insulin dependent diabetes mellitus: result of 20 year follow up of a London cohort of a multinational study. BMJ 1996; 313: 848-52.
3. Anonymous (U.K. Prospective Diabetes Study Group). The incidence of myocardial infarction in white, South Asian, and Afro-Caribbean patients with type 2 diabetes (U.K. Prospective Diabetes Study 32). Diabetes Care 1998; 21: 1271-7.
4. Oten MW, Teutsch ST, Williamson DF, Marks JS. The effect of known risk factors on the excess mortality of black adults in the united states. JAMA 1990; 263: 845-50.
5. Cappuccio FP. Ethnicity and cardiovascular risk: variation in people of African ancestry and South Asian origin. J Hum Hypertens 1997; 11: 571-6.
6. Cowie CC, Howard BV, Harris MI. Serum lipoproteins in African Americans and whites with non-insulin-dependent diabetes in the US population. Circulation 1994; 90: 1185-93.
7. Bhopal R, Unwin N, White M, et al. Heterogeneity of coronary heart disease risk factors in Indian, Pakistani, Bangladeshi, and European origin populations: cross sectional study. BMJ 1999; 319: 215-20.
8. Fang J, Madhavan S, Alderman MH. The association between birthplace and mortality from cardiovascular causes among Black and White residents of New York City. N Engl J Med 1996 21; 335:1545-51.
9. Head J, Fuller JH. International variations in mortality among diabetic patients: the WHO Multinational Study of Vascular Disease in Diabetics. Diabetologia 1990; 33: 477-81.
10. Matsumoto T, Ohashi Y, Yamada N, Kikuchi M. Coronary heart disease mortality is actually low in diabetic Japanese by direct comparison with the Joslin cohort. Diabetes Care 1994; 17:1062-3.
11. Nelson RG, Sievers ML, Knowler WC, Swinburn BA, Pettitt DJ, Saad MF, Liebow IM,Howard BV, Bennett PH. Low incidence of fatal coronary heart disease in Pima Indians despite high prevalence of non-insulin-dependent diabetes. Circulation 1990; 81:987-95.
12. Brancati FL, Kao WH, Folsom AR, Watson RL, Szklo M. Incidence type 2 diabetes mellitus in African American and white adults: the Atherosclerosis Risk in Communities Study. JAMA 2000; 283 :2253-9.
13. Chandie Shaw PK, Vandenbroucke JP, Tjandra YI, Rosendaal FR, Rosman JB, Geerlings W, de Charro FT, van Es LA. Increased end-stage diabetic nephropathy in Indo-Asian

immigrants living in the Netherlands. Diabetologia 2002; 45: 337-41.
14. Pickle LW, Gillum RF. Geographic variation in cardiovascular disease mortality in US Blacks and Whites. J Natl Med Assoc 1999; 91: 545-56.
15. Middelkoop BJC, Wal van der G, Geelhoud-Duijvesteijn PHLM. Effectiveness of culture-specific diabetes care for Surinam South Asian patients in The Hague: a randomized controlled trial/ controlled before-and-after study. Diabetes Care 2001; 24: 1997-8.
16. 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 of Epidemiol 1998; 14: 693-9.
17. Weijers RNM, Goldschmidt HMJ, Silberbusch J. Vascular complications in relation to ethnicity in non-insulin-dependent diabetes mellitus. Eur J Clin Invest 1997; 27: 182-8.
18. Dijkstra S, Klok M, Hoogenhuyze van D, Sauerwein HP, Berghout A. Ischaemic heart disease in Turkish migrants with type 2 diabetes mellitus in the Netherlands: wait for the next generation? Ned J Med 2002; 60: 21-4.
19. Struben H.W.A, Middelkoop B.J.C. Gezondheidsvragen in de stadsenquête Den Haag 2001; de uitkomsten bekeken in relatie tot de etnische achtergrond. Epidemiologisch bulletin 2002; 37: 2-14.
20. Ballegooie E.van, Heine RJ. Diabetes mellitus. Bunge, Utrecht 1995; 2nd edition.
21. Mooy JM, Grootenhuis PA, de Vries H, Valkenburg HA, Bouter LM, Kostense PJ, Heine RJ. Prevalence and determinants of glucose intolerance in a Dutch Caucasian population. The Hoorn Study. Diabet Care 1995; 18: 1270-3.
22. Report of the expert committee on the diagnosis and classification of diabetes mellitus. Diabet Care 1997; 20: 1183-97.
23. Rathmann W, Haastert B, Icks A, Lowel H, Meisinger C, Holle R, Giani G. High prevalence of undiagnosed diabetes mellitus in Southern Germany: Target populations for efficient screening. The KORA survey 2000. Diabetologia 2003; 46:182-9.
24. Redekop WK, Koopmanschap MA, Rutten GE, Wolffenbuttel BH, Stolk RP, Niessen LW. Resource consumption and costs in Dutch patients with type 2 diabetes mellitus. Results from 29 general practices. Diabet Med 2002; 19: 246-53.
25. Koopmanschap M; CODE-2 Advisory Board. Coping with type II diabetes: the patient's perspective. Diabetologia 2002; 45: S18-22.
26. Wilson JMG, Jungner G. Principles and practice of screening for disease. Public Health Paper number 34, Geneva: WHO, 1968.
27. Wareham NJ, Griffin SJ. Should we screen for type 2 diabetes? Evaluation against National Screening Committee criteria. BMJ 2001; 322: 986-8.
28. UK prospective Diabetes Study Group. Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes 38. BMJ 1998; 317: 703-13.

29. Vedsted P, Mainz J, Lauritzen T, Olesen F. Patients and GP agreement on aspects of general practice care. Fam Pract 2002; 19: 339-43.
30. Parnell SJ, Zalin AM, Clarke CW. Care of diabetic patients in hospital clinics and general practice clinics: a study in Dudley. Br J Gen Pract 1993; 43: 65-9.
31. Singh BM, Holland MR, Thorn PA. Metabolic control of diabetes in general practice clinics: comparison with a hospital clinic. Br Med J (Clin Res Ed) 1984: 289: 726-8.
32. Ruten GEHM, Verhoeven S, Heine RJ et al. NHG-standard diabetes mellitus type 2 (eerste herziening) 1999; 2: 67-84.
33. Kronsbein P, Jorgens V, Muhlhauser I, Scholz V, Venhaus A, Berger M. Evaluation of a structured treatment and teaching programme on non-insulin-dependent diabetes. Lancet 1988; 2: 1407-11.
34. Sonnaville JJ de, Bouma M, Colly LP, Deville W, Wijkel D, Heine RJ. Sustained good glycaemic control in NIDDM patients by implementation of structured care in general practice: 2-year follow-up study. Diabetologia 1997; 40: 1334-40.
35. Agarwal G, Pierce M, Ridout D. The GP perspective: problems experienced in providing diabetes care in UK general practice. Diabet Med 2002; 19 (suppl 4): 13-20.
36. Pinto D. Interculturele comunicatie. Bohn Stafleu van Loghum 1994.
37. Tripp-Reimer T, Choi E, Enslein JC. Cultural barriers to care: inverting the problem. Diabet Spectrum 2001; 14: 13-22.
38. Brown SA. Meta-analysis of diabetes patient education research: variations in intervention effects across studies. Res Nurs Health 1992; 15: 409-19.
39. van Wieringen JC, Harmsen JA, Bruijnzeels MA. Intercultural communication in general practice. Eur J Public Health 2002; 12: 63-8.
40. Harmsen H. Meeuwesen L, Wieringen J, Bernsen R, Bruijnzeels MA. When cultures meet in general practice: intercultural duifferences between GPs and parant of child patients. Patient Educ Counsel 2003 in press.
41. Hawthorne K, Tomlinson S. One-to-one teaching with pictures—flashcard health education for British Asians with diabetes. Br J Gen Pract 1997; 47: 301-4.
42. Uniken Venema P. Toen ik hier kwam was ik kerngezond; de gezondheid van Turkse in Nederland (I was healthy when I came here; the health situation of Turks in the Netherlands). PhD. thesis Erasmus University Rotterdam, 1989.
43. Mirdal GM. The condition of "tightness": the somatic complaints of Turkish migrant women. Acta Psychiatr Scand 1985; 71: 287-96.
44. Ritsner M, Ponizovsky A, Nechamkin Y, Modai I. Gender differences in psychosocial risk factors for psychological distress among immigrants. Compr Psychiatr 2001; 42: 151-60.
45. Anderson RJ, Freedland KE, Clouse RE, Lustman PJ. The prevalence of comorbid depression in adults with diabetes: a meta-analysis. Diabetes Care 2001; 24: 1069-78.

46. Stronks K, Uniken Venema P, Dahhan N, Gunning-Schepers LJ. Allochtoon, dus ongezond? Mogelijke verklaringen voor de samenhang tussen etniciteit en gezondheid geïntegreerd in een conceptueel model. Tijdschr Soc Geneeskd 1999; 77: 33-40.
47. Uitewaal PJM, Bruijnzeels MA, Bernsen RMD, Voorham AJJ, Hoes AW, Thomas S. Diabetes care in Dutch general practice: differences between Turkish immigrants and Dutch patients. Eur J Pub Health, 2003 in press.
48. Konings GPJM, Wijkel D, Rutten GEHM. Lukt het werken volgens de NHG-standaard diabetes mellitus type 2? Huisarts Wet 1995; 38: 10-14.
49. Davies M, Dixon S, Currie CJ, Davis RE, Peters JR. Evaluation of a hospital diabetes specialist nursing service: a randomised controlled trial. Diabet Med 2001; 18: 301-7.
50. Loveman E, Royle P, Waugh N. Specialist nurses in diabetes mellitus. Cochrane Database Syst Rev 2003; 2: CD003286.
51. Yong A, Power E, Gill G. Improving glycaemic control of insulin-treated diabetic patients—a structured audit of specialist nurse intervention. J Clin Nurs 2002; 11: 773-6.
52. Middelkoop BJC, Wal van der G. Culture-specific diabetes care for South Asians with low socioeconomic position: who benefits? PhD. thesis Free University Amsterdam, 2001.
53. Kornelius G, Groothoff JW, Sorgdrager J, Ben P, Haan J de, Post D. Werkdruk en praktijkverpleegkundige: eerste ervaringen in de huisartspraktijk. Med Contact 1999; 54: 104-7.
54. Konings GPJM, Wijkel D, Rutten GEHM. Implementatie van een standaard. Huisarts Wet 1996; 39:560-3.
55. Keyserling TC, Ammerman AS, Samuel-Hodge CD, Ingram AF, Skelly AH, Elasy TA, Johnston LF, Cole AS, Henriquez-Roldan CF. A diabetes management program for African American women with type 2 diabetes. Diabetes Educ 2000; 26: 796-805.
56. Wagner EH, Grothaus LC, Sandhu N, Galvin MS, McGregor M, Artz K, Coleman EA. Chronic care clinics for diabetes in primary care: a system-wide randomised trial. Diabetes Care 2001; 24: 695-700.
57. Joseph DH, Griffin M, Hall RF, Sullivan ED. Peer coaching: an intervention for individuals struggling with diabetes. Diabetes Educ 2001; 27: 703-10.
58. Auslander W, Haire-Joshu D, Houston C, Rhee CW, Williams JH. A controlled evaluation of staging dietary patterns to reduce the risk of diabetes in African-American women. Diabet Care 2002; 25: 809-14.
59. Tesser PTM, Dugteren F van, Merens JCF. Rapportage minderheden 1998. SCP Cahier 153, 1998.

Summary

In 1996, working as a general practitioner (GP) in the southern part of Rotterdam, I became involved in a study on the use of peer educators in the general practice. The aim of that study, conducted by the Rotterdam Area Health Authority, was to optimise the communication between the immigrant patient and GP with the help of a trained bicultural educator. The main chronic health problem encountered by the educators was type 2 diabetes. Therefore, it was proposed to evaluate the effect of a diabetes education programme conducted by bicultural educators in general practice on Turkish type 2 diabetes patient. The proposal was approved and financed by the Netherlands Ministry of Health as part of a systematic research into inequalities in health. In 1997 I was asked by the Rotterdam Area Health Authority to carry out this intervention.

Chapter 1 describes three different areas that require special attention with regard to type 2 diabetes mellitus and Turkish immigrants:

1) Current knowledge on the prevalence of type 2 diabetes and diabetes-related complications in immigrants, and differences between Turkish and Dutch type 2 diabetes patients with regard to the prevalence of cardiovascular risk factors.
2) Diabetes management and Turkish type 2 diabetes patients: Does diabetes care currently offered by the GP to Turkish diabetics differ from the care offered to Dutch diabetics, and what is the outcome of this care in Turkish and Dutch type 2 diabetes patients?
3) The effects of an ethnic-specific diabetes education programme on Turkish type 2 patients: Does such a programme contribute to improved diabetes management and better glycaemic control, and how is such a programme received by the Turkish patients and the GP?

The main research questions addressed in this thesis are also presented. **Chapter 2** describes the results of a systematic review on the prevalence of diabetes, other cardiovascular risk factors, and cardiovascular morbidity and mortality in Turkish and Moroccan immigrants in North-West Europe. Most

studies based their measurements on self-reports and are therefore, inadequate to assess the "true" prevalence of diabetes, other cardiovascular risk factors (with the exception of smoking), and the presence of cardiovascular disease. It was concluded from the review that the yielded evidence was insufficient for a good quality comparison of the cardiovascular risk profile between Turkish and Moroccan immigrants and indigenous populations. Nevertheless, the available evidence does demonstrate that diabetes mellitus is more prevalent in both Turkish and Moroccan immigrants, smoking is more prevalent in Turkish males, and very rare in Moroccan females. Data on cardiovascular death rates are scarce: in one study the death rate was strikingly lower in Turkish German immigrants compared to the German population; this finding, however, requires confirmation from future studies.

In **Chapter 3** the prevalence of cardiovascular risk factors and 10-year absolute risk for coronary heart disease (CHD) in both Turkish immigrants and in Dutch patients with type 2 diabetes mellitus are studied. A cross-sectional study was performed using databases from three Dutch studies on type 2 diabetes, comparing 147 Turkish with 294 Dutch diabetics. We concluded that the 10-year risk for CHD was similar in Turkish and Dutch patients, although some differences in individual risk factors existed; in particular the lipid profile and smoking habits. Turkish male patients have lower HDL-cholesterol levels, but also lower total cholesterol levels, so that the total/HDL-cholesterol ratio in Turkish and Dutch patients was similar. Lower HDL-cholesterol levels in Turkish males have also been reported in earlier studies, and apparently persist in Turkish male immigrants with diabetes. Fewer Turkish than Dutch women, in particular older Turkish women, with diabetes smoke. We also observed a higher prevalence of obesity in Turkish women and a poorer glycaemic control in Turkish patients. The observation of a comparable 10-year risk for CHD in Turkish and Dutch diabetics indicates that an equally aggressive approach is required in the management of cardiovascular risk factors in both Turkish and Dutch diabetics, particularly since poor glycaemic control in Turkish diabetics further increases the risk for coronary disease.

Because of cultural and language differences many GPs experience difficulties in delivering optimal diabetes care to patients from ethnic minority groups, and we expected these difficulties to result in a lower level of diabetes care

and poorer glycaemic control in Turkish type 2 diabetics compared to Dutch patients. The study presented in **Chapter 4** compared the adherence to the Dutch national guidelines on type 2 diabetes by the GPs and glycaemic control in Turkish and Dutch type 2 diabetics. The results show that adherence to clinical guidelines as registered in Turkish and Dutch type 2 diabetes patients is comparable, but that Turkish diabetes patients have higher mean non-fasting plasma glucose levels than the Dutch patients. The study supports the experience of GPs that it is more difficult to effectively control diabetes in ethnic minority patients, and that this can not be attributed to poorer adherence to guidelines alone. Although more insight in causative factors is needed, to improve glycaemic control in all diabetes patients a more tailor-made diabetes care with respect to the individual needs is necessary.

Chapter 5 describes the effects of an ethnic-specific diabetes education programme by Turkish female educators on glycaemic control and cardiovascular risk factors in Turkish type 2 diabetes patients. Fifty-three Turkish patients from seven practices in the southern part of Rotterdam formed the intervention group and were offered routine care together with ethnic-specific diabetes education. They were compared with 51 Turkish patients recruited from nine practices located in a comparable ethnic and socio-economic area in the northern part of Rotterdam, who were offered routine care only. Of the 104 recruited patients 85 could also be assessed at one-year follow-up. The results show that ethnic-specific diabetes education by Turkish female educators has no obvious beneficial effect on glycaemic control or the cardiovascular risk profile. The intervention was, however, slightly more effective regarding glycaemic control in women. Thus, more focus on specific patient selection and gender equality between educators/patients may prove worthwhile.

Chapter 6 presents an assessment of the feasibility of an ethnic-specific diabetes education programme in terms of drop-out, patient and GP satisfaction, and GP's perceived workload of this ethnic-specific education programme is presented. The results show that the ethnic-specific education programme by Turkish female educators was highly appreciated by most patients and most of the GPs. However, the drop-out rate from the programme was high (41%) and all GPs perceived an increased workload. Most patients that dropped-out, did so early in the intervention (74% within

the first 4 months); the main reason for this was going abroad for a relatively long period (18%). To reduce drop-out the programme should be even more finely-tuned, taking into account specific patients habits including, e.g., a long stay abroad. In addition, starting the programme with a run-in period to more accurately select eligible patients for the intervention should be considered in the future.

In our intervention group we observed a group of patients that over-used the education facility (over-compliers), and a substantial drop-out (41%) during intervention. Both drop-out and over-use affect the efficiency of the education programme. Identifying patients prone to drop-out or to over-use the facility would enable more specific tailoring of the intervention to the patients' needs and, thus improve the benefits of such a programme. In **Chapter 7** this issue is addressed by studying which patient characteristics are associated with non-compliance, and over-use of the education facility. The study shows that Turkish patients having diabetes for a longer period and those with relatively poor knowledge of diabetes are at risk to drop-out of the education programme, while Turkish female patients younger than 50 years, and female patients scoring low on "attitude" or "self-efficacy" (i.e. low belief in their capability to organize and execute the course of action required to deal with prospective situations) and those experiencing high "stress" (defined as: financial or personal problems hindering diabetes self-care, according to the patient), are more likely to over-use the educational facility.

In **Chapter 8** four propositions related to the field of diabetes and cardiovascular disease in non-Western ethnic minority groups are presented and discussed based on earlier studies and those reported in this thesis.

Proposition 1: *Monitoring of the prevalence of diabetes and other cardiovascular risk factors, and the prevalence/incidence of cardiovascular disease among non-Western immigrants living in the Netherlands is required to formulate target screening and treatment strategies.*
Information addressing the relation between diabetes, other cardiovascular risk factors, and the occurrence of cardiovascular morbidity and mortality is important to formulate target screening and treatment strategies. This relation varies not only between ethnic groups, but also within ethnic groups sharing the same origin but living in different countries. Therefore, data from ethnic groups living outside the Netherlands are not necessarily applicable to

ethnic groups living in the Dutch situation, implying that the collection of original data on the relation between prevalence/incidence of cardiovascular risk factors and cardiovascular disease in the different ethnic minority groups living in the Netherlands is required.

Proposition 2: *The higher prevalence of type 2 diabetes in non-Western ethnic minorities does not justify screening for diabetes.*
Undiagnosed type 2 diabetes is a serious condition since there is evidence that microvascular complications start to develop before the clinical diagnosis, and also patients with undiagnosed type 2 diabetes are at significantly increased risk for macrovascular disease. Therefore, testing for diabetes in all individuals aged 45 years and older, and at an even younger age in members of high-risk ethnic minorities, could be advocated. However, the benefits of early detection and treatment of undiagnosed diabetes have not been proven and before the screening of diabetes in ethnic minorities can be considered, important issues (such as insight in diagnostic cut-off points, a clear definition of the target group, and how to optimise diabetes management for diabetes patients from non-Western ethnic groups) should be clarified.

Proposition 3: *The general practitioner is not sufficiently equipped to provide adequate diabetes management for patients from non-Western ethnic minority groups with type 2 diabetes.*
In non-Western ethnic minority groups, language difficulties and the cultural gaps will cause great difficulties in helping diabetes patients to change their lifestyle. To achieve this goal adapting communication patterns, modifying diabetes education programmes (learning style, reading level, patient education materials), and eliciting information about the patient's logic of non-compliance is required. However, due to lack of time and resources, it is difficult for GPs to learn these skills. From both GP's and the patient's perspective, GPs in the inner city need more support in order to provide adequate diabetes care.

Proposition 4: *High quality diabetes care is based on teamwork, which should include the support of a bicultural worker for the care of diabetes patients from non-Western minorities.*
Based on experience and the available knowledge, an attempt is made to assess the capability of various health care providers in primary care to

deliver a high quality of care in the different aspects of diabetes management for immigrant patients. The best conditions to provide good diabetes care to immigrant patients, who have not yet mastered the Dutch language, is a co-operation between:

- the GP,
- a diabetes specialist nurse or a nurse practitioner,
- the physician's assistant (for support in routine diabetes check-ups),
- the regional laboratory (to invite the patients for the periodic blood test)
- a bicultural educator (to support the patient with ethnic-specific diabetes education in their preferred language, and to bridge the language and cultural gap between GP and patient during their consultations).

Samenvatting

Werkzaam als huisarts in Rotterdam-Zuid, raakte ik in 1996 betrokken bij een studie naar de inzet van "peer"-voorlichters in de huisartspraktijk. Deze studie, die werd uitgevoerd door de GGD Rotterdam e.o. had als doel met de hulp van een daarvoor opgeleide biculturele voorlichtsters de communicatie tussen patiënten uit etnische minderheidsgroepen en huisarts te optimaliseren. De meest voorkomende chronische aandoening die de voorlichtsters tegenkwamen was diabetes type 2. Gebaseerd op deze waarneming werd er een onderzoeksvoorstel gedaan om het effect van diabetesvoorlichting gegeven door biculturele voorlichtsters in de huisartspraktijk te evalueren.
Dit voorstel werd goedgekeurd en gefinancierd door het ministerie van volksgezondheid en maakte daarmee deel uit van een systematisch onderzoek naar gezondheidsverschillen. In 1997 werd ik door de GGD gevraagd dit onderzoek uit te voeren.

Hoofdstuk 1 is een inleiding van dit proefschrift en beschrijft drie verschillende aandachtsgebieden met betrekking tot diabetes type 2 en Turkse immigranten.

1) Huidige kennis over de prevalentie van diabetes type 2 en de aan diabetes gerelateerde complicaties bij immigranten, en verschillen tussen Turkse en Nederlandse diabetes type 2 patiënten in relatie tot de prevalentie van cardiovasculaire risicofactoren.
2) Diabetesmanagement en Turkse diabetes type 2 patiënten: verschilt de diabeteszorg zoals die momenteel door de huisarts aan Turkse diabetici wordt gegeven van de diabeteszorg aan Nederlandse diabetici?
3) De effecten van een etnisch specifiek diabetes voorlichtingsprogramma aan Turkse diabetes type 2 patiënten: draagt etnisch specifieke diabetes voorlichting door een voorlichtster eigentaal bij aan de verbetering van de diabetesmanagement en de glycaemische instelling, en hoe wordt zo'n programma ontvangen door Turkse patiënten en door de huisarts?

De belangrijkste onderzoeksvragen van dit proefschrift worden gepresenteerd.

Hoofdstuk 2 beschrijft de resultaten van een systematische review naar de prevalentie van diabetes, andere cardiovasculaire risicofactoren, en cardiovasculaire morbiditeit en mortaliteit bij Turkse en Marokkaanse immigranten in Noordwest-Europa. De meeste bestudeerde studies baseren hun metingen op zelfrapportage en zijn daarom ontoereikend om de "werkelijke" prevalentie van diabetes, andere cardiovasculaire risicofactoren (met uitzondering van roken) en de aanwezigheid van cardiovasculaire ziekte te schatten. De bestudeerde onderzoeken boden daarom onvoldoende materiaal voor een kwalitatief goede schatting van het cardiovasculaire risico bij Turkse en Marokkaanse immigranten en de autochtone bevolking. Niettemin toont beschikbare bewijs voldoende aan dat: diabetes mellitus vaker voorkomt bij zowel Turkse als Marokkaanse immigranten, dat Turkse mannen vaker roken, en Marokkaanse vrouwen zelden roken. Gegevens over cardiovasculaire sterftecijfers zijn schaars: in een studie was het sterftecijfer opvallend lager bij Turks-Duitse immigranten in vergelijking met de Duitse bevolking. Deze bevinding, echter, heeft bevestiging nodig van toekomstig onderzoek.

In **Hoofdstuk 3** worden de prevalentie van cardiovasculaire risicofactoren en het 10-jaars absolute risico op een coronaire hartziekte bij Turkse immigranten met diabetes type 2 vergeleken met die van Nederlandse diabetespatiënten. Gebruik makend van de gegevens van drie Nederlandse studies over diabetes type 2 werd een cross-sectionele studie uitgevoerd, waarbij 147 Turkse met 294 Nederlandse diabetici werden vergeleken. We concludeerden dat het 10-jaars absolute risico op een coronaire hart ziekte (CHZ) gelijk was bij Turkse en Nederlands patiënten, hoewel er wel verschillen bestonden tussen sommige individuele risicofactoren als het lipidenprofiel en de rookgewoonte. Turkse mannen hebben lagere HDL-cholesterol spiegels, maar ook lagere totaalcholesterol spiegels, zodat de totaal/HDL-cholesterolratio bij Turkse en Nederlandse patiënten gelijk blijft. Lage HDL-cholesterol spiegels bij Turkse mannen in het algemeen worden ook gerapporteerd in andere eerdere studies, en blijven blijkbaar bestaan bij Turkse migranten met diabetes. Minder Turkse, met name oudere Turkse vrouwen, dan Nederlandse vrouwen roken. We vonden een hogere prevalentie van obesitas bij Turkse vrouwen en een slechtere suikerinstelling bij Turkse patiënten. Het even hoge 10-jaars absolute risico op een CHZ bij Turkse en bij Nederlands diabetici betekent dat eenzelfde agressieve benadering nodig is bij de behandeling van cardiovasculaire risicofactoren,

zeker omdat een slechtere suikerinstelling bij Turkse diabetici het risico op een coronair ziekte verder kan verhogen.

Door cultuur en taalverschillen ondervinden veel huisartsen moeilijkheden bij het verstrekken van optimale diabeteszorg aan patiënten uit etnische minderheidsgroepen. Onze verwachting was dat deze moeilijkheden zouden resulteren in een lager niveau van diabeteszorg en een slechtere suiker-instelling bij Turkse diabetes type 2 patiënten in vergelijking met Nederlandse diabetes patiënten. Het doel van de studie gepresenteerd in **Hoofdstuk 4** is: het vergelijken van de mate waarin de huisarts de richtlijnen van de NHG-standaard voor diabetes type 2 patiënten volgt, en het vergelijken van de suikerinstelling van Turkse diabetes type 2 patiënten met de suikerinstelling van Nederlandse diabetes patiënten. De resultaten laten zien dat de richtlijnen van de standaard (zoals geregistreerd in het medisch dossier) bij Turkse en Nederlandse diabetes type 2 patiënten in gelijke mate worden gevolgd, maar dat ondanks deze gelijke behandeling Turkse diabetespatiënten hogere niet-nuchtere glucose plasmaspiegels hebben. Dit ondersteunt de ervaring van de huisartsen dat het bij patiënten uit etnische minderheidgroepen moeilijker is om de diabetes te reguleren, wat niet alleen kan worden toegeschreven aan een slechter volgen van de richtlijnen voor diabetes. Hoewel er meer inzicht nodig is in de factoren die dit veroorzaken, lijkt een meer op maat gesneden diabeteszorg, waarbij de individuele behoefte van de patiënt gerespecteerd worden, nodig om de suikerinstelling van alle diabetespatiënten te verbeteren.

De effecten van een door Turkse voorlichtsters gegeven etnisch specifiek voorlichtingsprogramma voor Turkse diabetes type 2 patiënten op de suikerinstelling en op cardiovasculaire risicofactoren worden gepresenteerd in **Hoofdstuk 5.** De interventiegroep, die bestond uit 53 Turkse patiënten afkomstig uit zeven praktijken in Rotterdam Zuid, kreeg naast de normale huisartsenzorg een etnisch specifiek diabetes educatieprogramma aangeboden. Zij werden vergeleken met 51 Turkse patiënten, geworven in negen praktijken gelegen in een etnisch en sociaal economisch vergelijkbaar gebied in Rotterdam Noord, die alleen de normale huisartsenzorg kregen aangeboden. Van de 104 geworven patiënten konden er 85 na een jaar follow-up beoordeeld worden. De resultaten laten zien dat etnisch specifieke diabeteseducatie door een Turkse voorlichtster geen duidelijk gunstig effect heeft op de suikerinstelling of het cardiovasculair risicoprofiel. De interventie

blijkt wel iets effectiever te zijn op de suikerinstelling van vrouwelijke patiënten. Een specifiekere patiënten selectie en aandacht voor sekse gelijkheid tussen voorlichter en patiënt kan dan ook de moeite waard blijken.

Een beoordeling van de haalbaarheid van een etnisch specifiek diabetes voorlichtingsprogramma in de huisartspraktijk in termen van patiëntuitval, patiënt- en huisartstevredenheid, en de door de huisarts ervaren werkbelasting wordt gepresenteerd in **Hoofdstuk 6**. De resultaten laten zien dat de meeste patiënten en huisartsen het etnisch specifieke voorlichtingsprogramma door Turkse voorlichtsters in hoge mate waardeerden. Echter het percentage uitvallers was hoog (41%) en alle huisartsen ervoeren een hogere werklast. De grootste uitval van patiënten was vroeg in de interventie (74% viel uit in de eerste 4 maanden). De belangrijkste reden voor uitval was een langdurig verblijf in het buitenland (18%). Om de uitval te beperken zou het programma fijner moeten worden afgestemd op de specifieke gewoonten van de patiënt zoals een langdurig verblijf in het buitenland. Hierbij kan een inloopperiode overwogen worden om nauwkeuriger geschikte patiënten voor de interventie te selecteren.

Binnen onze interventiegroep viel een groep patiënten op die overdadig gebruik maakte van de voorlichtingsvoorziening (over-compliers), naast een grote groep uitvallers. Zowel uitval als overdadig gebruik beïnvloeden de efficiëntie van het voorlichtingsprogramma. Door vooraf de patiënten te identificeren die neigen uit te vallen, of degene die juist overdadig gebruik zullen maken van de voorlichtingsvoorziening, zou de voorlichting beter kunnen worden afgestemd op de behoeften van de patiënt, en daarmee de resultaten van de voorlichting verbeteren. **Hoofdstuk 7** richt zich op dit onderwerp door te bestuderen welke patiënteigenschappen geassocieerd worden met uitval (non-compliers), of met overdadig gebruik van de voorlichting (over-compliers). Deze studie laat zien dat Turkse patiënten, die al langere tijd diabetes hebben en degene met een relatief slechte kennis over diabetes, risico lopen uit het diabetesprogramma te vallen, terwijl Turkse vrouwen jonger dan 50 jaar en vrouwen die laag scoren op "attitude" of "self-efficacy" (dat wil zeggen weinig geloof hebben in het eigen kunnen om het noodzakelijke gedrag op te brengen of uit te voeren om met bepaalde toekomstige situaties om te gaan) en degene die veel "stress" ervaren (gedefinieerd als: het hebben van financiële of persoonlijke problemen die volgens de patiënt zelf de diabeteszelfhulp belemmeren) meer kans lopen overdadig gebruik te maken van de voorlichtingsvoorziening.

In **Hoofdstuk 8** worden vier stellingen met een relatie tot het terrein van diabetes en cardiovasculaire ziekten bij niet-westerse etnische minderheidsgroepen gepresenteerd en bediscussieerd.

Stelling 1: *het monitoren van de prevalentie van diabetes, andere cardiovasculaire risicofactoren en de prevalentie/incidentie van cardiovasculaire ziekten bij niet-westerse in Nederland wonende immigranten is noodzakelijk voor het formuleren van strategieën voor doelgerichte screening en behandeling.* Informatie over de relatie tussen cardiovasculaire risicofactoren (waaronder diabetes) en het vóórkomen van cardiovasculaire morbiditeit en mortaliteit is belangrijk om doelgerichte screenings- en behandelingsstrategieën te formuleren. Deze relatie varieert tussen etnische groepen, maar ook binnen etnische groepen wonend in verschillende landen of streken. Daarom zijn gegevens van etnische groepen die buiten Nederland wonen niet zondermeer te gebruiken voor etnische groepen die in de Nederlandse situatie leven. Dit impliceert dat het verzamelen van originele gegevens over de relatie tussen prevalentie/incidentie van cardiovasculaire risicofactoren en cardiovasculaire ziekten bij de verschillende in Nederland wonende etnische minderheidsgroepen noodzakelijk is.

Stelling 2: *de hogere prevalentie van diabetes type 2 bij niet-westerse etnische minderheidsgroepen rechtvaardigt niet het screenen op diabetes.* Ongediagnosticeerde diabetes type 2 is een ernstige toestand. Er is bewijs dat microvasculaire complicaties zich al ontwikkelen voordat de klinische diagnose gesteld is, en ook dat patiënten met ongediagnosticeerde diabetes type 2 een duidelijk verhoogd risico lopen op een macrovasculaire ziekte. Daarom wordt bepleit om alle personen van 45 jaar en ouder (en zelfs vanaf een jongere leeftijd bij leden van etnische minderheidsgroepen met een verhoogd risico op diabetes) te testen op diabetes. Echter de voordelen van vroege detectie en behandeling van ongediagnosticeerde diabetes zijn niet aangetoond en, voordat screening op diabetes bij etnische minderheidsgroepen overwogen kan worden, moet er meer duidelijkheid komen over enkele belangrijke onderwerpen zoals: inzicht in diagnostische afkappunten, een heldere definitie van de doelgroep, en over hoe de diabetesmanagement voor diabetes patiënten uit niet-westerse etnische groepen geoptimaliseerd kan worden.

Stelling 3: *de huisarts is onvoldoende geoutilleerd voor het verstrekken van*

adequaat diabetesmanagement aan patiënten uit niet-westerse etnische minderheidsgroepen met diabetes type 2.
Bij diabetespatiënten uit niet-westerse etnische minderheidsgroepen zullen taalproblemen en cultuurverschillen grote moeilijkheden geven bij het pogen de levensstijl van deze patiënten te veranderen. Om dit doel te bereiken is het noodzakelijk om communicatiepatronen aan te passen, diabetes educatieprogramma's te wijzigen (bijvoorbeeld: leerstijl, leesniveau, patiënten voorlichtingsmateriaal), en informatie los te krijgen over de logica van de patiënt niet compliant te zijn. Echter als gevolg van tijdgebrek en de beperkte mogelijkheden van de huisarts is het moeilijk voor de huisarts om deze vaardigheden te leren. Zowel vanuit het perspectief van de huisarts als de patiënt hebben huisartsen in achterstandswijken meer ondersteuning nodig voor een adequate verstrekking van diabeteszorg.

Stelling 4: *kwalitatief hoge diabeteszorg voor diabetes patiënten uit niet-westerse minderheden is gebaseerd op teamwerk, inclusief de ondersteuning van een allochtone zorgconsulent.*
Gebaseerd op ervaring en de beschikbare kennis wordt een poging gedaan in te schatten hoe goed de verschillende eerstelijns hulpverleners met de deelaspecten van diabeteszorg aan immigranten met diabetes kunnen omgaan. De beste voorwaarde om een kwalitatief goede diabeteszorg aan immigranten met diabetes, die de Nederlandse taal slecht beheersen, te verstrekken is een optimale samenwerking tussen:
- de huisarts,
- de gespecialiseerde diabetesverpleegkundige of praktijkondersteuner,
- de huisartsassistente (voor de ondersteuning bij routine diabetesonderzoek),
- het huisartsenlaboratorium (om patiënten op te roepen voor het periodieke bloedonderzoek)
- de allochtone zorgconsulent (om de patiënt te ondersteunen met etnisch specifieke diabeteseducatie in de taal van voorkeur, en om de taal- en cultuurkloof te overbruggen tussen huisarts en patiënt bij een arts/ patiëntconsult).

Dankwoord

Hoewel ik in het verleden er regelmatig blijk van heb gegeven wetenschappelijke ambities te hebben en ik me ook enkele malen een paar stappen binnen het wetenschappelijk bolwerk heb gewaagd, was deze interesse in 1996 nog slechts sluimerend aanwezig. Het is zeker de verdienste van Toon Voorham geweest deze interesse weer op te wekken. Omdat het onderwerp diabetes en Turkse migranten mij bijzonder aansprak en het na bijna zeven jaar huisartsenij tijd leek voor verandering, besloot ik om op het verzoek een onderzoek voor de GGD uit te voeren in te gaan. Allereerst wil ik dan ook Toon Voorham bedanken als projectleider en wegwijzer op het terrein van de voorlichting. Een hoogtepunt was zeker ons bezoek aan Curaçao waar we op uitnodiging van de GGD aldaar zijn geweest. De prettige manier waarop ik op de GGD heb kunnen werken, is naast de goede werksfeer die er heerst op de GGD, voor een belangrijk deel aan Toon toe te schrijven.
In het begin van dit onderzoek bleek al snel hoe weinig ervaring er nog was opgedaan met het geven van diabetesvoorlichting aan Turkse immigranten. De interventie moest voor een belangrijk deel nog ontwikkeld worden en de voorlichtsters hadden extra scholing nodig om deze voorlichting te kunnen geven. Dat dit uiteindelijk toch is gelukt is voornamelijk te danken aan Tine de Hoop. Zonder haar inzet zou deze interventie niet hebben kunnen slagen. Ik dank Tine voor haar zeer prettige samenwerking.

Zondermeer de meeste dank ben ik verschuldigd aan mijn copromotor Marc Bruijnzeels die, naarmate het onderzoek vorderde een steeds belangrijker steun voor mij is geworden. Hij is ook degene geweest die ervoor gezorgd heeft dat ik mijn promotiewerkzaamheden voort kon zetten binnen het instituut beleid en management gezondheidszorg (BMG) van het Erasmus MC. Hoewel de talloze conceptartikelen voor dit proefschrift die we besproken hebben veel meer tijd hebben gekost, herinner ik mij het liefst onze gesprekken waarbij we brainstormde over mogelijke onderzoeksvragen en manieren zochten om deze vragen te operationaliseren.

Graag wil ik mijn beide promotoren bedanken. Siep Thomas vroegen we promotor te worden voordat zijn aanstelling aan het huisartsen instituut te Rotterdam helemaal rond was. Ik moet dus ook wel zijn eerste promovendus zijn. Arno Hoes wil ik bijzonder danken voor zijn heldere en opbouwende kritiek. Beide promotoren waakte over de noodzakelijke voortgang van dit proefschrift wat, hoewel minder prettig, van essentieel belang is geweest voor de uiteindelijke voltooiing.
Ferd Sturmans wil ik bedanken voor de korte periode dat hij promotor mijn was, voordat Arno Hoes dit van hem overnam.

Het slagen van de interventie is te danken aan een groot aantal mensen. Naast Tine de Hoop die optrad als coördinator, waren er natuurlijk de voorlichtsters, Güler Temur en Perihan Ozkam-Bugdayci, die met hun grote inzet het eigenlijke werk hebben gedaan. Perihan was tevens de eerste migrantenvoorlichtster in ons gezondheidscentrum, en van haar heb ik ook veel mogen leren. Helaas is zij veel te vroeg is overleden.
Een bijzondere plaats neemt Pervin Mosheuvel-Akgul in die de patiënten wierf voor het onderzoek en gedurende het onderzoek de contacten met hen onderhield. Gaandeweg dit onderzoek bleek dit een onmisbare taak te zijn, die zij met groot enthousiasme vervulde.

Natuurlijk wil ik alle huisartsen bedanken die aan dit project hebben meegewerkt. Belangrijk voor dit onderzoek waren ook de studenten
G ten Bolscher, M Dobbelsteen , R Kerseboom, H Tran, P Visser,
HM Willemsen die een waar monnikenwerk verricht hebben door alle statussen van diabetes patiënten na te zoeken op alle diabetes gerelateerde opmerkingen en aantekeningen. Hierbij wil ik ook Roos Bernsen bedanken voor haar warme belangstelling en het feit dat ze uit de brei van gegevens, die dit statusonderzoek opleverde, uiteindelijk toch een bruikbare dataset kon destilleren.
Ook de medewerkers van de stichting trombose en artsenlaboratorium te Rotterdam wil ik bedanken voor de extra inzet die zij moesten leveren voor het uitvoeren van de metingen voor dit onderzoek. Daarbij wil ik met name Paul Trienekens bedanken, die deze hulp mogelijk gemaakt heeft "

De hulp van Arie Berghout is zeker van belang geweest bij mijn eerste pogingen iets over de interventie op papier te zetten en was een steun als deskundige op het gebied van zowel endocrinologie als allochtonen.

Ook ben ik Lex Goudswaard en Lielith Veltmaat dank verschuldigd voor het leveren van hun data. Zij hebben me telkens weer bemoedigende woorden geschreven wanneer het even niet zo goed leek te lopen met ons artikel. Radjesh Manna dank ik voor het delen van zijn kennis over en hulp zijn hulp bij het literatuuronderzoek.

Natuurlijk wil ik alle patiënten bedanken die aan dit onderzoek hebben meegewerkt. Verder zijn er nog tal van anderen geweest die mij bij deeltjes van dit proefschrift geadviseerd hebben of bemoedigend hebben toegesproken. Zonder hen allemaal te willen noemen wil ik ze toch hiervoor bedanken.

Zelf ben ik er nogal eens onzeker over geweest of ik dit proefschrift tot een goed einde zou brengen. Als waarschijnlijk de meeste huisartsen die promoveren ervoer ik de dubbele baan en uiteindelijk het schrijven van het proefschrift als een forse last. Dat dit zeker ten koste is gegaan van in de eerste plaats mijn gezinsleven en mijn sociale leven zal duidelijk zijn. Josée en Aafke hebben mij vele weekeinden (en ook enkele vakantie uitstapjes) moeten missen. Wij kunnen ons nog geen leven voorstellen zonder dit proefschrift. Ik dank Josée en Aafke dan ook bijzonder voor het geduld dat ze op moesten brengen, en voor het waken over mijn gezondheid door mij met grote regelmaat thee, koffie en hapjes te brengen terwijl ik noest probeerde door te werken. Ik hoop in de nabije toekomst deze schade weer enigszins te kunnen vereffenen.

Curriculum vitae

Paul Uitewaal was born in Utrecht, on the august 3rd. 1957. He passed his secondary school exam (VWO) in 1976 at the St Bonifatius College in Utrecht. He started his medical education at 1976 at the Utrecht University and obtained his medical degree in 1984. From 1985 till 1987 he studied sociology. In that same time he worked as a research fellow at the Free University Amsterdam on a study on osteoporosis (supervised by Paul Lips). From 1987 till 1988 he followed the one-year training for general practitioner. After finishing this GP training till 1991 he temporarily took over several general practices. In 1990 he started as a Ph.D. student on a study "child with fever", but this project was aborted one year later in 1991. From 1991 until now he has worked as a GP in Rotterdam (Zorg op Zuid foundation). In 1997 he combined his work as a GP with a part-time appointment at the Rotterdam Area Health Authority on a study of peer education on Turkish type 2 diabetes patients. He later continued this work at the Department of Health Policy and Management, Erasmus Medical Centre Rotterdam, along with the participation in several other studies on migrants, diabetes and cardiovascular disease.

Paul Uitewaal werd op 3 augustus 1957 geboren in Utrecht. Nadat hij in 1976 het Atheneum B diploma behaalde aan het St. Bonifatius college te Utrecht, studeerde hij geneeskunde aan de Universiteit van Utrecht. In 1984 behaalde hij zijn artsdiploma. Van 1985 tot 1987 werkte hij aan de Vrije Universiteit aan een onderzoek naar osteoporose aan de Vije Univeriteit te Amsterdam (onderleiding van Paul Lips). Tegelijkertijd studeerde hij parttime sociologie aan de Universiteit van Utrecht. Aansluitend in 1987 volgde hij de eenjarige huisartsopleiding in Utrecht. Na beëindiging van de huisartsopleiding in 1988 tot 1991 werkte hij als waarnemend huisarts in verschillende huisartspraktijken. In 1990 startte hij aan een promotieonderzoek genaamd "kind met koorts" maar dit onderzoek werd 1 jaar later afgebroken. Van 1991 tot nu toe heeft hij gewerkt als huisarts in het gezondheidscentrum Zorg op Zuid (voorheen gezondheidscentrum Lange Hille). Sinds 1997 combineerde hij zijn werk als huisarts met een parttime aanstelling als huisartsonderzoeker. Aanvankelijk werkte hij bij de GGD Rotterdam e.o. aan het onderzoek "effecten van peer-educatie op Turkse diabetes type 2 patiënten". Later vervolgde hij dit werk bij het instituut Beleid en Management Gezondheidszorg, Erasmus MC Rotterdam en is hij tevens betrokken bij een aantal andere onderzoeken op het gebied van diabetes en hart- en vaatziekten bij migranten.