

Self-management in patients with diabetes mellitus

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ABSTRACT

Background: In the Czech Republic, the incidence of new cases of diabetes mellitus is rising. It is desirable for patients to manage the control and management of their illnesses. Thus, education in the area of self-management is important, which requires appropriate support from health professionals, especially nurses. The Partners in Health Scale (PIH, Health Partner Scale) can be used to evaluate self-management. The scale identifies areas of self-care reserves and patient self-regulation.

Objective: The objective is to verify the reliability and internal consistency of the PIH scale in the socio - cultural conditions of the Czech Republic and to describe the level of self - management in patients with type 2 diabetes mellitus.

Methods: A structured questionnaire containing the Czech version of Partners in Health Scale was used as part of a quantitative cross-sectional prospective study.

Results: The survey was attended by 58 respondents who met the inclusion and exclusion criteria of the study. The high reliability and internal consistency of the Czech version of PIH has been demonstrated. The best results were the proband in the field of monitoring the course of the disease and respecting the treatment regimen. The link between education and the financial situation and the level of self-determination has been demonstrated. There was no difference between men and women and the overall level of self-management.

Conclusion: The PIH scale is a suitable tool for determining the level of self-management in patients with type 2 diabetes mellitus in the socio-cultural conditions of the Czech Republic.

KEY WORDS

Self-management, diabetes mellitus, PIH scale, self-care, self-regulation

INTRODUCTION

Diabetes mellitus has reached the size of epidemic in the world. There were 366 million people suffering from diabetes mellitus in 2011 (1). Experts predict that the number of patients will double by 2030 (2). The Czech Republic is also facing an increasing tendency in diabetes mellitus (DM) occurrence. During the year, diabetes mellitus was newly diagnosed in 117.2 thousand patients, out of which 1597 cases in people under the age of 19. The incidence of new DM cases has an increasing tendency, from 56.398 new cases in 2007 to 80.255 cases in 2015, every year the number of newly diagnosed patients increases by 3000 people (3).

Diabetes mellitus brings along several limitations in life of a patient, such limited ways of spending free time, limits in sport, in intimate life and many other activities. Patients need to have enough special infor-

mation in order to be able to control and manage their disease without a doctor or nursing staff, not only in their home environment, but also at work, at school or on holiday. This has a special name, self-management. The goal is to perform tasks independently and to be active in the process of self-check and reinforcement of the attitude to the disease and its symptoms (4). It has been proved that patients who are able to be responsible to self-management of their disease contribute to reduction of healthcare costs by avoiding costly and potentially life-threatening complications and the related conditions (5). Patients need to acquire knowledge and skills in all related sets of activities and information about options how to prevent potential complications in order to be able to manage well the difficult task of self-management of the disease. It is also necessary for the patient to be aware of the disease and to maximise his or her cooperation and change his or her behaviour (1).

In connection to these tendencies, the interest of nursing in education and self-management of patients with chronic conditions on the increase. While the traditional form of patient's education provides information with technical skills, self-management education teaches how to solve problems, continuously monitor the symptoms of the disease with the opportunity to use the action plans to achieve the goals in care (6). The role of a person with a chronic condition within self-management (self-care) includes managing the health aspects of the disease, managing the life roles related to changes caused by the disease, managing the psychological consequences of the chronic condition (7, 8). Lots of authors emphasize the relationship between health literacy and self-management. Patients with a high level of critical health literacy show better prerequisites for self-management (9).

To fulfil the tasks of self-management, it is necessary to have basic self-management skills, like to know how to solve problems, how to make decisions, to have access to resources, to be capable of developing relationships with healthcare providers and be able to act (10). Good knowledge of diabetes mellitus and positive attitude to life seem to be the indicators of succeeding in self-management, which improves the patients' quality of life (2). Health service providers admit that self-management activities are beneficial, improve the quality of life and reduce healthcare costs (11).

Self-management in patients with diabetes mellitus type 2 involves activities connected to DM treatment (diet arrangement, regime, appropriate medication and physical activity), self-monitoring (glycemia, level of sugar in urine, body weight, care of legs) and activities related to prevent complications during activities (recognize hypo- and hyper-glycemia, acute condition, stress and travelling) (12). American Association of Diabetes Educators (AADE) in cooperation with the American Diabetes Association (ADA) have developed national standards to educate patients with DM - National Standards for Diabetes Self-Management Education, emphasizing the education focused on self-management of diabetes mellitus – DSME (Diabetes Self-management Education) (13). DSME is designed to provide quality education of patients and to support healthcare personnel. These standards are used to change lifestyle and solve psychosocial problems. DSME is aimed at support, awareness, decision making, health-oriented behaviour, self-management, problem solving and active collaboration of patients with health professionals, and to improve clinical outcomes, better health and better quality of life (14). DSME is a change in lifestyle, control and responsi-

bility for treatment – physical activity, regime, self-monitoring of glycemia, following the therapeutic regime – pharmacotherapy, monitoring the hypo-glycemia, reduction of risk factors and life with DM (15).

Not all patients with a chronic condition are capable of taking care of themselves because of their mental and/or physical abilities. Self-management is not suitable for every patient, it greatly depends on how the patient is able to manage himself or herself. Therefore, the role of education in self-management is crucial. Knowledge and skills do not guarantee managing the self-care or the change in behaviour. What is essential is the repetitive education in the area of diabetes, the assessment of knowledge and filling the information gaps through individual education programmes (1).

Assessment of managing the life with diabetes is just as important as providing specialized knowledge and skills. Various groups of patients (of various age and social background) have various needs while managing self-monitoring (self-control), symptoms and complications present in their disease (4). It is essential that nurses and education-providing workers develop efficient strategies of self-management according to subjective as well as clinical characteristics of a patient. It has been proved that one of the factors significantly affecting the quality of life in patient with diabetes is the positive attitude to therapy and to self-management. Other factors include correct understanding of education and ability to master self-management practices (2). Some studies have shown that a long-term indifference of patients with DM to self-management leads to developing the diabetic complications, nephropathy and neuropathy (16). To enable people to manage themselves appropriately (to apply self-management) requires sufficient support from health professionals, especially from nurses (17).

To evaluate self-management, it is possible to use the scale called the Partners in Health Scale (PIH), the name of which has been derived from the basic principle of developing the partnership between a patient and a health professional (18). PIH scale has been created by Flinders University in Australia within the Flinders program to assess self-management in health centres (Battersby et al., 2003, pp. 43 – 45). The newly designed scale is composed of 12 questions that assess following the therapeutic measures, knowledge about disease, managing the side effects and signs and symptoms. The scale is intended to be used in patients by primary health professionals. Patients rate each item on Likert scale from 0 to 8, where 0 means "a little", "never" or "not very well", and 8 stands for "a lot", "always", or "very well" (18, 19, 8). The scale identifies areas of patient's self-management gaps and is an in-

indicator for a patient as well as for a healthcare provider where to be active. All that leads, consequently, to a better quality of life in a patient with a chronic condition (18). According to Petkov et al., the scale provides a valid and appropriate measuring tool to assess knowledge and behaviour of chronic patients in self-management. (19).

OBJECTIVE OF THE PAPER

The paper presents the outcomes of the study aimed at verifying the reliability and the internal consistency of PIH scale in sociocultural conditions in the Czech Republic and contains the description of self-management level in patients with diabetes mellitus type 2.

METHODOLOGY

A method of a quantitative cross-sectional prospective study was chosen to reach the goals of the survey. With the consent of authors, a standard language validation of Partners in Health Scale (PIH scale) was performed and the Czech version was created (20). The survey was carried out in a form of a structured questionnaire using the Czech version of PIH scale and containing the identification data of respondents, including information meeting the criteria to be involved in the study. Using 12 items of PIH scale, it was possible to assess the level of self-management in areas related to collaboration between a patient and

health professionals, knowledge of patients' own health condition, monitoring the course and state of the chronic condition, as well as the overall management of the disease. The Likert scale from 0 to 8 was used for assessment.

The experimental group was made up of probands meeting the inclusion criteria, such as diagnosed DM type 2, age of 60 and more, and a consent to participate in the research. Exclusion criteria involved: acute health problem, treated depression, inpatient hospitalization and dependence on another person's care.

The research was carried out in collaboration with diabetology office in Olomouc region with 90 probands. The rate of return was 100% due to a personal approach. Given several questionnaires being incomplete (only identification data were filled in) and the failure to meet the exclusion criteria, 58 questionnaires meeting the set requirements were statistically processed.

OUTCOMES

Gathered data were processed by the statistical software Microsoft Excel and Statistika.cz, with the descriptive and comparative statistics. The range of the group, the number of men and women, data about the age of probands in the descriptive statistics are summarized in table 1.

Table 1 Description of the group in terms of gender and age

Gender	n	%	Age				
			Average	Me	Mo	Min	Max
Men	21	36.21	66.81	67	68	60	79
Women	37	63.79	69.49	70	70	61	82
Whole group	58	100.00	68.52	68	70	60	82

Notes: n – number, Me – median, Mo – modus

The statistical calculation of reliability and internal consistency of the Czech PIH scale version was performed using Cronbach's alpha, it is $\alpha = 0,8240$, which represents the high reliability and internal consistency of the Czech PIH scale version of the questionnaire.

PIH scale items were processed according to the methodology of authors, each item containing calculation of arithmetic mean, standard deviation and median (see table 2). Items 1 and 2 represent the average results related to what extend the probands are aware of their health condition. Items 3–5 show the average results related to the collaboration with health professionals. Items 6 – 8 provide the average results related to monitoring the signs of the chronic disease.

Items 9 – 12 show the average results of managing the influence of the health condition on the lifestyle of respondents.

Table 2 Average values, standard deviations and medians of each PIH scale item of the questionnaire.

Scale item	Average	SD	Me
PIH 1	6.71	1.23	7
PIH 2	6.78	1.25	7.5
PIH 3	7.63	0.61	8
PIH 4	6.19	1.74	6.5
PIH 5	6.68	1.22	7

Scale item	Average	SD	Me
PIH 6	7.78	0.39	8
PIH 7	7.29	0.94	8
PIH 8	7.37	0.83	8
PIH 9	5.42	1.69	4.5
PIH 10	5.39	1.45	5
PIH 11	5.26	1.54	5
PIH 12	5.14	1.79	4

Notes: SD – standard deviation, Me - median

The evidence of the influence of gender, achieved education and financial situation on the overall self-management was observed using the comparative statistics. All statistical tests were performed at the significance level $\alpha=0,05$.

Student's t-test was used to determine the difference between men and women in total score of PIH scale (normality of distribution of the total PIH score was confirmed through Shapiro-Wilcoxon test, $p>0,05$) with the conclusion that no significant difference between men and women in the overall level of self-management in patients with diabetes mellitus type 2 was proved, as shown in table 3.

Table 3 Student's t-test to determine the differences between men and women in the total PIH scale score of the questionnaire

Mean PIH score		Student's t-test			
Men	Women	t	Significance	Number of men	Number of women
80.43	76.1	1.55	0.128	21	37

Notes: t – Student's t

To determine the relationship between the categorical variables related to education and the total score of PIH, it was necessary to create the alternative variable TS cat 2 (points 48–77 = 1; 78–96 = 2) from the total score of PIH scale.

When divided into more categories, the group showed a low categorical frequency unsuitable to be processed through chi-square test. Nevertheless, there is a low frequency occurring in some boxes of contingency tables based on a low range of the observed group. Pearson correlation test proved the relationship between education and the total score of PIH scale (contingency coefficient $C = 0.339$; $p<0.05$), however, considering the facts mentioned above, even if the C coefficient is statistically significant, it may not be significant clinically. The frequency of each box in table 4 should be more than 5, to be correct. The contingency table would make sense if the varia-

ble, education, contained just two categories (1 and 2). The table 4 shows only the fact that the sample group of probands with the secondary education contains a large group of those with a lower score of PIH scale. Respondents with higher education show the opposite tendency, but the number of values is so low that it cannot be proved statistically.

Table 4 Contingency table for correlation between education of probands and the total score of PIH scale divided into two categories

Education	Range of PIH score		Σ
	48-77	78-96	
Primary	5	4	9
Secondary	22	13	35
College	2	4	6
University	1	7	8
Σ	30	28	58

Notes: Σ – sum of lines and columns

The same statistical process was used to prove the relationship between the financial situations of participants and their level of self-management given by the total score of PIH scale. The relationship between the financial situation and the total score of PIH scale was proved, the frequency of probands is shown in table 5 ($C = 0.309$; $p<0.05$). Although the coefficient C is statistically significant, it may not be significant clinically. According to frequency in the first box (1) of contingency table 5, the calculation of contingency coefficient is not meaningful, therefore, it is impossible to speak about the relationship between variables.

Table 5 Contingency table for the correlation between financial situation of probands and the total score of PIH scale, divided into two categories

Financial situation	Range of PIH score		Σ
	48-77	78-96	
Salary, earnings	1	8	9
Pension	29	20	49
Σ	30	28	58

Notes: Σ – sum of lines and columns

The comparative statistics was used to prove the influence of gender, age and acquired education on the level of managing the effect of the health condition of patients with diabetes mellitus type 2 on their lifestyle. The defined variables were compared with the results of items monitoring the influence of the health condition on the lifestyle, namely on items

9 – 12 of PIH scale (the sum of these items is involved in the variables of PIH 9-12 that does not show a normal distribution, as was confirmed by Shapiro-Wilcoxon test, $p < 0.05$).

Non-parametrical Mann-Whitney U-test that proved the significant difference between men and women ($p < 0.05$) in variable PIH 9-12 was used to determine the difference between the male and female probands in managing the influence of their health condition on their lifestyle. Since women were noticed to achieve a higher score than men, we can say that women in the examined sample are able to manage the influence of their health condition on their lifestyle better (see table 6).

Table 6 Mann-Whitney U-test to determine the difference between men and women in managing the influence of their health condition on their lifestyle

Mean score PIH 9-12		Mann-Whitney U-test				
Men	Women	U	Z	Significance	Number of men	Number of women
20.16	23.33	264.5	1.99	0.046	21	37

Notes: U – Mann-Whitney statistics; Z – standardized value of Mann-Whitney statistics U

Spearman's non-parametrical correlation coefficient was used to determine the relationship between the age and education of participants and how they manage the influence of their health condition on their lifestyle (PIH 9-12). No significant relationship was determined between the age and managing the influence of health condition on lifestyle of probands ($r = -0.149$, $p > 0.05$), unlike the proven connection between education and the level of managing the influence of health condition on lifestyle ($r = 0.269$, $p < 0.05$).

DISCUSSION

Statistical analyses show that different age in patients has no correlation with the total PIH score, as well as there is no connection between the total score and gender. Different results were gained by authors of the study performed in Oman where women with diabetes mellitus type 2 proved to have a higher level of self-management than men, but it is important to realize that women in Oman society tend to be more educated than men and are generally better informed how to live with diabetes as well as of the disease itself (2). On the other hand, Peñarrieta-de Córdoba et al. (8) carried out a cross-sectional study on the Mexican population, on adult patients with diabetes, high blood

pressure and cancer in which self-management skills and abilities of individuals were objectively assessed. The results identified the gender differences, with women achieving, in general, better results in self-management than men. No difference was proved between age categories.

Our survey shows that the level of education in participants as well as their financial situation have a statistical impact on PIH score. Finding a positive correlation between education and self-management can be considered crucial. This relationship appeared primarily in area of how aware the patients are of their health condition. The higher level of education the participants reported, the more aware they were of their own health condition. This result correlates with Heijmans's findings that there is a statistical context between education and the overall level of self-regulation (9). XU, Wang Hong suggests that the lack of education predicts the lack of information about self-care (21). Results of a number of surveys show that better self-management, due to higher education and better awareness, results in better quality of life (2). This is also confirmed by authors of the systematic review focused on the self-management efficiency who have proved that the self-management approach to health care in disease strengthens the patient, influences his/her attitudes and behaviour and potentially improves the health condition and disease management (22).

Although there has been a statistically significant relationship between the total PIH score and the financial situation of the patients addressed, in terms of clinical factors, these parameters may not have a real impact on the level of their self-management and the quality of life. To compare the obtained results, no outcomes of identical research dealing with the diabetic patients have been searched for, however, it is possible, with regards to connection of adherence to the therapy and self-management, to mention results of a randomized study in patients with hypertension. The authors proved, beside other things, the connection between the lack of financial support and non-adherence to treatment (23).

The meta-analysis aimed at factors of self-management in chronically ill patients shows clearly that there are five categories of factors affecting this process. They are the lifestyle, health condition, resources, environmental characteristics and the healthcare system. It is evident that the profile of these factors affects the ability to manage the disease independently, the ability of self-management (24). Unfavourable financial situation of diabetic patients can negatively affect the attitude to education in the area of self-management due to, as they say, excessive costs (25).

Results of the performed research imply that there is no correlation of PIH score with social situation of each respondent – diabetic patient. The outcomes do not fully correspond with the findings of the survey carried out in Mexico proving that the family plays a significant role in patient's motivation in self-management of his/her disease. Respondents claimed that the reason for attending the doctor or self-management education were either unexpected signs of their disease or a call from their family members (wives, spouses, children). Other family members may influence the self-management process in the patient with diabetes mellitus. Family belongs to a category of so-called external factors affecting the management of disease. Results of the mentioned research show that the family members' involvement in self-management education in patients with diabetes mellitus leads to proper understanding of the diseases and the importance of self-management and support for the patient (26).

The importance of self-management in patients with diabetes mellitus is evident particularly in area of prevention of developing the diabetic complications, as the survey results performed in Iran demonstrate. Patients with significantly low self-management score were proved to suffer from a higher occurrence of vascular complications (16).

LIMITS

The study brings benefits since it verifies the usability of PIH scale in conditions of healthcare practice in the Czech Republic and it also discovered that the level of self-management in patients with diabetes mellitus corresponds in several parameters with the results of studies performed abroad. Limits of survey results are related to non-representative sample of probands and limitation of the research to one region.

CONCLUSIONS

Diabetes mellitus is a chronic condition negatively affecting and limiting the life of a patient and, therefore, the quality of his or her life. Proper self-management can improve the quality of life in diabetic patients and, at the same time, reduce the risk of developing complications. Nevertheless, it is vital that the patient's education is aimed at self-management and supporting an active collaboration of the patient with health professionals. This approach is based on assessing the level of self-management in patients and defining the nursing interventions based on this assessment.

PIH scale is a suitable and simple tool to determine the level of self-management in patients with diabe-

tes mellitus type 2 in sociocultural conditions of the Czech Republic. It has been proved that the level of self-management can be affected by the level of education and the financial situation of the patient. On the contrary, the influence of age was not proved. The influence of gender on the overall level of self-management in patients with diabetes mellitus type 2 was not proved, however, the influence of gender on managing the influence of the health on the lifestyle was demonstrated.

Using PIH scale while assessing a patient can be very beneficial in order to direct effectively the care and, in particular, educating activity of a nurse in the care of a patient with diabetes mellitus type 2.

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