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ORIGINAL ARTICLE

Does patient education facilitate diabetic patients' possibilities to reach national treatment targets?

A national survey in Swedish primary healthcare

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Abstract

Objective. To describe how patient education is arranged in Swedish primary healthcare (PHC) and to assess whether the type of patient education and individual goal setting have an impact on diabetic patients' possibilities of reaching national treatment targets. *Design.* A Swedish national survey. *Setting.* Swedish PHC. *Subjects.* Data from 485 primary healthcare centres (PHCCs) and 91 637 diabetic patients reported by the PHCCs to the National Diabetes Register in 2006. *Main outcome measures.* Description of how patient education is arranged, HbA_{1c}, body mass index, cholesterol, blood pressure, and physical activity. *Results.* Of the PHCCs that reported how they performed the individual counselling, 50% reported checklist-driven counselling and 8% individualized counselling based on patients' needs. A total of 105 PHCCs reported that they arranged group education. Of these, 67% used pre-planned programmes and 9% individualized the programme to the patients' needs. The majority of PHCCs (96%) reported that they set individual goals (HbA_{1c}, blood pressure, lipids, and lifestyle). A minority of the PHCCs (27%) reported that the patients were involved in the final decision concerning their goals. Individual goal-setting facilitated patients' possibilities of reaching treatment targets. Goal-setting, list size of PHCCs, and personnel resources explained a variance of 2.1–5.7%. Neither individual counselling (checklist-driven or individualized to patients' needs) nor group education had an impact on patients' possibilities of reaching the targets. *Conclusion.* The current study indicates that improvement is needed in patient education in PHC to facilitate diabetic patients' possibilities of reaching national treatment targets.

Key Words: *Diabetes mellitus, family practice, patient education, primary health care*

In Sweden, patient education for most people with type 2 diabetes and some with type 1 diabetes is integrated into primary healthcare (PHC) [1]. Diabetic patients visit their general practitioner (GP) and their nurses/diabetes specialist nurses (DSNs) at least once a year, and medical check-ups and individual counselling are performed at these annual visits [1,2]. In addition to individual counselling, group education might be provided [3]. The patient education and care provided are supposed to be based on the Swedish national guidelines for care and treatment in diabetes mellitus in order to improve the quality of diabetes care [4].

In 1996, the National Diabetes Register (NDR) was introduced in Sweden with the intention of facilitating quality control concerning treatment targets. Since the start of the NDR, the observable trend has been an improvement in reaching national treatment targets for HbA_{1c} [5,6], lipids [6], and blood pressure [5]. On the other hand, deteriorating results are reported for body mass index (BMI) [5]. The UK Prospective Diabetes Study (UKPDS) [7–9] has had an impact on the trend of improvements in patients' metabolic control. However, there is still a gap between treatment targets and reality [5]. Several factors have been discussed as methods

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Patient education has been evaluated in primary healthcare (PHC) but not, to our knowledge, in a national survey.

- The majority of primary healthcare centres (PHCC) have checklist-driven/pre-planned education, and a minority have individualized education based on patients' needs.
- The majority of PHCCs set individual goals and a minority involve patients in the final decision regarding their goals.
- Individual goal-setting facilitated patients' possibilities of reaching national treatment targets.

for decreasing this gap [10,11], one of which is the influence of patient education [12–14]. Thus, the particular interest in this study was to investigate whether education influences diabetic patients' possibilities of reaching recommended national treatment targets. The aims were to describe how patient education is arranged in Swedish PHC and to assess whether the type of patient education and individual goal-setting have an impact on diabetic patients' possibilities of reaching national treatment targets.

Material and methods

This paper reports on a part of a larger study – The Swedish national survey of the quality and organization of diabetes care in primary healthcare (Swed-QOP). Two data sources have been used: a questionnaire to collect data from PHCCs in Sweden during 2006, and patient data obtained from the 2006 NDR.

Study participants

A total of 921 PHCCs were eligible to participate. Of these, 684 (74.3%) responded to the questionnaire, of which 540 had reported data to the NDR in 2006. Exclusion criteria were: not having reported data (n = 144) and having reported <30 patients (n = 55) to the NDR in 2006.

Based on the number of patients the PHCCs listed, 175 were classified as small to medium ($\leq$7999, 36%), 180 as large (8000–11 999, 37%) and 130 as very large ($\geq$12 000, 27%) [15].

At the 485 PHCCs, the mean number and standard deviation ($\pm$SD) of diabetic patients were 392 ($\pm$204), whole time equivalent (WTE) GP per 1000 patients was 0.50 ($\pm$0.16), and WTE DSN per 500 diabetic patients was 0.75 ($\pm$0.41). Of the 485 PHCCs, 370 (77.2%) had diabetes-responsible GP(s), 478 (98.6%) had diabetes-responsible DSN(s), 356 (74.0%) had DSN(s) with postgraduate education in diabetes with 1.5 to 15 European Credit Transfer and Accumulation System (ECTS) points, and 91 (18.9%) had DSN(s) with >15 ECTS points. At the 485 PHCCs, 91 637 patients were registered in the NDR. The mean age of the patients was 68.0 years ($\pm$2.26), and they had lived a mean of 8.6 years ($\pm$2.37) with the disease. Their mean HbA_{1c} was 6.1% ($\pm$0.27) (measured in MonoS). The MonoS can be converted to DCCT standard level using the formula $0.923 \times HbA_{1c}$ MonoS + $1.345 = HbA_{1c}$ DCCT [16]. The patients' mean BMI (weight/height m^2) was 29.4 kg/m^2 ($\pm$0.89), blood pressure was 140.0 mm Hg ($\pm$4.16)/76.7 mm Hg ($\pm$2.84), and cholesterol 4.9 mmol/l ($\pm$0.23).

A total of 45.5% of the patients were female, and 92.4% were defined as having type 2 diabetes. The Steering Committee of the NDR defines type 2 diabetes as "treatment with diet only or in combination with oral hypoglycaemic agents (OHA), or with either insulin only or OHA in combination with insulin in patients $\geq$40 years of age when diabetes was diagnosed" [5, p. 1421].

The questionnaire

The questionnaire was based on a survey of asthma care in Sweden [15] and on published surveys of diabetes care in the UK [17,18]. The questions in the Swed-QOP covered: list size of PHCCs, number of diabetic patients, personnel resources (number of WTE GPs, time that DSN(s) spent providing care to diabetic patients, having diabetes-responsible GP(s) and DSN(s), having DSN(s) with postgraduate education in diabetes, other resources), and way of working (having and using diabetes guidelines, screening for long-term complications, time spent with each patient, routines for starting insulin treatment, follow-up system, type of patient education, individual goal setting, NDR registration, and example of quality work).

Besides organizational factors like list size and personnel resources at the PHCCs, in this paper we report on type of patient education and individual goal-setting.

Prior to the main study, the questionnaires were sent to 10 DSNs and 10 PHC managers at 10 PHCCs in a catchment area of 260 000 inhabitants in mid-Sweden. The reliability test between the two groups showed a correlation between -0.316 and $+1.0$. Questions with low reliability were adjusted or reconstructed, and the instructions were made clearer before the final questionnaire was sent to all PHCCs. The revised questionnaires were sent to PHCCs registered in the Health & Medical Information

Service address register. Data were collected from February to the end of August 2007.

NDR

All Swedish PHCCs are encouraged to report data to the NDR, although this is not compulsory. In 2006, 78.1% of the PHCCs did so. Patients receive information and approve their registration in the NDR prior to the reporting. Data are reported at least once a year (http://www.ndr.nu). The latest reported data for 2006 used, besides demographic and clinical characteristics, were HbA_{1c}, BMI, cholesterol, blood pressure, and physical activity. In Sweden, treatment targets at the time of the study were $HbA_{1c} < 6.5\%$, BMI < 25 kg/m^2, cholesterol < 5.0 mmol/l, blood pressure $\leq 140/\leq 85$ mm Hg [4], and a general physical activity recommendation of three to five times a week.

To prevent an individual PHCC from being able to be identified, the data obtained were recoded by a person outside the research group when the data from the questionnaires were connected to data from the NDR.

Ethical considerations

The Research Ethics Committee at Uppsala University approved the study design (Dnr 2006:335). The questionnaires were given a temporary identification code to track non-respondents to be able to remind the PHCCs about the study. The PHCCs were informed about the aim of the study in a covering letter when the questionnaire was sent to them. A returned questionnaire was interpreted as consent by the PHCC to participate in the study. Only decoded data from the patients were used in this study.

Data analyses

The questionnaires were scanned and verified, and answers to the open questions were handled manually using qualitative content analysis [19]. Inter-rater reliability agreement was 85%.

SPSS 14.0 for Windows was used for quantitative data analyses. The Pearson correlation coefficient was used for continuous variables and Cohen's kappa for discrete variables in the reliability test in the questionnaire. Mean and $\pm$SD were used for continuous and discrete variables. The data were analysed at the PHCC level, and fulfilment of the treatment targets for HbA_{1c}, BMI, cholesterol, blood pressure, and physical activity was reported as the percentage of patients at a PHCC who reached these targets. The percentages were considered to be continuous variables, and stepwise multiple linear regression analyses with backward selection were performed with these percentages as dependent variables. The list size of the PHCCs, number of diabetic patients, personnel resources, type of patient education, and individual goal-setting were independent variables. Variables with a p-value < 0.10 were included in the model. For all statistical analyses, a two-sided p-value < 0.05 was considered statistically significant.

Results

Patient education and individual goal-setting

In the individual counselling, 50.3% (n = 244) of the PHCCs were found to be checklist driven, 8.3% (n = 40) individualized the counselling based on the patients' needs, and 41.4% (n = 201) did not report how they performed the counselling. A total of 21.6% (n = 105) of the PHCCs reported that they arranged group education. Of these, 66.7% (n = 70) used pre-planned programmes, 8.6% (n = 9) individualized the programme according to patients' needs, and 24.7% (n = 26) did not report how they arranged the programme.

The majority of PHCCs reported that they set individual goals for HbA_{1c} (97.7%; n = 474), blood pressure (97.9%; n = 475), lipids (90.5%; n = 439), and lifestyle (98.1%; n = 476). A minority of the PHCCs reported that patients were involved in the final decision regarding their goal-setting for HbA_{1c} (26.8%; n = 130), blood pressure (23.5%; n = 114), lipids (22.5%; n = 109), and lifestyle (35.7%; n = 173).

Proportions of patients in individual counselling and in group education reaching the national treatment targets for HbA_{1c}, BMI, blood pressure, cholesterol, and physical activity are presented in Table I.

Factors influencing the reaching of national treatment targets

Reaching treatment targets for HbA_{1c} was positively related to setting individual HbA_{1c} goals, but was negatively related to the number of WTE GPs per 1000 patients, while reaching blood pressure targets was positively related to the list size of a PHCC, having DSN(s) with a postgraduate education in diabetes and setting individual lipid goals. Reaching cholesterol targets was positively related to setting individual lipid goals. No variable had a significant effect on reaching BMI or physical activity targets (Table II).

It should be noted that setting individual goals had a great impact on reaching treatment targets. Thus, setting individual HbA_{1c} goals increased the percentage of patients at a PHCC reaching treatment

Table I. Proportions of patients, in individual counselling and in group education, reaching the national treatment targets for HbA_{1c}, body mass index (BMI), blood pressure (BP), cholesterol. and physical activity.

	Individual counselling			Group education added to the individual counselling		
	Checklist-driven	Individualization based on patients' needs	Individual counselling*	Pre-planned	Individualization based on patients' needs	Group education*
Number of PHCCs	n = 244	n = 40	n = 201	n = 70	n = 9	n = 26
Number of diabetic patients	n = 47 979	n = 7 232	n = 36 426	n = 15 263	n = 2 617	n = 4 339
Proportion of patients (%)						
$HbA_{1c} < 6.5\%$	67.8	69.1	66.3	68.5	71.3	67.9
BMI < 25 kg/m^2	18.5	16.7	17.7	18.8	19.2	18.2
BP $\leq 140/\leq 85$ mm Hg	57.9	59.5	55.8	58.5	61.9	59.8
Cholesterol < 5.0 mmol/l	57.6	58.0	56.2	58.1	58.3	58.5
Physical activity						
3–5 times/week	21.0	18.3	20.4	21.4	16.5	20.0

Note: *Not explained how they performed the education.

targets for HbA_{1c} by 11.1 percentage points, while setting individual lipid goals increased the percentage of patients reaching treatment targets by 5.8 percentage points for blood pressure and 6.4 percentage points for cholesterol. However, the adjusted R^2 values were rather low (0.021–0.057), which means that only a small fraction of the variation in the dependent variables is explained by the given independent variables.

Neither individual counselling (checklist-driven or individualized based on the patients' needs) nor group education had an impact on patients' possibilities of reaching the targets. Involving patients in the final decisions concerning their goals had no impact on their possibilities of reaching the targets.

Discussion

The majority of Swedish PHCCs had checklist-driven counselling or pre-planned education programmes and set individual goals. A minority of

Table II. Multiple linear regression models with the dependent variables: (1) HbA_{1c}, (2), body mass index (BMI), (3) blood pressure (BP), (4) cholesterol, and (5) physical activity, reported as the percentage of patients who reached these treatment targets at primary healthcare centres (PHCCs).

Dependent variable	Independent variables	Slope	*t*	*P*	Adj R^2
$HbA_{1c} < 6.5\%$	List size of PHCCs	1.152	1.949	0.052	0.057
	Number of WTE general practitioners (GPs) per 1000 patients	−8.757	−3.059	0.002	
	Diabetes-responsible GP	1.861	1.749	0.081	
	Setting individual HbA_{1c} goals	11.099	2.121	0.034	
BMI < 25 kg/m^2	List size of PHCCs	0.583	1.915	0.056	0.021
	Individual counselling based upon patients' needs	−1.392	−1.679	0.094	
	Setting individual lifestyle goals	4.652	1.905	0.058	
BP $\leq 140/\leq 85$ mm Hg	List size of PHCCs	1.755	2.703	0.007	0.049
	Diabetes specialist nurse (DSN) with 1.5 to 15 ECTS points postgraduate education in diabetes	4.169	2.069	0.039	
	DSN with >15 ECTS points postgraduate education in diabetes	5.814	2.582	0.010	
	Setting individual lipid goals	5.794	2.714	0.007	
Cholesterol < 5.0 mmol/l	Setting individual lipid goals	6.430	3.129	0.002	0.021
Physical activity 3–5 times/week	Number of WTE DSN per 500 diabetic patients	−2.598	−1.712	0.088	0.022
	Diabetes-responsible GP	2.754	1.878	0.061	
	Setting individual HbA_{1c} goals	14.032	1.955	0.051	

Notes: All variables with p-value <0.10 were included in the models. ECTS = European Credit Transfer and Accumulation System.

PHCCs individualized the counselling/education, involved patients in the final decision concerning their goals, and arranged group education programmes. Besides organizational factors not specifically related to diabetes care, having DSN(s) with postgraduate education in diabetes and individual goal-setting were found to facilitate patients' possibilities of reaching national treatment targets.

Having DSN(s) with postgraduate education in diabetes was found to have some impact on patients' possibilities of reaching treatment targets. In their review, on the other hand, Renders et al. [11] were not able to conclude whether a DSN with postgraduate education in diabetes contributed to improving the quality of diabetes care. The DSN's role in diabetes care has been discussed [11,20]. Renders et al. [11] found that a DSN can play an important role in patient-oriented education. Meanwhile, in a survey including 169 PHCCs and medical data on 18 642 people with diabetes, Khunti et al. [20] found no association between having nurses interested in diabetes and patients' glycaemic control. This indicates that it requires more than having professionals interested in the disease to improve patient care. In Sweden, however, most of the PHCCs reported that their DSNs have postgraduate education in diabetes.

Considering the trend in society toward increased participation and self-control, it is remarkable that only a minority of the patients in this study were involved in the final decisions regarding their goals at the PHCCs. Research during recent decades has also reported the importance of involving patients in their self-control [13,14]. On the other hand, Stewart et al. [18] found that more than 50% of the 99 participating PHCCs in their survey reported that almost all, or many, patients were involved in individual goal-setting. The present study showed that setting individual goals had an impact on patients' possibilities of reaching treatment targets. In a randomized controlled six-year follow-up study at 311 PHCCs, Olivarius et al. [21] found that individualized goal setting in individual counselling every third month improved diabetic patients' ($n = 459$) glycaemic control, blood pressure, and cholesterol compared with patients in routine diabetes care ($n = 415$).

In line with our findings, Khunti et al. [20] found that improvement is needed in clinical practice in PHC for patients with diabetes. Education needs to be individualized [22] and the dialogue between the care providers and patients needs to improve [23,24]. However, during the past decade the UKPDS has reported that good glycaemic control, blood pressure, and lipids decrease the risk of long-term complications in diabetes [7–9], with a major impact on diabetes care. Reports from the NDR show that patients' possibilities of reaching national treatment targets have improved [5,6], and the same trend is found in the UK [25].

We found an inverse association between the proportion of patients with $HbA_{1c} < 6.5\%$ and the number of GPs per 1000 patients. An explanation for this might be that GPs with a larger list size are normally found in the countryside. These GPs might have better knowledge about the local population, which in turn influences their ability to support their patients. GPs having a larger list size could also mean that the DSN has a more active role in diabetes care at the PHCC and that more controls are performed to achieve better glycaemic control for the patients.

Limitations and strengths

A limitation of the present study is that a dropout analysis was not considered possible. With regard to a PHCC's decision not to participate in the study, no further questions about its characteristics were posed. A combination of methods such as reviewing patient records and making observations could have strengthened the reliability of the study. This was impossible, however, due to the large number of PHCCs spread across the country. Another limitation was that the validation of data reported to the NDR by the PHCCs has not been systematically tested. However, all data reported were validated by filtering extreme values [5].

PHCCs that reported data from fewer than 30 patients were excluded from the analyses because the sample was considered too small to be representative. Attention must also be paid to the fact that severely ill patients might not have been reported [5].

Low socioeconomic factors have been found to affect the risk of morbidity and mortality in diabetes [26]. However, we have not been able to adjust for socioeconomic status because individuals' socioeconomic factors are not reported to the NDR. No question was raised in the Swed-QOP about the PHCCs' socioeconomic catchment areas.

A strength of the study is the widespread geographical coverage of the PHCCs. Another strength is that 74.3% responded to the questionnaire, and the total number of patients reported to the NDR is probably representative of diabetes patients in Swedish PHC.

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