A Study of Patients' Perceptions of Diabetes Care Delivery and Diabetes

Propositional analysis in people with type 1 and 2 diabetes managed by group or usual care

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OBJECTIVE—We investigated the perceptions of diabetes care and diabetes in patients followed long-term by group or usual care.

RESEARCH DESIGN AND METHODS—Three open questions were administered to 120 patients (43 with T1DM and 77 with T2DM) who had been randomized at least 2 years before to be followed by group care and 121 (41 T1DM and 80 T2DM) who had always been on usual care. The responses were analyzed by propositional analysis, by identifying the focal nuclei, i.e., the terms around which all sentences are organized, and then other predicates, according to their hierarchical relationship to the nuclear proposition. Specific communicative units were arbitrarily classified into three categories: attitudes, empowerment, and locus of control.

RESULTS—Patients on group care showed more positive attitudes, higher sense of empowerment, and more internal locus of control than those on usual care. In addition, they expressed a wider and more articulated range of concepts associated with the care received and made less use of medical terminology ($P < 0.001$, all). Higher HbA_{1c} was associated with negative attitudes ($P = 0.025$) and negative empowerment ($P = 0.055$).

CONCLUSIONS—Group treatment reinforces communication and peer identification and may achieve its clinical results by promoting awareness, self-efficacy, positive attitudes toward diabetes and the setting of care, an internal locus of control, and, ultimately, empowerment in the patients.

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Diabetes is a disorder resulting from a defect in insulin secretion, insulin action, or both, leading to disturbances of carbohydrate, fat, and protein metabolism with chronically elevated plasma glucose (1), which carries the risk of multiple disabling, yet potentially preventable complications (2,3).

The key to preventing chronic complications resides in achieving the best possible control of hyperglycemia, blood pressure, and circulating lipids (1,4,5). However, pharmacological intervention is often not sufficient to achieve treatment goals, and appropriate education is necessary to involve patients in everyday decisions regarding dietary choices, physical activity, and adherence to drug prescriptions (4,5).

In the past years we have developed and validated an educational model that can be applied to everyday practice in busy diabetes clinics. This model shifts the emphasis from the traditional one-to-one patient–provider relationship to interactive educational techniques applied in a group setting (6–10). A multicenter randomized controlled clinical trial proved that group care was more effective than usual care in improving metabolic control along with patients' health behaviors, knowledge of diabetes, and quality of life (11). In this study we aimed at investigating, by propositional analysis, how patients who were followed long-term in our clinic by group or usual care perceive diabetes care and diabetes.

Propositional analysis is a method of semantic analysis developed in cognitive science to represent linguistic information, which has been used previously in biomedicine (12–14). A proposition is defined as the smallest unit of discourse that still retains a meaning (12). Discourse theory assumes that the elements of a proposition should be analyzed as concepts, above and beyond the words within the text, because its meaning may change depending on the context in which it originated, even if the lexical-semantic relationships among its elements are similar (15,16). Understanding the concepts hidden within a proposition allows one to achieve a comprehensive assessment of a person's perception of a given topic. By administering open questionnaires to people with diabetes managed by group or usual care we were able to facilitate the expression of articulated responses, which were then subjected to propositional analysis.

RESEARCH DESIGN AND METHODS

Patients

Two-hundred and forty-one consecutive patients, parts of cohorts that had been randomized at least 2 years before to group or usual care, were involved in the study. One-hundred and twenty patients (43 with T1DM and 77 with T2DM) had been followed by group care and 121 (41 T1DM and 80 T2DM) by usual care. Table 1 shows their socioeconomic and clinical data. Patients with T1DM had higher schooling, and more patients with T2DM were retired. All patients with T1DM were on four daily insulin injections and practiced self-monitoring of blood glucose.

Survey

The patients on group care were asked three open questions: *1*) What does participating in a group visit mean to you?

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Table 1—*Clinical data of the patients*

	Significance of differences among all groups	T1DM			T2DM		
		Control subjects	Group care	Significance of differences	Control subjects	Group care	Significance of differences
N		41	43		80	77	
Sex (female/male)	NS	21/20	23/20		39/41	49/28	
Age (m ± ds)	<0.0001	39.3 ± 13.1	42.6 ± 11.2	NS	65.8 ± 9	68.7 ± 7.7	NS
Schooling[a] (N/P/MS/HS/U)	<0.0001	0/1/11/21/8	0/1/10/20/12	NS	1/29/22/24/4	2/34/17/20/4	NS
Occupation[b] (H/R/B/SE/C/ W/O)	<0.0001	3/2/10/5/5/11/5	2/4/2/8/4/14/9	NS	12/45/3/6/4/7/3	5/55/1/4/5/5/2	NS
Family status[c] (S/W/D/S/M)	<0.0001	23/0/1/1/16	11/4/2/1/25	NS	1/16/2/3/58	3/11/4/2/57	NS
Glucose-lowering treatment (D/OHA/OHA+Ins/Ins)[d]	<0.0001	0/0/1/40	0/1/0/42	NS	5/38/16/21	2/45/11/19	NS
Family history of diabetes mellitus (yes/no)	0.001	14/27	18/25	NS	54/26	47/30	NS
Years in group care		0	6.6 ± 2.5		0	9.5 ± 4.2	
Owning glucose meter (yes/no)	NS	41/0	43/0		75/5	74/3	
Self-monitoring blood glucose (yes/no)	<0.0001	41/0	43/0	NS	72/8	71/6	NS
Smoker (no/yes/former)	NS	23/12/6	23/9/11		45/11/24	40/10/27	
Hypertension (yes/no)	<0.0001	28/13	32/10	NS	27/53	31/46	NS
Known diabetes duration (years)	0.0002	22.0 ± 9.2	23.9 ± 10.8	NS	17.2 ± 8,2	18.5 ± 7.5	NS
BMI	<0.0001	24.7 ± 4.5	24.6 ± 3	NS	28.6 ± 4.3	27.9 ± 4.8	NS
Fasting blood glucose (mmol/L)	NS	9.75 ± 4.11	8.30 ± 3.99	NS	8.51 ± 3.19	8.29 ± 2.45	NS
HbA_{1c} (percent of total Hb)	0.0002	8.54 ± 1.5	7.4 ± 0.9	0.001	8.02 ± 1.6	7.57 ± 1.0	NS
Total cholesterol (mmol/L)	NS	5.03 ± 1.29	5.06 ± 1.15	NS	4.89 ± 0.13	5.09 ± 1.01	NS
HDL cholesterol (mmol/L)	<0.0001	1.42 ± 0.36	1.75 ± 0.58	0.002	1.25 ± 0.35	1.29 ± 0.40	NS
Triglyceride (mmol/L)	<0.0001	1.33 ± 0.87	0.95 ± 0.51	NS	1.71 ± 1.08	1.61 ± 0.80	NS

[a]Schooling: N, no formal education; P, primary school; M, middle school; H, high school; U, university degree; [b]Occupation: H, housewife; R, retired; B, blue collar; SE, self-employed; C, craftsman; W, white collar; O, other; [c]Family status: S, single; W, widower; D, divorced; S, separated; M, married; [d]Diet only: OHA, oral hypoglycemic agents; OHA+Ins, OHA plus insulin; Ins, insulin.

2) How important is the group to you within the clinical and educational model of group care? and *3*) Please list the first five words that spring to mind in association with group care.

Patients on usual care were asked the following three questions: *1*) What does having your medical visit mean to you? *2*) How important are one-to-one medical consultations for the treatment of your disease? and *3*) Please list the first five words that spring to mind in association with medical visits.

The questionnaires were self-administered, and the patients were asked to answer in writing on specially provided forms. If the patients had literacy problems, they were helped by a health operator. The interviews were carried out between January and November 2009. No patient refused to participate, and all gave their informed consent to the study, which conformed to the principles of the Helsinki Declaration (17).

Propositional analysis

Propositional analysis is used in qualitative research to investigate the meaning that individuals attach to their own activities, life contexts, impact on society, and belief systems they share with other members of the same cultural group (12–16). It derives its approach from such different disciplines as sociology, philosophy, psychology, informatics, communication science, linguistics, and history. Through analytical deconstruction of texts or other systems of symbols, propositional analysis extracts concepts, representations, and cognitive processes that underlie written or oral speech, the basic assumption being that individuals use language to learn, influence each other, build symbolic universes, and share representations and rules that regulate behaviors within their group (16).

Propositional analysis was carried out by a specifically trained professional educator (M.R.). Any doubts in attribution were independently reconsidered by a second professional educator (M. Trevisan) and, in case of disagreement, finally adjudicated by a psychopedagogue (M. Trento).

The responses to the first two questions of both questionnaires were subjected to propositional analysis. First, propositions in each sentence were isolated by identifying the predicates and all related arguments (18). Focal nuclei, defined as the terms around which sentences are organized, were identified and, subsequently, the other predicates were defined according to their hierarchical relationship to the nuclear proposition (18). A conceptualization process was applied to identify themes of importance to the people interviewed (18).

Specific communicative units were arbitrarily classified into three categories: attitudes, empowerment, and locus of control, since these were most frequently

identified in the patients' responses. An attitude is a hypothetical construct representing an individual's degree of like or dislike for a given item. Attitudes are generally positive or negative views of a person, place, thing, or event, which is referred to as the attitude object (19). Positive attitudes include identification, acknowledgment, and awareness of a problem. Negative attitudes involve dissatisfaction and/or having negative feelings toward the problem (19). Empowerment is the process of enabling an individual to think, behave, take action, and control work and decision making in autonomous ways. It is the state of feeling able to take control of one's own destiny (20). The locus of control (21) refers to an individual's generalized expectations concerning where control over events resides. The concept of locus of control denotes a context of outer- or inner-directed behavior in various situations that people have to face in daily life.

Based upon the above criteria, a positive or negative value was assigned to the concepts identified within each category. A score of +1 or −1 was assigned to positive and, respectively, negative attitudes, empowerment, or locus of control. If a concept was repeated in both answers, a score of +2 or −2 was assigned for emphasized positive or negative attitude, empowerment, or locus of control. If categories could not be identified within the answers, they were scored 0.

Examples of propositional analysis, as applied to the patients' responses, are as follows: ["(The visit) is touch and go, it's very superficial. Problems are not analyzed in any depth; the visit itself is but a conclusion of self-monitoring, for self-monitoring in the end is what seems to matter. Time is ever too short to go deep into details"].

In this period, the predicates are "is," "are not analyzed," "what seems to matter," and "to go deep." The related arguments are "touch and go," "very superficial," "in any depth," "a conclusion of self-monitoring," "ever too short," and "into details."

In the first proposition, "is touch and go" can be taken as focal nucleus and "it's very superficial" as reinforcement on the same hierarchical level. This was interpreted as negative attitude toward the traditional visit (attitude object).

In the second proposition, the focal nucleus is "Problems are not analyzed in any detail," related arguments being "the visit itself is but a conclusion of self-monitoring" first in hierarchical order and "self-monitoring in the end is what seems to matter" in second order. Besides reiterating a negative attitude, this proposition suggests a hint of outer-directed locus of control.

In the third proposition, the focal nucleus "Time is ever too short" and the related argument "to go deep into details" further reinforce the presence of a negative attitude.

This period was scored "−1" for attitudes, "0" for locus of control, and "0" for empowerment.

Here is another example of a propositional analysis, as applied to the patients' responses: ["What's more important, I receive information in a new way. Helpful information, not just the usual numbers and calculations. Talking to the other participants, useful and interesting new things come out, which remain more vivid in my mind, because they are linked to everyday life."]

In this period, the predicates are "is," "receive," "Talking," "come out," "remain," and "are linked." The related arguments are: "more important," "information in a new way. Helpful information, not just the usual numbers and calculations," "to the other participants," "more vivid in my mind," and "to everyday life."

In the first proposition, "I receive information in a new way," including "Helpful information, not just the usual numbers and calculations," is the focal nucleus denoting a positive attitude toward the object group visit.

In the second proposition, "useful and interesting new things come out" is the focal nucleus, reiterating a positive attitude, with "Talking to the other participants" and "which remain more vivid in my mind" as first order–related arguments and "because they are linked to everyday life" as second in hierarchical order.

This period was scored "+1" for attitude, "0" for locus of control, and "0" for empowerment.

Based upon the same procedure, the following propositions were analyzed and scored as follows: *1*) ["I go to see the doctor because I have to, but had rather not." "The doctor tells me what to do and what not to do."] This period was scored "0" for attitude, "−1" for locus of control, and "0" for empowerment; *2*) ["I find it important. I think there is nothing better I could do to take care of myself."] This period was scored "0" for attitude, "+1" for locus of control, and "0" for empowerment; *3*) ["I don't think visits are that important, just to get diabetes back into track . . . if only I knew how to do it myself . . ."] This period was scored "0" for attitude, "0" for locus of control, and "−1" for empowerment; and *4*) ["It is important, because you acquire awareness. I learnt so much from exchange among us. I now feel ready to take care of myself."] This period was scored "0" for attitude, "0" for locus of control, and "+1" for empowerment.

With reference to item No. 3 in the questionnaires, words and sentences expressed by the patients were coded as positive or negative concepts. The presence of ≥4 positive or negative concepts was coded as emphasized positive or negative, respectively. The presence of medical terms within the answers given by the patients was coded as absent (score = 0), mentioned once or twice (score = 1), or repeated ≥3 times (score = 2).

Group care

The group care model to manage type 1 and 2 diabetes was described previously (6–8). In brief, traditional individual visits were substituted with group education sessions held every 2 to 3 months (type 1 diabetes) or 3 to 4 months (type 2 diabetes) by one to two health operators (doctor, nurse, dietitian, educator, or psychopedagogue) who act as facilitators according to the methodological principles of adult learning. The full program lasts 2 years and is repeated ad libitum. Sessions and group discussions are concerned with motivational aspects, acceptance of diabetes, psychosocial problems, and coping strategies. To induce positive group dynamics, patients are helped to identify and share their problems and successes with the other members and encouraged to report on their personal experience. Sessions last 40–50 min and are followed by brief individual consultations with the doctor to comment on laboratory results, selected aspects of the previous group session, or yearly check-up for complications or to address emerging problems, if any. Few of the control subjects had received structured diabetes education.

Statistical methods

Descriptive data are shown as absolute frequencies of the different modalities for categorical data and as mean ± SD for continuous variables. The χ^2 or Fisher exact test for categorical variables was carried out to compare the four groups in the study: patients with type 1 or 2 diabetes, managed by group care or usual care. For continuous variables, the ANOVA test with Bonferroni correction for multiple comparisons was carried out to assess whether significant differences could be demonstrated among the four groups.

The χ^2 test was carried out to compare the outcome variables (attitude, empowerment, locus of control, positive or negative value attributed to terms used and use of medical terms) both among the four groups and between the group care model and control group, separately for type 1 and 2 diabetes.

The same outcome variables were dichotomized and treated as dependent variables in a logistic regression model, where the treatment model (group care vs. usual care), type of diabetes (T1DM vs. T2DM), age, sex, duration of diabetes, HbA_{1c}, BMI, family history of diabetes, and schooling (high school or academic degree vs. primary and secondary school) were the independent variables.

For all tests the significance level was set at $\alpha = 0.05$

All analyses were performed with SPSS-17.

RESULTS—The average length of participation in group care was 6.6 ± 2.5 years among patients with T1DM and 9.5 ± 4.2 years in those with T2DM. HbA_{1c} was lower in the patients with T1DM followed by group care than control subjects (7.4 ± 0.9 vs. 8.5 ± 1.5; $P <$ 0.001) and not significantly so in those with T2DM (7.6 ± 1.0 vs. 8.0 ± 1.6; NS). Apart from lower HDL cholesterol in the control subjects with T1DM (P = 0.002), there were no other differences among patients followed by group and usual care (Table 1).

Univariate analysis (Table 2) showed mostly positive attitudes in the patients followed by group care, both T1DM and T2DM, in contrast with those followed by traditional visits. Negative empowerment did not appear in the patients followed by group care but was observed in those followed by usual care. A more external locus of control was observed in the patients followed by usual care, in contrast with a more internal locus in those managed by group care.

With reference to item No. 3, the patients followed by group care expressed a wider and more articulated range of concepts associated with the care received (T1DM = 210, T2DM = 356) than those seen by usual care (T1DM = 152, T2DM = 314). Patients with T1DM and T2DM followed by group care used mostly positive concepts, whereas those followed by usual care expressed mostly concepts with negative connotations. The concepts most used by patients with type 1 diabetes to define the usual visit were as follows: "What a drag!", "Too much to wait," or "Tension." In patients with type 2 diabetes the visit evoked such feelings as: "Let's hope the results are OK," "Too much to wait," "Anxiety," and "Fear." Concepts most used by patients with type 1 diabetes to define group visits were as follows: "Comparing," "Knowledge," "Educational," and "Friendship." In patients with type 2 diabetes, the visit evoked the following concepts: "Friendship," "I feel good," "I like this," "I learn," and "Interesting." The patients followed by group care made less use of medical terminology.

Multivariate analysis confirmed the associations of positive attitudes with the group care model ($P < 0.0001$), regardless of diabetes type, and of higher HbA_{1c} with negative attitudes (P = 0.025) and negative empowerment (P = 0.055). group care remained associated with the use of terms indicating an internal locus of control ($P < 0.0001$), whereas increasing age was associated with an external locus of control (P = 0.017).

CONCLUSIONS—Propositional analysis has been used in medicine mainly to investigate neurologic problems (12–16), and this is the first study in which it is applied to analyze the perceptions of patients with diabetes about the setting in which they receive care and, indirectly, about diabetes itself. We chose to apply propositional analysis to diabetes research because patients with chronic illnesses create their own models and commonsense representations which, in turn, may influence self-management of their disease. Although the majority of patients can acquire and apply basic technical skills, such as insulin injections and self-monitoring, effective self-management involves problem-solving abilities to overcome daily barriers to adherence and make appropriate adjustments to self-care regimens. Such lifelong process requires the acquisition of knowledge and a change of attitudes and perceptions to adapt to life events .

The results suggest that patients seen by usual care tend to describe their condition and setting of care with concepts that mostly imply negative attitudes, poor empowerment, and an external locus of control. This is in accordance with previous reports emphasizing low empowerment and external locus of control in patients with diabetes (22). The traditional one-to-one approach was developed to care for acute illnesses but may not be appropriate to activate, develop, and support the care of chronic diseases in which communication and pedagogic skills become at least as important as medical ones (23). Settings of care in which health operators tend to adopt a top-down approach and patients play a passive role may be poorly effective in achieving communication or developing self-efficacy and a balanced long-term

Table 2—*Propositional analysis. Results*

	Significance of differences among all groups	T1DM			T2DM		
		Control subjects	Group care	Significance of differences	Control subjects	Group care	Significance of differences
Attitudes (EN/N/P/EP)*	<0.0001	3/6/8/22	0/0/2/41	<0.0001	13/25/13/26	2/0/5/70	<0.0001
Empowerment (EN/N/P/EP)*	<0.0001	1/7/4/0	0/0/17/6	<0.0001	5/26/7/0	0/0/34/9	<0.0001
Locus of control (EE/E/I/EI)‘	<0.0001	7/7/5/0	0/0/23/9	<0.0001	10/25/6/2	0/1/38/21	<0.0001
Concepts (EN/N/P/EP)*	<0.0001	6/13/11/8	0/0/10/32	<0.0001	18/41/16/2	0/1/21/54	<0.0001
Medical terms (A/M/R)°	<0.0001	27/11/3	40/2/1	0.008	33/42/5	68/9/0	<0.0001

*EN, emphasized negative; N, negative; P, positive; EP, emphasized positive; ‘EE, emphasized external; E, external; I, internal; EI, emphasized internal; °A, absent; M, mentioned once or twice; R, repeated ≥3 times.

patient-professional relationship (23). Time constraints and shortage of pedagogic and communication competencies may limit the ability of health operators to perceive the feelings of patients with chronic diseases (24) and become additional obstacles to their achievement of awareness and empowerment (23).

Patients with T1DM and T2DM may develop negative perceptions of their illness and setting of care as a consequence of the emotional toll and lifestyle changes that start from the time of diagnosis and include stress, frustration, social isolation, interpersonal conflicts, depression, and fear. On the contrary, being followed for many years in a group setting may have been instrumental in bringing about positive attitudes. This, in turn, may have contributed to improve self-care behaviors and ultimately helped to achieve the well-established clinical and psychological benefits associated with group care (6–11).

This model suggested that collaborative diabetes care requires a new paradigm, involving a fundamental redefinition of the roles and relationships between health care professionals and patients. In patients followed by group care an increased sense of personal empowerment ["It is important, because you acquire awareness. I learnt so much from exchange among us. I now feel ready to take care of myself."] may derive from the development of such essential skills as communication, assertiveness, information-seeking, decision-making, coping, and social support seeking (7,9).

This study suggests that patients with T1DM and T2DM followed by group care have a more internal locus of control, confirming our previous reports in which specific questionnaires were used (22). Patients can formulate their own personal strategy to adopt an internal locus of control and make the changes necessary to alter life circumstances and reach personal goals. Those with an internal locus of control are more successful because they view their efforts as vital to achieving goals and assume responsibility for their own lives (26). In group care, the focus is on health rather than disease, prevention and education rather than cure, making people aware of their choices in relation to health. Experience sharing may help modify the locus of control by promoting the development of a sense of responsibility toward one's own healthy behaviors (27).

Traditional visits, on the other hand, are centered on medical information and prescriptions aimed at avoiding the feared consequences of incorrect behaviors, but these messages often fail to come across because they are removed from the patients' perceptions of their disease (28,29). Most of the terms expressed on usual care by our patients were related to worry, anxiety for the future, and frustration for their perceived inability to change. Most expressed dissatisfaction for the care received and a passive attitude. In addition, some of the concepts were not connected to diabetes and its care, suggesting poor awareness and perception of disease and a consequent inability to be an actor of change and adaptation.

Strengths of this study include that attitudes, empowerment, and locus of control were analyzed together for the first time in large groups of patients subjected for many years to treatment approaches that differ in the weight they assign to communication and interpersonal relationships and were proved repeatedly to differ in the clinical, educational, and psychological outcomes they produce (10). Weaknesses include its post hoc nature and that its results may not be readily generalized to other clinics. The procedure of propositional analysis also requires a somewhat arbitrary assignment of concepts to categories with positive/negative connotation, and this process may be influenced by lack of blindness to treatment modality. To minimize bias, any doubtful interpretation was adjudicated in a second and, eventually, third layer of assessment.

In conclusion, this report supports the notion that group treatment reinforces communication and peer identification and that it may achieve its clinical results by promoting awareness, self-efficacy, positive attitudes toward diabetes and the setting of care, an internal locus of control, and, ultimately, empowerment in the patients.

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M.R. conducted the study, distributed and analyzed the questionnaires, contributed to the discussion, and drafted the manuscript. M.Trev. acted as second adjudicator and contributed to the discussion. A.F.T. helped run the group sessions and contributed to the discussion. L.C. and F.C. did the statistical analysis, analyzed the data, and revised the manuscript. M.P. contributed to the discussion and wrote the manuscript. M.Tren. planned the study, researched the data, contributed to the discussion, revised the manuscript, and is guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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