

Impact of Primary Care–Based Disease Management on the Health-Related Quality of Life in Patients With Type 2 Diabetes and Comorbidity

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OBJECTIVE — This study examined the effectiveness of the German diabetes disease management program (DMP) for patients with varying numbers of other medical conditions with respect to their health-related quality of life (HRQoL).

RESEARCH DESIGN AND METHODS — A questionnaire, including the HRQoL-measured EQ-5D, was mailed to a random sample of 3,546 patients with type 2 diabetes (59.3% female). The EQ-5D score was analyzed by grouping patients according to those on a DMP and those receiving routine care.

RESULTS — The analysis showed that participation in the DMP ($P < 0.001$), the number of other medical conditions ($P < 0.001$), and the interaction between the DMP and the number of other conditions ($P < 0.05$) had a significant impact on the EQ-5D score.

CONCLUSIONS — Our findings suggest that the number of other medical conditions may have a negative impact on the HRQoL of patients with type 2 diabetes. The results demonstrate that the German DMP for type 2 diabetes may help counterbalance this effect.

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Previous research showed that the presence of other medical conditions had a negative impact on health-related quality of life (HRQoL) for patients with type 2 diabetes (1–3). In Germany, a special disease management program (DMP) has been in place throughout the country since 2003, aiming to better structure and coordinate the care of patients with type 2 diabetes. This primary care–based continuous program comprises elements of the Chronic Care Model and is accessible for all patients with type 2 diabetes (4,5). This study aimed to examine the effectiveness of the German diabetes DMP for patients with varying numbers of other medical conditions with respect to their HRQoL.

RESEARCH DESIGN AND METHODS — This study was integrated into the Evaluation of a Large-Scale Implementation of Disease (ELSID) study (2005–2007), a comparative evaluation of the German DMP for patients with type 2 diabetes. This controlled observational study aims to compare the effectiveness of care provided by the DMP with that of routine care. A total of 20,625 patients were included, of whom 59.2% were female. The sample and the classification of patients in terms of enrollment in a DMP were based on routine claims data (6). The basis for the survey study presented in this article was a random sample of 3,546 patients (59.3% female) taken from the ELSID population. In 2006, these pa-

tients received questionnaires with a cover letter sent by their health insurance provider. Details of the data acquisition have been published (5).

We used the EQ-5D, a validated generic instrument for measuring HRQoL that is available in more than 50 languages. The EQ-5D score ranges from 0 to 1 and can be calculated by applying scores from the EQ-5D preference weights elicited from the general population. For this study, the EQ-5D score was calculated using the value set for the European population (7,8). Further investigations have demonstrated the usefulness of the EQ-5D in identifying determinants of health states (9,10). The minimal important difference for the EQ-5D has been reported in the relevant literature as a change in score of at least 0.05 points (11).

The questionnaire is comprised of questions on sociodemographic characteristics (age, sex, educational level, marital status, and household income), self-reported health information (weight, height, and smoking status), and a list of conditions other than type 2 diabetes in lay terms (hypertension, osteoarthritis, cancer, previous stroke, coronary heart disease, chronic obstructive pulmonary disease, asthma, heart failure, previous heart attack, and other). Study protocols of the ELSID study and of this survey were both approved by the ethics committee of the University of Heidelberg.

Statistical analysis

All analyses were conducted with SPSS software (version 15.0; SPSS, Chicago, IL). The EQ-5D score was analyzed by grouping patients according to those who participate in the German diabetes DMP and patients in routine care. To compare the EQ-5D score in both groups, we performed ANCOVA with the DMP (yes/no), the number of other medical conditions (0–6 and more), and sex as independent factors and age as a covariate. We considered all main effects and the interaction effect of the DMP and the number of other

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conditions. The level of significance was $P < 0.05$.

RESULTS— Of the 3,546 questionnaires mailed, 1,532 were returned (response rate 42.2%). Valid data were available for 1,399 patients. The EQ-5D score could be calculated for 1,291 patients. A nonresponder analysis (on the basis of claims data) showed that responders, compared with nonresponders, were younger, a higher proportion were female, and more patients were participating in a DMP.

Patient characteristics

Of the 1,399 patients included, 649 were male (46.4%) and 750 were female (53.6%). The mean age for the entire sample was 70.3 ± 8.5 years. On average, the patients were enrolled for 26.8 ± 9.0 months in the DMP for type 2 diabetes. Significant differences between the two patient groups did not exist for the whole sample but did for some subgroups: patients with no other conditions (age), one other condition (coronary heart disease and cancer), two other conditions (previous heart attack), three other conditions (education), five other conditions (osteoarthritis), and six other conditions (heart failure).

The analysis for the number of other medical conditions revealed that 92.8% of the DMP patients and 93.4% of the patients in routine care had one or more other conditions. It also showed that 70.7% of patients who were enrolled in the DMP and 72.9% of patients who were not enrolled had two or more conditions. Moreover, 25.2% of patients in the DMP group and 28.5% in the non-DMP group had four or more other conditions.

EQ-5D score

The analysis of the main effects showed that participation in the DMP [$F_{(1, 1,276)} = 11.50$; $P < 0.001$], the number of other conditions [$F_{(6, 1,276)} = 44.35$; $P < 0.001$], sex [$F_{(1, 1,276)} = 19.22$; $P < 0.001$], and age [$F_{(1, 1,276)} = 14.89$; $P < 0.001$] had a significant impact on the EQ-5D score. The analysis of the interaction effect (between DMP and the number of other conditions) also revealed a significant impact on the EQ-5D score [$F_{(6, 1,276)} = 2.19$; $P < 0.05$].

An assessment of the estimated EQ-5D score mean values showed that as the number of other conditions rose, the score decreased in both groups. Starting at 0.826 (95% CI 0.773–0.879) for DMP patients and 0.790 (0.719–0.862) for pa-

Table 1—Comparison of EQ-5D score between type 2 diabetes patients in disease management and patients in routine care (N = 1,291)

Other conditions	Routine care			Disease management		
	n	Mean \pm SEM	95% CI	n	Mean \pm SEM	95% CI
0	40	0.790 \pm 0.036	0.719–0.862	66	0.826 \pm 0.027	0.773 \pm 0.879
1	111	0.775 \pm 0.021	0.734–0.816	189	0.789 \pm 0.015	0.759 \pm 0.819
2	140	0.682 \pm 0.018	0.646–0.717	214	0.670 \pm 0.014	0.642 \pm 0.699
3	91	0.642 \pm 0.023	0.598–0.687	178	0.654 \pm 0.016	0.622 \pm 0.686
4	64	0.566 \pm 0.027	0.513–0.619	93	0.627 \pm 0.022	0.584 \pm 0.671
5	42	0.510 \pm 0.034	0.443–0.578	60	0.575 \pm 0.027	0.522 \pm 0.628
6 \leq	46	0.398 \pm 0.030	0.338–0.457	65	0.539 \pm 0.026	0.487 \pm 0.590

Data are means \pm SEM.

tients in routine care with no other conditions, the EQ-5D score decreased for patients with six or more other conditions to 0.539 (0.487–0.590) in the DMP group and to 0.398 (0.338–0.457) for patients in routine care. With the exception of patients with two other conditions, patients in the DMP have higher estimated mean values for all numbers of other conditions. A minimal important difference between DMP and routine care existed for patients with four other conditions (DMP = 0.627; routine care = 0.566), five other conditions (DMP = 0.575; routine care = 0.510), and six or more other conditions (DMP = 0.539; routine care = 0.398) (Table 1).

CONCLUSIONS— The results of our study demonstrate that participation in a DMP may have a greater impact on HRQoL for patients with type 2 diabetes, especially for those with increasing numbers of comorbid conditions. We were able to show that HRQoL decreased continuously and the difference between the DMP and routine care clearly increased as the number of other medical conditions rose. The study thus provides additional research evidence on the positive impact of the German DMP, which is in line with previous studies (6,12). In addition, these results may suggest that the number of other medical conditions has an important influence on HRQoL.

The higher HRQoL in patients with type 2 diabetes with comorbidity in the DMP group may be related to different factors. According to previous studies, structured chronic care may improve medical care for other conditions as well (13,14). This may be a result of both greater motivation on the part of the doctor to provide treatment and more opportunities to do so, as these patients visit the practice regularly. The finding may also

reflect the added value of primary care, as this is by definition highly accessible, patient-oriented, and comprehensive (15).

This study has some limitations. Because the DMP was established nationwide before our study began, randomization was not possible. Furthermore, we do not know whether and how motivation to enroll in the DMP affects HRQoL, and differences (i.e., age, sex, and DMP status) between responders and nonresponders may also affect our results.

However, our findings suggest that having additional medical conditions may have a negative impact on the HRQoL of patients with type 2 diabetes. Our results demonstrate that primary care-based structured and coordinated care, such as that offered in the German DMP for type 2 diabetes, may help counterbalance this effect.

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