Economic evaluation of a diabetes disease management programme with a central role for the diabetes nurse specialist

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Abstract

Background: In the region of Maastricht, The Netherlands, a disease management programme (DMP) for patients with diabetes mellitus was implemented. The programme aims to improve quality of care within existing budgets. To achieve this, diabetes nurse specialists (DNSs) were given a central role within a multidisciplinary team of care providers. This study describes the cost-effectiveness of this approach.
Aim: To measure the incremental cost-effectiveness of a diabetes DMP, with a central role for the diabetes nurse specialist, in comparison to usual diabetes care.
Methods: Within the DMP, patients with low, medium and high complexities of care are cared for by general practitioners, DNSs and endocrinologists, respectively. The DNSs independently treat patients assigned to them and pay special attention to extensive self-management education. A quasi-experimental trial with two-year follow-up (n=473) was undertaken to measure the cost-effectiveness of the DMP compared with usual care.
Results: A total of 23% of patients were assigned to the GP, 66% to the DNS and 10% to the endocrinologist. Statistical significant improvements in glycaemic control, health-related quality of life, compliance and most aspects of self-care behaviour were found. No statistically significant changes were found concerning total costs of care. All improvements were greatest in patients assigned to DNS.
Conclusion: A DMP in which DNSs play a central role is associated with improved quality of care within existing budgets. Patients assigned to DNS benefit most, indicating that the central role of DNS in the diabetes DMP is one of its critical success factors.

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Key Words

Diabetes nurse specialist; multidisciplinary team; disease management programme; economic evaluation

Introduction

The importance of nurses in the collaborative management of prevalent and costly chronic diseases such as diabetes mellitus has long been emphasised.[1] Nowadays, diabetes nurse specialists (DNSs) play an important role in several disease management programmes (DMPs).[2–15] DMPs seek to identify chronic conditions more quickly and treat them more effectively, thereby slowing disease progression. This is pursued through a combination of enhanced screening, monitoring and education, co-ordination of care among providers and settings, and standardisation of care using evidence-based guidelines.[16,17]

The assumption is that, for the increasing number of chronically ill patients, better care today will result in better health and less expensive care in the future.[17] Until today, however, many DMPs have been introduced without critical evaluation of the actual value of such programmes; in 2004, the US Congressional Budget Office published a report stressing that 'To date there is insufficient evidence to conclude that DMPs can generally reduce the overall cost of healthcare services'.[17] Most studies do not directly address costs,[17] while on outcomes such as mortality, hospitalisation, patient satisfaction, patient knowledge and patient self-management no significant improvements are shown.[12] This study reports on the two-year cost-effectiveness of a population-based diabetes DMP,[11] wherein the DNS had a central role.

Patients and methods

Patients and setting

The region of Maastricht encompasses circa 120 000 inhabitants, 90 general practitioners (GPs) and one university hospital. GPs interested in participating in the programme were selected on condition that they offered a part-time working place to the DNS within their practice. Out of a total of 90, 63 GPs took part in the DMP. Between April 2001 and

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February 2002, patients were recruited from a convenience sample of nine randomly chosen general practices (involving 12 GPs) and the hospital's outpatient department; they were followed for 24 months. Subsequently, patients with a diagnosis of diabetes mellitus and aged ≥16 years were invited to participate. Since the DMP aimed to cover the entire population of people with diabetes (including patients with complications and/or co-morbidity), only patients with severe co-morbidity, such as pre-terminal renal failure or carcinoma and/or those needing dialysis, were excluded.

Study design

A single-group pre-post test design was applied,[18] since the DMP was implemented region-wide and a 'fair' comparison region was unavailable. In all potential comparison regions, innovations that would bias the measure of usual care, such as self-management programmes or electronic patient record devices, were being implemented.

Disease management programme

The DMP involves all patients with type 1 or 2 diabetes mellitus who are known by the GP. The main features of the DMP are: use of evidence-based guidelines; central co-ordination of care; assignment of patients to a care provider; and central data collection with annual individual feedback to care providers regarding (among other things) clinical outcomes, number of consultations, referrals and hospital admissions.

The DNSs treat patients in GPs' offices and function as the liaison between hospital-based endocrinologists and GPs. Besides the diagnostic and therapeutic tasks that are listed in the (inter)national guidelines for endocrinologists and GPs, the DNS pay specific attention to patient education and promotion of self-management.

The patient population was identified from GP and hospital databases. After obtaining written informed consent, patients were invited for an initial consultation that was performed by DNSs within the GPs' office. During this consultation the DNS registered patients' demographic and clinical characteristics and completed an inventory of previous and/or current complications such as, vascular complications, retinopathy, neuropathy and hypertension. Based on these data, the team (GP, endocrinologist, and DNS) confirmed or reconsidered the diagnosis. They classified disease complexity and required intensity of care in accordance with (inter)national guidelines,[19–21] leading to a proposal concerning the assignment of the patient. If patients agreed, those with newly diagnosed type 1 diabetes mellitus, or poorly regulated type 1 or 2 diabetes with serious complications or co-morbidity, were assigned to the endocrinologist. Patients with stable diabetes mellitus who were using insulin and/or suffering from serious (psychosocial) complications with which the GP did not have sufficient experience (as judged by the GP), received quarterly outpatient appointments with the DNS within the practice. All other patients were assigned to the GP.

The stratification was based on Dutch guidelines for diabetes,[19–21] research justifying the treatment of people with diabetes by DNSs,[5,7] and local agreements concerning optimal organisation of diabetes care given the availability of (medical) facilities in primary and secondary care. The head endocrinologist encouraged care providers to follow a multidisciplinary protocol, consisting of appropriate national and international evidence-based clinical practice guidelines[19–21] and a description of task division as well as local agreements, thus increasing uniformity in treatment policy. The contrasts between usual care and care as provided within the DMP related to central co-ordination of care, uniform treatment policy, reassignment of patients, introduction of the DNS in this central role, increased attention to patient self-management education and annual feedback for all care providers involved.

Within usual care, patients were either managed by their GP (if they required low to medium complexity of care) or the endocrinologist (for medium to high complexity of care). Typically, there was a large variety in treatment policy among physicians. Consultations focused mainly on the medical aspects of the condition and took 10 minutes on average. Patients were seen by their GP or endocrinologist either when they requested a consultation or for regular control as proposed by the physician. Some DNSs were involved in a shared-care programme[11] that preceded the DMP: they had taken over some of the follow-up consultations, which had previously been provided by GPs and endocrinologists, and offered self-management education to a selected group of patients with stable type 2 diabetes.

Data collection

As indicators of effectiveness, clinical parameters, health-related quality of life (HRQoL)[22–24] and patient self-management[24,25] were measured. Data on resource use were collected to assess (in)direct costs of care.[24,26] Data collection covered a period of six months before patients entered the programme (T0), up to 24 months afterwards (T1). Laboratory and clinical data were obtained from caregivers' registries. All other data were collected using a postal questionnaire. Resource use was measured retrospectively every six months, starting when a patient entered the programme.

Variable*	All patients (n=473)			Patients assigned to: GP (n=254)			DNS (n=160)			Endocrinologist (n=59)		
	Baseline	2 year	p-value	Baseline	2 year	p-value	Baseline	2 year	p-value	Baseline	2 year	p-value
HbA_{1c}	7.5±1.3	7.3±0.8	0.00	6.7±0.7	7.1±0.7	0.00	8.1±1.4	7.3±0.6	0.00	8.8±0.6	8.1±0.8	0.00
Proportion of patients with:												
- good glycaemic control (HbA_{1c}<7.0%)	47	21		78	20		17	27		0	9	
- moderate glycaemic control (HbA_{1c}≥7.0%, <8.5%)	33	73	0.02	20	75	0.00	59	71	0.00	15	70	0.00
- bad glycaemic control (HbA_{1c}≥8.5%)	20	6		2	5		24	2		85	21	
Total cholesterol (mmol/l)	6.0±1.6	5.0±1.0	0.03	5.1±1.2	5.1±1.0	0.95	5.9±3.9	4.9±1.0	0.04	5.1±1.2	5.1±1.1	0.95
High-density lipoprotein (mmol/l)	1.3±0.4	1.2±0.4	0.00	1.3±0.4	1.2±0.4	0.00	1.2±0.5	1.1±0.4	0.00	1.4±0.4	1.1±0.3	0.00
Low-density lipoprotein (mmol/l)	4.7±1.4	3.8±1.1	0.02	3.8±0.9	3.9±0.8	0.32	4.7±2.0	3.8±0.7	0.01	3.7±0.9	4.0±1.0	0.10
Systolic blood pressure (mmHg)	154±22	144±20	0.00	150±22	142±20	0.00	160±21	146±19	0.00	145±18	146±22	0.86
Diastolic blood pressure (mmHg)	85±15	77±11	0.00	86±19	76±10	0.00	83±10	78±12	0.01	81±9	71±11	0.21
BMI (kg/m^2)	29.8±5.6	29.3±5.0	0.05	29.2±4.1	28.9±4.3	0.22	30.2±6.6	29.5±5.4	0.12	31.8±7.4	31.5±6.7	0.72

*All variables are presented as means ±SD unless otherwise stated.
HbA_{1c}, glycosylated haemoglobin

Table 1. Effects on clinical outcome measures in patients with diabetes assigned to care with a general practitioner (GP), diabetes specialist nurse (DNS) or endocrinologist

Outcome measures

The main clinical outcome measure was change in glycaemic control, which has been defined as the change in glycated haemoglobin level (%HbA_{1c}). Glycaemic control was evaluated as the proportion of patients with good (HbA_{1c} <7.0%), moderate (HbA_{1c} ≥7.0%, <8.5%) or poor control (HbA_{1c} ≥8.5%).[19] Clinical status was further determined by systolic and diastolic blood pressure, body mass index (BMI), total cholesterol concentration and high-density lipoprotein (HDL) level. All laboratory measures were performed by standard techniques in one laboratory.

Health-related quality of life was measured with a Dutch version of the SF-36 questionnaire; scores range between 0 and 100, with higher scores indicating a better HRQoL.[22,23] Additionally, a visual analogue scale (VAS) was applied as single-item measure of quality of life. Self-management of patients was measured using the Self-care Behaviour Checklist, a validated diabetes-specific instrument[25] that includes four domains: dietary adherence; self-control of glucose levels; physical activity and self-performed foot control. Scores for each domain are computed (range 1–5). Patient adherence to medication schemes, scored on a five-point Likert scale, was measured with three items referring to the extent to which patients adhere to the scheme and take either more or less medication than prescribed. Scores are computed as the sum score of the three items (range 3–15).

Statistical analysis

All presented analyses were based on intention-to-treat. Missing response was handled by using the last observed response (carry forward procedure).[27] Before–after comparisons were analysed using paired-sample *t*-tests and Wilcoxon signed ranks tests (two-sided; α=0.05) where appropriate. *Post-hoc* subgroup analyses were performed to assess the relative contribution of each of the patient groups to the overall effect of the programme. All data are presented as means(±SD) unless stated otherwise. Data processing and analysis was performed using SPSS 12 for Windows.

Economic evaluation

The economic evaluation adopted a societal perspective, meaning that all diabetes-related healthcare costs were included in the analysis. Cost calculations were based on actual resource use as measured with a 15-item questionnaire and verified with administrative data from providers. Direct healthcare costs were calculated using current prices, when available, or tariffs.[26] Prices provided in the Dutch Pharmacotherapeutic Compass were applied to estimate medication costs. Productivity losses were assessed in terms of sick-leave days, and calculated using the age-dependent friction cost method.[28] Overhead costs encompassed: the employment of a medical and a project co-ordinator; continuing education of the DNS; administrative support office; maintenance of the electronic patient record system; telephone and travel costs of

Variable*	All patients (n=473)			Patients assigned to: GP (n=254)			DNS (n=160)			Endocrinologist (n=59)		
	T0	T1	p-value	T0	T1	p-value	T0	T1	p-value	T0	T1	p-value
Compliance (3–15)	10.7±2.0	11.1±2.0	0.006	10.5±2.2	10.1±2.2	0.105	10.7±1.9	11.9±1.7	0.000	11.6±1.8	11.4±1.2	0.468
Dietary adherence (1–5)	2.3±0.8	2.9±1.0	0.000	2.3±0.9	2.6±0.8	0.013	2.1±0.6	3.1±1.2	0.000	3.1±0.5	3.0±0.2	0.102
Self control glucose (1–5)	2.3±0.6	2.7±1.0	0.000	2.1±0.5	2.3±0.9	0.031	2.2±0.7	2.9±1.2	0.000	2.8±0.6	3.0±0.4	0.140
Physical activity (1–5)	3.0±1.2	3.0±1.2	0.513	3.1±1.3	3.1±1.2	0.555	2.8±1.2	2.9±1.3	0.287	3.4±1.0	2.7±1.0	0.002
Foot control (1–5)	2.3±0.7	2.6±1.2	0.000	2.2±0.7	2.4±1.2	0.169	2.1±0.6	2.6±1.2	0.000	3.1±0.6	3.1±0.5	0.660

*All data were (near-) normally distributed and expressed as mean±SD. Data collection covered a period of 6 months before patients entered the programme (T0), up to 24 months afterwards (T1).

Table 2. Effects on patient self-management in patients with diabetes assigned to care with a general practitioner (GP), diabetes specialist nurse (DNS) or endocrinologist

Variable*	Unit costs	All patients (n=473)			Patients assigned to: GP (n=254)			DNS (n=160)			Endocrinologist (n=59)		
		UC	DMP	Δ (95% CI)	UC	DMP	Δ (95% CI)	UC	DMP	Δ (95% CI)	UC	DMP	Δ (95% CI)
Overhead costs		0	21	21	0	21	21	0	21	21	0	21	21
Consultations with													
- GP	20.20	21±24	13±26	–8 (–4,–12)	23±21	25±35	3 (–4,10)	20±26	7±16	–12 (–17, –7)	24±26	6±15	–18(–27, –9)
- DNS	32.80	16±25	26±28	10 (7,15)	12±18	16±30	5 (–2,11)	21±30	36±24	16 (10,22)	6±15	13±22	7 (–2,15)
- endocrinologist	100	31±65	20±48	–11 (–19,-3)	2±20	4±28	2 (–5,9)	38±65	14±40	–24 (–35, –13)	74±99	121±67	7 (–28,43)
Medication use													
- oral medication	NA§	26±34	22±29	–4 (–8,–1)	24±28	25±31	1 (–4,6)	26±36	18±22	–8 (–13,–2)	32±40	29±41	–3 (–12,6)
- insulin	NA	34±57	41±53	7 (2,13)	6±28	8±30	1 (–4,5)	28±51	43±44	15 (6,24)	129±40	123±46	–6 (–22,11)
Self control development	NA	28±77	37±37	9 (0,17)	8±22	20±38	12 (4,20)	37±75	47±35	11 (–1,22)	43±40	34±28	–9 (–51,34)
Paramedical care¶	NA	18±25	24±34	6 (–4,22)	16±27	28±44	12 (–8,54)	26±62	28±64	2 (–6,23)	13±36	27±57	14 (–20,86)
Home care	40.40	58±81	87±133	50 (–46,152)	34±95	38±101	4 (–6,15)	56±148	88±172	32 (–29,69)	118±221	154±338	36 (–53,87)
Hospitalisation	476/day	162±444	104±411	–57(–115,88)	53±220	47±192	–6 (–64,51)	171±447	78±396	–93 (–171,–15)	289±691	244±690	–45 (–309,219)
Productivity loss	35/hour	88±448	62±19	–27 (–81,27)	32±162	37±246	4 (–53,62)	66±160	40±147	–26 (–88,37)	122±343	180±131	–58 (–107,183)
TOTAL COSTS	NA	482±575	453±569	–29 (–106,47)	210±306	269±541	59 (–94,139)	489±543	420±467	–69 (–188,7)	849±901	952±719	103 (–151, 105)

*All data are expressed in euros. §NA = no fixed unit cost available; ¶ Includes costs for podiatrist, dietician, pedicure and social work; DMP = disease management programme

Table 3. Effects on costs (in Euros, costs per three months) in patients with diabetes assigned to care with a general practitioner (GP), diabetes specialist nurse (DNS) or endocrinologist

the DNS; salary costs of the unit leader. Not included in this analysis were costs of informal care provided by family members, long-term disability and premature death, because information on these parameters was not available.

The number of quality adjusted life years (QALYs) was adopted as the outcome measure for effectiveness as it incorporates both effects on survival and quality of life in a single index.[29] The bootstrap estimates[30] of the differences in costs and QALYs are plotted on the cost-effectiveness plane.[29,30] The percentage of estimates in the south-east quadrant gives the probability that the DMP provides an increase in QALYs at lower costs and is thus to be preferred over usual care.

Results

Patient inclusion and response rates

Based on GP and hospital registries, 521 patients were eligible, of whom 473 agreed to participate in the study (91%). The mean age of patients was 69±12 years and average duration of diabetes was 9.8±6.8 years. Half of the patients were male, 97% had type 2 diabetes and 23% were current smokers. Of the patients included, 12% (type 2/type 1 = 47/12) were assigned to the endocrinologist, 34% (type 2/type 1 = 156/4) to the DNS and 54% (type 2/type 1 = 253/1) to the GP. The assignment was altered substantially after two years, with 11% of the patients assigned to the endocrinologist, 66% to the DNS and 23% to the GP. Results for these patients were subscribed to the initial assignment group.

Clinical data were available for 82% (n=386) of the patients after follow-up. Data from questionnaires were available from 319 patients at T=0 (67%) and 245 patients at T=1 (52%). The main reasons for not returning the questionnaires were unwillingness to complete questionnaires (which included directly at the start of the study) and loss of interest. Patients who did not respond to the questionnaires were more likely to be assigned to the GP ($p<0.05$), had on average lower HbA_{1c} values (Δ –0.7±0.02; $p<0.05$) and 1.5±0.03 years shorter duration of diabetes ($p<0.05$).

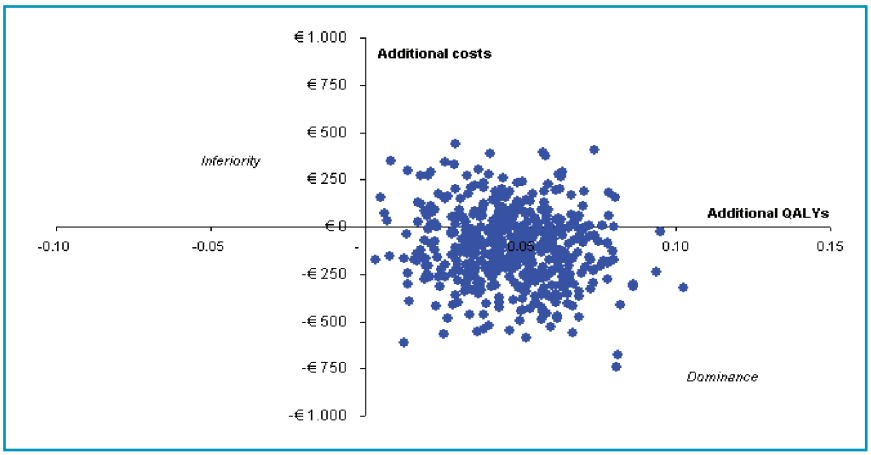

Figure 1. Cost-effectiveness plane of usual care versus diabetes disease management

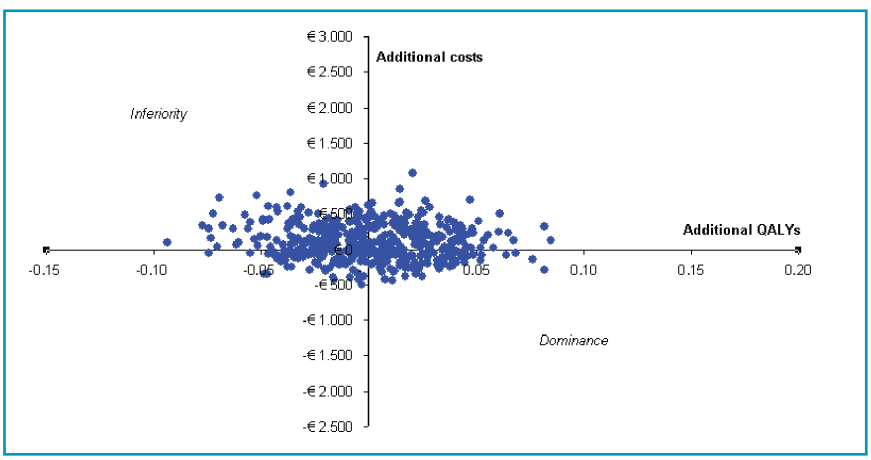

Figure 2. Cost-effectiveness plane for general practitioner subgroup only

Clinical parameters

Over the course of the DMP, mean HbA_{1c} (7.5±1.3 at baseline) improved significantly (Δ –0.2±1.2 at two years, p<0.001, Table 1). The proportion of patients with poor glycaemic control decreased by 15%, while the proportion of patients with moderate control increased by 40%. The 25% decrease in the proportion of patients with good glycaemic control resulted from a decrease in glycaemic control among patients assigned to the GP; this deterioration was the main reason for re-assigning a substantial number of these patients to the DNS. Total cholesterol and HDL levels decreased significantly, as did systolic and diastolic blood pressure (Table 1). No significant changes in BMI were observed in any of the subgroups (Table 1).

Health-related quality of life

The VAS scores increased significantly from 5.4±2.4 at baseline to 5.8±1.5 (p=0.002). This effect was mainly driven by the large improvement within the DNS-subgroup (from 5.0±2.4 to 5.9±1.4; p<0.001). Overall, scores on the SF-36 domains increased from 65±16 to 70±8 (p<0.001). The largest improvement was found on the domain 'general health' (from 54±11 to 63±12; p<0.0001), the smallest improvements were on the domains 'role limitation physical' and 'physical functioning' (both Δ +2; p>0.05).

Patient self-management

Overall, scores for medication and dietary adherence, glucose self-control and foot control improved significantly (on average by 15%, Table 2). Scores for physical activity did not change among patients assigned to GP or DNS and decreased significantly for patients assigned to the endocrinologist (Table 2). The largest and most significant improvements in self-management were measured in the DNS subgroup (Table 2).

Costs and cost-utility

Overall, the number of diabetes-related consultations with GPs and endocrinologists decreased, whereas additional routine consultations with the DNS took place (Table 3). Among patients assigned to the DNS, this led to a significant rise in consultation costs (Table 3). Patients assigned to the GP started to use more self-care devices, whereas patients assigned to the DNS used less oral medication but more insulin. Furthermore, a 54% decrease in hospitalisation costs was found within the DNS subgroup.

No statistically significant changes in total cost were measured within the two-year period. However, the cost-effectiveness plane in Figure 1 shows that the DMP is the dominant strategy in 74% of the bootstrap simulations, saving on average €117 per patient per year, while HRQoL increases by 5%. The cost-effectiveness planes presented in Figures 2–4 show how each subgroup contributes to the overall effect of the DMP. From the relative density of the plot in Figure 3 it can be seen that the DMP is most certainly associated with improved quality of care at lower costs for patients treated by the DNS.

Discussion

The introduction of a DMP with a key role for the DNS is associated with improvements in glycaemic control, except for patients assigned to

the GP. Although room for improvement was limited in this subgroup of patients, given their relatively low values of HbA_{1c} at baseline, the deterioration of glycaemic control was still worrying and led to the reassignment of a substantial number of patients from GPs to DNSs.

Visual analogue scale and SF-36 scores showed a significant improvement in HRQoL (circa 5% for the total population). Patient self-management also improved after the DMP was introduced, except for physical activity; this might be explained by the relatively high mean age of the study population. Total costs did not change significantly within the two-year period, although in the DNS subgroup a significant decrease in hospitalisation costs was found. The DMP was shown to be the 'dominant' strategy in 74% of simulations. This means that there is a probability of 74% that DMP for patients with diabetes improves HRQoL and saves money (on average €117 per patient) compared with usual care.

Although the study design does not allow us to attribute the results to any specific element of the DMP, it seems most likely that augmented patient follow-up – as reflected in an increased number of control consultations with the DNS – in combination with improved self-management of patients, pays off in better glycaemic control within a two-year period. In addition, concerning other outcomes, the DNS-subgroup seems to benefit most from the introduction of the DMP. This is an important finding, since stratification of the patient population by disease severity and the key role of the DNS within the collaborative practice model are the most important differences between DMP and usual care. The increased attention to patient education and self-management probably plays an important role herein, as does the combination of nursing and medical

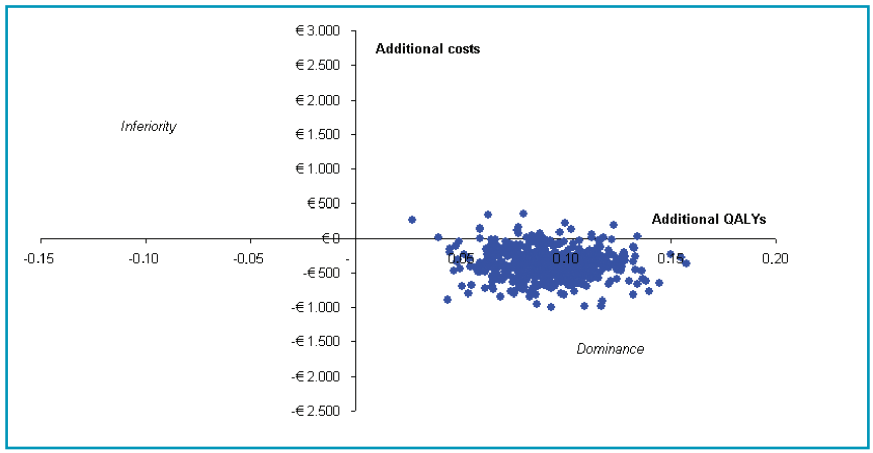

Figure 3. Cost-effectiveness plane for diabetes specialist nurse subgroup only

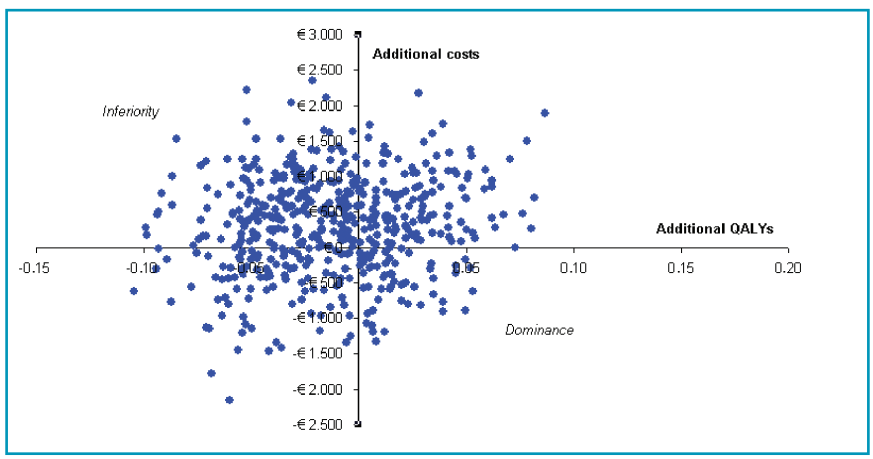

Figure 4. Cost-effectiveness plane for endocrinologist subgroup only

skills of the DNS. Because adherence to the protocol is highest within this group, this might further explain the beneficial effects found. Notwithstanding the positive outcomes in the DNS subgroup, these data also show that the natural deterioration of diabetes was not sufficiently slowed down among patients assigned to the GP. This indicates that more attention should be paid to secondary prevention for the (so far) relatively well-controlled patients in order to prevent decline in HbA_{1c} control, health status and quality of life in the early stages of disease, and prevent future complications.

Given the limitations of the study design, no causal relationship between the introduction of the DMP and the observed changes in costs and effects of care can be demonstrated. Consequently, the results from this study might be biased by, for example, regression to the mean.[31] Without underestimating the power of this phenomenon, we are confident that the observed results can at least to a large extent be attributed to the introduction of the DMP. Regression to the mean would have biased the results in all patients; not only in those who were assigned to the DNS, in whom the largest changes were observed. Also, no co-interventions that could interfere with our measurements (e.g. changes in discharge policy, introduction of screening programmes or availability of new drugs) occurred during the study period. Furthermore, given the magnitude of the observed changes in (for example) glycaemic control, self-management behaviour and an

average decrease in hospitalisation costs of 54% among patients assigned to the DNS, we believe this cannot be explained by the natural disease course or by (inter)national trends.

Missing values is another concern of this study. Although response and completion as achieved in this study are common for longitudinal studies involving the chronically ill,[32] the missing data selectively affect measurements within the DMP. Because patients with missing data were more likely to be those with relatively high HRQoL and low costs (i.e. patients assigned to the GP), the costs and effects of the DMP are underestimated, if anything.

Considering the study limitations, further experimentation with diabetes DMP is recommended, wherein DNSs play a key role. In addition, the focus of future studies should be on the long-term cost-effectiveness of DMPs, including diabetic complications and mortality.

Conclusion

The DMP being studied – in which DNSs played a central role by delivering care to 66% of the population of patients with type 1 or 2 diabetes mellitus – was associated with improved quality of care, within budget. The patients assigned to DNS benefited most from the programme's introduction, suggesting that the central role of the DNS in diabetes disease management is the critical success factor in this programme.

Conflict of interest statement:

None

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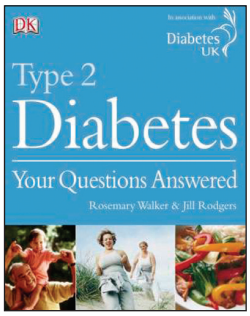
Book Review

Type 2 diabetes: your questions answered

Rosemary Walker and Jill Rogers



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'Type 2 diabetes: your questions answered' is a very clear, easy to read guide for patients with type 2 diabetes. It provides comprehensive coverage of the condition and its related aspects, and is well illustrated, with step-by-step photographs, e.g. showing patients how to monitor their blood glucose level. It will appeal to patients who have a good command of the English language and are fairly knowledgeable about diabetes in general terms.

The book provides practical advice for patients on how to minimise the risk of complications by following a healthy lifestyle and monitoring their blood glucose level. The question and answer format identifies many of the key concerns of patients with diabetes and addresses them in detail, although inevitably there is some repetition from chapter to chapter.

Some aspects of diabetes management should perhaps be approached with a little more caution, such as when advising on increasing insulin doses during illness. Although a patient with diabetes on a large insulin dose may be able to tolerate dosage increases, I would be cautious when advising a patient to increase their dose by 6 units at a time, as recommended on occasion in this book. There may be a danger that a patient may decide to increase their insulin dose to an inappropriate level as a result of reading this book. From a safety aspect, I would be hesitant to advise a patient to increase their oral medication (as in one chapter) when they may already be on maximum therapy. It should be emphasised that it is very important that patients should always seek specialist/medical advice at times of illness when either oral medication or insulin doses may need to be reviewed.

In clinical practice, I would also not recommend 'rounding blood glucose readings up or down' as this can be misleading when interpreting results. Readings are more likely to be rounded down rather than up, therefore providing patients with a falsely positive perspective of their diabetes.

Despite these criticisms, I would recommend this book to a patient with diabetes, depending on their level of knowledge. It is a useful source of information and is clearly presented, providing a valuable resource to patients.

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Conference Notice

43rd Annual Meeting of the European Association for the Study of Diabetes (EASD)

17–21 September 2007, Amsterdam, The Netherlands

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