RESEARCH | PESQUISA

Adherence to self-care in people with Diabetes Mellitus in Primary Care: a mixed-methods study

Adesão ao autocuidado de pessoas com Diabetes Mellitus na Atenção Primária: estudo de método misto

Adhesión al autocuidado de personas con Diabetes Mellitus en la Atención Primaria: un estudio de método mixto

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Abstract

Objective: to develop an interpretive model on the adherence to self-care of people with Diabetes Mellitus in Primary Health Care. **Method:** a mixed-method study conducted in four Basic Health Units. The cross-sectional quantitative study was composed of 329 participants, sociodemographic and clinical variables and the questionnaire of self-care activities were chosen. In the qualitative study, with 31 participants, the constructivist strand of Grounded Theory was used. The data were analyzed using descriptive statistics and initial and focused coding. **Results:** most participants are female, married, with one to five years of schooling, retired, and with an income of one to three minimum wages. Low adherence to healthy eating, physical activity, and glycemic monitoring was obtained. The desirable adherence was related to the use of medications and foot care. In the qualitative step, the phenomenon was: Facing the complexity of the treatment of Diabetes Mellitus and seeking self-care. This was supported by two categories: Encountering difficulties to follow the treatment and valuing the facilitating aspects of the treatment that provided subsidies for the development of the model. **Conclusions and implications for practice:** an interpretative model was elaborated whose elements demonstrate the complexity of the phenomenon and contribute to the adherence to self-care in this population.

Keywords: Self Care; Diabetes Mellitus; Primary Health Care; Treatment Adherence and Compliance; Grounded Theory.

Resumo

Objetivo: elaborar um modelo interpretativo sobre a adesão ao autocuidado de pessoas com Diabetes Mellitus na Atenção Primária à Saúde. **Método:** estudo de método misto realizado em quatro Unidades Básicas de Saúde. O estudo quantitativo transversal foi composto por 329 participantes, elegeram-se variáveis sociodemográficas e clínicas e o questionário de atividades de autocuidado. No estudo qualitativo, com 31 participantes, utilizou-se a vertente construtivista da Teoria Fundamentada nos Dados. Os dados foram analisados utilizando-se a estatística descritiva e a codificação inicial e focalizada. **Resultados:** a maioria dos participantes é do sexo feminino, casada, com um a cinco anos de estudo, aposentada e com renda de um a três salários-mínimos. Obteve-se baixa adesão à alimentação saudável, à atividade física e ao monitoramento glicêmico. A adesão desejável foi relacionada ao uso de medicamentos e cuidados com os pés. Na etapa qualitativa, obteve-se como fenômeno: Enfrentando a complexidade do tratamento do Diabetes Mellitus e buscando o autocuidado. Este foi sustentado por duas categorias: Encontrando as dificuldades para seguir o tratamento e Valorizando os aspectos facilitadores do tratamento que deram subsídios para a elaboração do modelo. **Conclusões e implicações para a prática:** foi elaborado um modelo interpretativo cujos elementos demonstram a complexidade do fenômeno e contribuem para a adesão ao autocuidado nessa população.

Palavras-chave: Autocuidado; Diabetes Mellitus; Atenção Primária à Saúde; Cooperação e Adesão ao Tratamento; Teoria Fundamentada.

Resumen

Objetivo: elaborar un modelo interpretativo sobre adhesión al autocuidado de personas con Diabetes Mellitus en Atención Primaria de Salud. **Método**: estudio de método mixto realizado en cuatro Unidades Básicas de Salud. El estudio cuantitativo transversal fue compuesto por 329 participantes, se eligieron variables sociodemográficas y clínicas y el cuestionario de actividades de autocuidado. En el estudio cualitativo, con 31 participantes, se utilizó el enfoque constructivista de Grounded Theory. Los datos se analizaron mediante estadística descriptiva y codificación inicial y focalizada. **Resultados**: la mayoría de los participantes son mujeres, casadas, con uno a cinco años de estudio, jubiladas y con ingresos de uno a tres salarios mínimos. Se obtuvo una baja adhesión a la alimentación saludable, la actividad física y el control glucémico. La adhesión deseable se relacionó con el uso de medicamentos y el cuidado de los pies. En la etapa cualitativa se obtuvo el siguiente fenómeno: Enfrentando la complejidad del tratamiento de la Diabetes Mellitus y buscando el autocuidado. Esto fue apoyado por dos categorías: Encontrando las dificultades para seguir el tratamiento y Valorando los aspectos facilitadores del tratamiento que apoyaron el desarrollo del modelo. **Conclusiones e implicaciones para la práctica**: se desarrolló un modelo interpretativo cuyos elementos demuestran la complejidad del fenómeno y contribuyen a la adhesión al autocuidado en esta población.

Palabras clave: Autocuidado; Diabetes Mellitus; Atención Primaria a la Salud; Cooperación y Adhesión al Tratamiento; Teoría Fundamentada.

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INTRODUCTION

Self-care refers to a person's ability to perform actions aimed at preserving his or her health, development, and well-being[1]. The self-care of people with Type 2 Diabetes Mellitus (DM2) involves lifestyle changes that are necessary to prevent complications from the disease that can lead to disability or death. Maintaining a healthy diet, regular physical activity, continuous use of medications, frequent blood glucose checks, and foot care are among the activities necessary for cooperation and adherence to treatment that ensure the maintenance of self-care for people with DM2[1,2].

Adherence to self-care can change as a result of circumstances inherent to the person him/herself[3,4] and external issues involving social aspects[5] and actions performed by the health system[6,7]. In this sense, Primary Health Care (PHC) is strategic for the promotion of self-care through comprehensive and resolute care to people with DM2.

The daily decisions that people with DM2 need to make to maintain self-care involve issues that go far beyond an individual resolution[3,8] and, therefore, the understanding of the problems cannot be analyzed in isolation or under a single focus, but they must be interpreted within a systemic view, that is, interdependent on a context[9].

In this sense, considering that adherence to self-care for people with DM2 involves multiple interdependent factors, this study was theoretically based on Edgar Morin's Complex Thought[9]. This theory allows us to understand the various dimensions of reality, placing the phenomenon inseparable from the historical and social context. Complexity encompasses actions, relations, and interactions, and thus does not incur in the contradiction of simplifying and reducing the phenomenon[9].

Although studies show that adherence to self-care can be influenced by individual, social, and health system aspects[3,4,6,7], there is a knowledge gap regarding the relationships and interactions between these aspects in self-care. It is assumed that adherence to self-care for people with DM2 treated in PHC is a complex phenomenon in which there are interactions among multiple individual, social, and health system factors. In this interdependence, the guiding questions emerge: (1) How has the adherence to self-care occurred in people with DM2 treated in PHC? (2) What are the relationships and interactions involved in the adherence to self-care of people with DM2 treated in PHC?

The objective was to develop an interpretive model on self-care adherence of people with DM in the PHC setting.

METHOD

This is mixed methods research of the sequential explanatory type[10], conducted in two stages. The first consisted of a descriptive study, with a quantitative approach, written according to the STROBE recommendation, implemented first and with less emphasis. The second stage was a qualitative research that used the constructivist strand of Grounded Theory (GT), proposed by Charmaz[11], to explain the quantitative results. The choice of the constructivist strand of the GT is appropriate for the study of self-care adherence of people with DM2 in that it recognizes the phenomena studied as constructs whose precepts respond to the interpretive tradition[11]. This step was written according to the COREQ recommendation.

The study was conducted in four Basic Health Units (BHUs) in the municipality of São José, Santa Catarina, Brazil, from January to June 2017. These units were chosen due to the researcher's bond and experience with these units in the city and the interest of local managers.

The population consisted of 1,285 people with DM2 registered in the four BHUs. Inclusion criteria were: health service users over 18 years of age and with a self-reported diagnosis of DM2 for over a year. The exclusion criteria were as follows: bedridden people, unable to perform the self-care activities included in the data collection instrument. For the first stage, called quantitative approach study, the minimum sample size of 296 people was calculated from the population, with an estimate of 50% and confidence interval of 95%. Thus, the intentional sample of this study was 329 people, according to the population of people with DM2 registered in each BHU (Table 1).

For this study, the sociodemographic variables elected were: marital status (married, single, separated/divorced, widowed); age range (up to 59 years, 60-69 years, 70 years or older); gender (male, female); income in minimum wages (less than one, one to three, three to six, more than six); years of schooling (never studied, one to five years, six to nine years, ten to 12 years, 13 years or more). The clinical variables were: presence of comorbidities; duration of disease (one to five years, six to ten years, 11 to 20 years, more than 20 years), and type of treatment (oral hypoglycemic agents, oral hypoglycemic agents + insulin therapy, insulin therapy). The data were obtained by means of a structured instrument.

The variables related to self-care were assessed using the Diabetes Self-Care Activities Questionnaire (DSAQ), a validated version of the Summary of Diabetes Self-Care Activities (SDSCA). The instrument is a self-report measure that assesses six dimensions of self-care behaviors over the past seven days: general eating (two items); specific eating (three items); physical activity (two items); blood glucose monitoring (two items); foot care (three items); medication use (three items, and the person answers one of the items according to the medication regimen). The evaluation is standardized on weekdays. Responses are scored from zero to seven according to least desirable (zero) and most desirable (seven)[12]. Since the DSAQ does not propose a cut-off point for desirable adherence, it was considered in this study based on a previous study[13], that the most desirable is that the person followed the recommendations for each of the items for at least five days of the week. Thus, 5-7 days were considered the most desirable, and 0-4 days the least desirable. For the sub items fat intake and sweets intake, the values were inverted as recommended in the instrument, being considered more desirable from 0-2 days and less desirable from 3-7 days.

Table 1. Absolute and relative frequencies of study participants by Basic Health Unit. São José, SC, Brazil, 2017.

BHU	Number of people with DM registered	N	%
1	387	99	30.1
2	201	51	15.5
3	356	91	27.7
4	341	88	26.7
TOTAL	1,285	329	100.0

Key: n = absolute frequency; % = relative frequency.
Source: research data.

Smoking habits are also investigated in the instrument, but were not addressed in this study.

The participants were invited by letters delivered to people with DM2 by Community Health Agents (CHA) and those who agreed to participate were scheduled for the application of data collection instruments (questionnaire containing sociodemographic and clinical variables and DSAQ). The participants were informed about the research and the Informed Consent Form was read and signed. The questionnaire and the DSAQ were applied individually in the PHU or in the person's home by the main researcher and/or by a Nursing undergraduate student previously trained by the main researcher. The average time for each questionnaire was 15 minutes.

Data was organized in Excel® and analyses were performed using IBM SPSS software (version 20.0). In the descriptive analysis, the absolute and relative frequencies (categorical variables) and the measures of position and dispersion of the data (numerical variables) were verified.

The second stage, called qualitative approach study, was guided by the quantitative study from the choice of participants to the development of guiding questions. According to what was established in the GT, the participants were selected through the composition of sample groups directed by hypotheses that emerged from the analyses. Therefore, in addition to people with DM2, health professionals who work in the care of these people participated in this stage, a process that is better detailed below. It was an intentional sampling in which people with DM2 received the invitation during the quantitative stage, and the inclusion criterion was to have participated in the previous stage. As for health professionals, the inclusion criterion was to be over 18 years old and have worked for more than a year in the care of people with DM2 in PHC.

From the results of the quantitative study, the hypothesis that people with DM2 who adhere to self-care find meanings to do so emerged. This led to the formation of the first sample group composed of twelve people with DM2 who had adherence to self-care measured by the DSAQ. This group was identified by the letter E for interviewee, followed by the interview number from

one to 12 (E1 to E12). After the analyses of these interviews, it was hypothesized that there might be a difference in the meaning of self-care among those who did not show adherence to self-care measured by the DSAQ, a fact that defined the second sample group composed of twelve people with DM2. This group was identified as E13 to E24. For the first and second sample groups, data collection had as an initial question: "Tell me about the meaning of diabetes self-care for you".

The analysis of the interviews of the second group revealed the hypothesis that PHC is a support for adherence to self-care, which generated other questions. To search for data that could corroborate or redirect this hypothesis, the third sample group was composed of seven PHC professionals, whose question was: "Tell me about the meaning of the care provided by you to people with DM2 referring to the promotion of self-care." This group was identified by the letter P followed by the interview number (P25 to P31). At the end of these analyses, the theoretical sampling and the saturation of the categories were reached.

Saturation was defined when no more data was found by which to develop category properties, i.e. when similar instances occurred repeatedly, making it necessary to look for groups that would extend the diversity of data as far as possible, ensuring that saturation was based on the widest possible range of data about the category[14].

In data collection, observation and in-depth interviews were used. The observation consisted in detecting real situations experienced by the researcher that would produce reflections about the phenomenon. The observations were noted down daily. The interviews were carried out by the main researcher individually in the BHU office or at the person's home and lasted, on average, 40 minutes. They were audio-recorded and transcribed.

The documents from the observations and interviews were exported to the Atlas Ti software, version 1.0.45 for Mac (license n.110271462), in which the process of coding and organizing the data was performed. The analyses occurred simultaneously with data collection as recommended in the GT. An initial coding was used, in which each segment of data was coded in the software, followed by a selective and focused phase in which the most significant or frequent initial codes were classified, integrated, synthesized and organized into categories and subcategories, guided by the proposal of Charmaz[11].

The research followed the ethical aspects of Resolution No. 466/2012 of the National Health Council (NHC), and was approved by the Research Ethics Committee of the Federal University of Santa Catarina (UFSC).

RESULTS

As for sociodemographic and clinical characteristics, of the 329 (100%) participants, most were female (71.70%), aged 60 to 69 years (38.60%), and married (50.50%), with one to five years of schooling (48.60%), retired (58.70%), and with family income of one to three minimum wages (73.20%), and the minimum wage in 2017 was R $937.00. The most prevalent comorbidities were hypertension (78.70%), dyslipidemia (55.6%), and heart

disease (30.1%). Most had one to five years of diagnosis for DM2 (65.6%) and used only oral hypoglycemic agents as drug therapy (65.9%).

Regarding adherence to the various dimensions of self-care, the people with DM2 who showed desirable self-care behaviors are presented below (Table 2).

Among the characteristics of the participants in the second stage, it is noteworthy that, of the 12 participants in the first sample group, nine were female, their ages ranged from 61 to 83 years, and the time of disease ranged from two to 40 years. In the second group, among the 12 participants, ten were female, the age ranged from 38 to 90 years, and the time of illness ranged from two to 20 years. In the third sample group, among the seven participants, two were nurses, two were physical educators, two were Community Health Agents (CHAs), and one was a physician; the age ranged from 33 to 55 years, and the time of professional training ranged from three to 30 years.

From the analytical process guided by the GT, the following phenomenon was obtained: *Facing the complexity of the treatment of Diabetes Mellitus and seeking self-care*. This phenomenon was supported by two categories built from the comparison and triangulation of data between the three sample groups. The categories found are shown in Chart 1.

The category *encountering difficulties in following treatment* shows the multidimensionality of the difficulties encountered in self-care.

The *perceiving individual aspects as hindering self-care* refers to habits acquired throughout a lifetime, especially in adherence to a healthy diet and regular physical activity. The fact that the disease is silent, the difficulty to relate the changes in blood glucose with daily practices, emotional issues, the side effects of medications, and the presence of other health problems that are sometimes considered more serious than DM2 make it difficult to adhere to a healthy diet and physical activity.

> *I was used to eating junk food, we only ate salty snacks (E15). I was not used to doing physical activity. So, I find it very difficult to incorporate this habit (E14). People don't give due value [...] for the problem that is silent, the person doesn't feel anything at that moment, and he takes it with him (P27).*

People with DM2 recognize living in a society marked by the social determination of the disease. The financial difficulties, family issues, and problems in the local and global political sphere were pointed as hindering the treatment and are

Table 2. Frequency of desirable outcomes regarding self-care activities of people with Type 2 Diabetes Mellitus. São José, SC, Brazil, 2017 (n=329)

DSAQ self-care activities	F	%
General Diet		
1. Followed a healthy diet (5-7 days/week)	156	47.4
2. Followed dietary advice given by health professional (5-7 days/week)	153	46.6
Specific Diet		
1. Ingested five or more servings of fruits and/or vegetables (5-7 days/week)	198	60.1
2. Ingested high-fat foods (0-2 days/week) *	231	70.3
3. Ingested sweets (0-2 days/week)*	241	73.3
Physical Activity		
1. Did physical activity for at least 30 min (5-7 days/week)	50	15.3
2. Performed specific physical exercise (5-7 days/week)	44	13.5
Blood Sugar Monitoring		
1. Assessed blood sugar (5-7 days/week)	85	25.8
2. Evaluated blood sugar the recommended number of times per professional (5-7 days/week)	80	24.4
Foot care		
1. Examined the feet (5-7 days/week)	246	74.8
2. Examined the shoes before putting them on (5-7 days/week)	232	70.8
3. Dry the spaces between the toes after washing (5-7 days/week)	276	83.9
Medication		
Took the medications as recommended (5-7 days/week)	276	83.9

* Reverse score
Source: Research data.

Chart 1. Categories and subcategories of the phenomenon "Facing the complexity of the treatment of Diabetes Mellitus and seeking self-care". São José, SC, Brazil, 2017.

Categories	Subcategories
Encountering the difficulties in following treatment	Perceiving individual aspects as hindering self-care
	Living in a society marked by the social determination of the disease
	Perceiving themselves as vulnerable to Primary Health Care
Valuing the facilitating aspects of treatment	Overcoming individual difficulties and accepting treatment
	Overcoming social difficulties and coping with treatment
	Recognizing Primary Health Care as a support and seeking self-care

Source: prepared by the authors.

reflected in the purchase of food, medicines, physical activity, and also in the performance of tests or consultations. Health professionals also recognize that social aspects interfere in diabetes self-care and that measures of the health system can minimize these issues.

> *Because, when I can buy a fruit, I eat a fruit, I know what is good for me, but I can't always buy it (E18). And other types of activities would be good, like a hydro, but I can't afford it, it is expensive! (E13). We work with a population that has many problems and we have to know how to deal with them, otherwise they abandon the treatment to take care of another issue (P26). I have worked with the group of physical exercises with exercises and materials that patients bring from home so that they can repeat these exercises at home* (P27).

From the observation made in the households, the social determination of the disease could be perceived in the precariousness of living conditions, making these people in a situation of social vulnerability. Thus, other social problems, considered bigger than the DM2, make people postpone the treatment to dedicate themselves to issues considered more urgent.

It was also evidenced that people with DM2 in sample groups 1 and 2 perceive themselves as vulnerable to PHC. The delay in tests, the lack of basic and/or more effective supplies and medications for glycemic control, the difficulty of referral to a specialist, the constant change of doctors, the lack of test strips and lancets for glycemic control and bureaucratic issues of the health service were seen as hindering self-care.

> *To do an exam, it takes time, my endocrinologist has not been able to see me for a while [...] it makes us kind of bad, the fact of getting there (BHU) and not having the medicine (I07). I had to do the test (glycemia) three times a week, I have a doctor's order to do it at the clinic, I even started right, but the clinic here is far away, difficult to schedule (I15). We still lack tape and lancet, this month, I had to buy, but it is too expensive* (E08).

Health professionals recognize that bureaucratic issues related to the health system and the relationship with professionals interfere with self-care. But the opinions about the interference of the lack of glucometer and reagent strips, the difficulty of tests and referral to specialists diverge from those presented by people with DM2.

> *If it is routine, it will wait up to three months (the exams). Now, if there is some alteration, we can release them earlier. Because here we release exams according to clinical data (P26). We need to get rid of the issue that everything is based on referral, which is very deep-rooted. People don't understand what this Family Health issue really is* (P28).

Overcoming these difficulties was evidenced among people with DM2 who adhere to treatment. Thus, we obtained the category valuing the facilitating aspects of treatment, which showed differences between the two sample groups of people with DM2. As for health professionals, they recognize that the appreciation of the facilitating aspects rather than the difficulties is an important aspect related to self-care.

Both people with DM2 who adhere to treatment and those who do not recognize the facilitating aspects, but they seem to be more valued among those who adhere to treatment. Therefore, the latter emphasize that overcoming individual difficulties and accepting treatment are fundamental to self-care. Acceptance of the disease, facing treatment with positive thinking, and finding support in oneself are aspects mentioned.

> *And after I started to accept it, the glucose is normal, so, one must accept it and learn to live with it (E06). My support is myself, because I know I will not get well, but taking the medicine, dieting, I will live well, seeking a better life* (E08).

Among those who do not adhere to treatment, there is a difficulty in acceptance or a non-appreciation of the disease and treatment and also recognition that there is a lack of motivation within oneself to face the disease and even a blaming of oneself.

> *I don't worry about it! I try to live as if nothing is happening, I don't have any disease (E16). I think I lack willpower. I*

know how it should be, but I don't do it! [...] Honestly, I have no support. But I think it depends on myself (E24).

Health professionals also recognize that overcoming individual difficulties is necessary, and that the person him/herself is the main responsible for the treatment, but that social and health system supports favor self-care.

The participation of the person in the treatment is important. In the case of physical activity, we are trying to remedy it. Because they didn't have this education and when they understand the importance, they start to practice. So, it depends on them, of course, but it depends on many other educational factors (P28).

In the social context, getting around social difficulties and coping with treatment were seen as one of the facilitators of treatment. This means having financial resources, finding support in the family and in public programs or public spaces.

I always go to the doctor, I do my exams, every six months, it has to be through the plan, we can't wait for UHS (E02). I think the SCCC (Senior Citizen Care Center) is an economy for the municipality, people who go there are less sick precisely because of the activity and interaction (E05). The important thing is the social support network. The Social Service should be together because the problem of almost everything has something social (P26).

In the context of the study population, many aspects facilitating treatment were found within the health system. People with DM2 recognize PHC as a support and seek self-care.

After I started going to the clinic more, I see that we only learn things if we are closer. I need to look for the doctor more, look for what I can do to take care of myself more (I07). Whenever I have doubts, I look for the (area nurse), she guides me about nutrition, about skin care, with the feet. I didn't know that the person's problem sometimes starts in the foot (E12). Maintaining our physical activity group depends a lot on the collaboration of the team, the coordinator of the health center (P28).

The speeches above point out that, with regard to PHC support, the following stand out: the bond established with health professionals; the importance of the work of nurses, physical educators, and physicians; the groups for physical activity or healthy habits; the reference of nurses from the areas and the proximity of the CHAs as clarifiers of doubts related to the disease and treatment and also about the functioning of UHS. This was also evidenced during the observation when, on the way to the interviews, many times the CHAs were approached by the population, who asked about clinical or bureaucratic doubts about the service, and they gave the necessary referrals.

Figure 1 presents the interpretative model that illustrates the articulation between the dimensions of self-care of people with DM2, the categories presented and the phenomenon of the study.
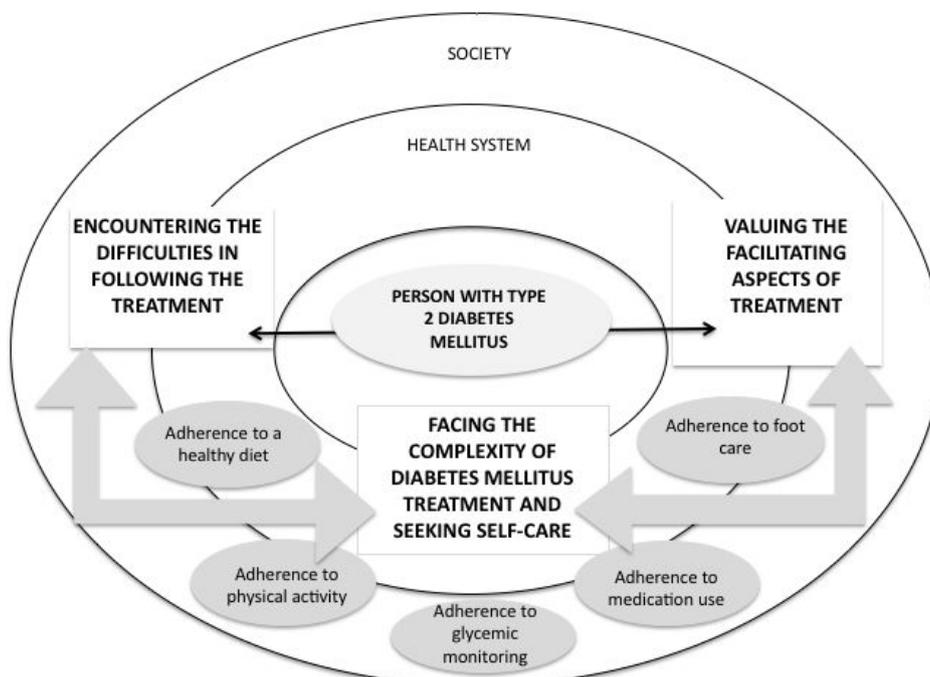

Figure 1. Representative diagram of the articulation between the dimensions of self-care of people with DM2, the categories and the phenomenon. São José, SC, Brazil, 2017.
Source: prepared by the authors.

DISCUSSION

The quantitative stage evidenced low adherence to general diet, physical activity, and glycemic monitoring. More desirable adherence was evidenced in specific diet, foot care, and medication use. These findings are similar to those presented in other studies that also showed low adherence to healthy diet[8,15], to physical activity[8,16,17] and for blood sugar monitoring[8,15]. With regard to foot care, good levels of self-care were found[8]. Better adherence to medication use has also been found in studies[8,15,16,18].

The qualitative stage showed that the difficulties encountered to follow treatment are common among people who adhere and those who do not adhere to treatment. Overcoming these difficulties seems to be the difference between adherence and non-adherence to self-care.

Thus, in the triangulation of the quantitative and qualitative results, there was a convergence. Thus, the second stage explains some data from the first stage of the research. With regard to adherence to the various dimensions of self-care among people with DM2, the category encountering difficulties to follow treatment explains the low prevalences of desirable adherence to healthy diet, physical activity, and glycemic monitoring found in the quantitative stage. The difficulties indicated for adherence to diet and physical activity were more localized in the individual and social spheres. In these two dimensions of self-care, the three sample groups converged on the difficulty of changing habits acquired during life, financial difficulties, and lack of support from family or social network.

In fact, the change in habits acquired during life is an important component for adherence to diet and physical activity. An integrative review pointed out that people with DM2 who practiced healthy habits before the onset of the disease reported easier adherence to a healthy diet and physical activity[19]. Other studies have also shown that intrinsic motivation and coping with illness with positive thinking are related to adherence to physical activity[4,20]. As for financial difficulties, people with DM2 have the conviction that better purchasing power allows the promotion of a diet appropriate to their health condition[5]. Lack of family support can also be a hindrance to adherence to these dimensions of self-care[19].

Despite the low prevalence of adherence to physical activity, it is noteworthy, among those who adhere to this dimension of self-care, that many facilitating aspects are in the social and health system spheres. In this sense, social spaces such as the Senior Citizen Care Center (SCCC), public spaces for physical activity, and physical activity groups in some BHU were mentioned.

The importance of public spaces for the practice of physical activities has been recognized by public health policies and, in light of this, the Health Academies Program is worth mentioning, aiming at the implementation of centers with infrastructure, equipment and professionals for the guidance of physical activity practices and healthy lifestyles in a coordinated manner with the Expanded Family Health Centers (EFHC)[21]. The joint efforts that have been made to maintain physical activity groups continue in some BHUs and involve medical and nursing staff and physical

educators. The literature shows that group physical activities, with professional support, are an important strategy for adherence to this dimension of self-care[22].

As for adherence to glycemic monitoring, the low prevalences of desirable adherence found can also be explained in the category encountering difficulties to follow treatment, being, in this case, more related to the health system. The lack of reagent strips for use in glucometer makes people with DM2 sometimes seek mistaken strategies such as not checking as recommended by professionals. Professionals, in turn, recognize that these devices are important in the treatment, but other aspects are equally important.

Undeniably, glucose monitoring plays an important role in self-care among people with DM2, however, monitoring alone does not lower blood glucose levels. To be useful, the information must be integrated into clinical and self-care plans[2], which was strongly emphasized by the health professionals in this study.

With regard to foot care, the prevalence of more desirable adherence can be explained by the category valuing the facilitating aspects of treatment, which highlights the importance of professionals in the guidance concerning this dimension of self-care. The prevalence of people who take care of their feet in a more desirable frequency may be a result of these guidance practices. A study conducted in the Northeast of Brazil found an association between the level of knowledge and greater adherence to foot care and highlighted the importance of health professionals, especially nurses, to provide guidance on the care that should be practiced[13].

The use of medication at a desirable frequency in the studied population may also be the result of health system actions. The National Pharmaceutical Assistance Policy and the creation of public programs to obtain medicines in a co-payment system in public or accredited private pharmacies act on the financial and geographical barriers to access[23]. Access to medication is an important strategy for adherence to drug therapy[24,25].

However, many difficulties were mentioned regarding the availability of medications and, especially, the lack of more effective drugs, which are often not provided by the public system. A study that assessed the factors associated with therapeutic adherence in PHC in Northern Brazil showed that the difficulty in obtaining medicines interferes with adherence to this dimension of self-care[24].

It was evidenced that adherence to the various dimensions of treatment involves overcoming difficulties and valuing aspects that facilitate treatment at the individual, social, and health system levels.

Other studies have emphasized that individual factors are responsible for better adherence to self-care[4]. The social support found in the family, financial resources or public programs directed to health were also social aspects facilitators for self-care mentioned in this study. This is in line with the results of another study conducted with people with DM2 treated in PHC in Southern Brazil. This study showed that social support influences self-care behaviors in DM2, and family support was related to healthier

eating and physical activity more frequently[19]. Another study conducted in the Brazilian Midwest region also pointed to the lack of family support as a hindrance to adherence to self-care[25].

PHC was pointed out as a support for people with DM2. Despite the structural and organizational difficulties evidenced, human relationships are maintained and people trust PHC and professionals. There is evidence in the literature that PHC plays an important role in self-care for people with DM2, since PHC professionals act as facilitators and mobilizers by raising awareness, changing behavior and developing the individual's capacity and ability for self-care[7,26].

By analyzing these results from the perspective of complex thinking, it can be stated that self-care among people with DM2 is a complex and multidimensional phenomenon in which multiple and complex relationships/interactions/associations among individual, social, and health system-related factors are involved. These findings are presented in the interpretive model elaborated in which the diagram represents the phenomenon "Facing the complexity of Diabetes Mellitus treatment and seeking self-care" articulated with the dimensions of self-care of people with DM2 and the facilitating and hindering aspects of self-care.

CONCLUSION AND IMPLICATIONS FOR PRACTICE

The integration of the results of the quantitative and qualitative studies led to the development of an interpretive model that helps to understand the adherence to self-care of people with DM2. The quantitative study showed low prevalence of adherence to healthy diet, physical activity, and glycemic monitoring, which were explained in the qualitative step, which showed many difficulties in these dimensions of self-care. The prevalences of more desirable adherence to medication use and foot care were explained by the appreciation of the facilitating aspects of treatment in these dimensions of self-care. The qualitative study showed that overcoming the difficulties encountered and valuing the facilitating aspects of treatment can contribute for people with DM2 to achieve self-care. These aspects evidenced in the quantitative and qualitative studies are the constituent elements of the interpretive model developed.

There is an understanding that individual, social and health system aspects interfere in self-care. The individual difficulties and social vulnerability of this portion of the studied population make people with DM2 have a strong dependence on the public health system for their health care. The difficulties related to PHC can potentiate the individual and social difficulties, since they prevent access to basic aspects of the treatment.

Regarding the limitations of the study, it is noteworthy that the fact that the results were obtained by self-report and refer to the behavior pattern of the last seven days, by the instrument used, may not represent the reality regarding the adherence to self-care of people with DM2.

The use of the interpretative model helps to understand the phenomenon of adherence to self-care among people with DM2

treated in PHC and can contribute, in the local context, to the planning of health actions aimed at this population. Given the importance of PHC in self-care adherence of people with DM2, the relationship between structural and organizational factors of the service and adherence to self-care among people with DM2 needs to be further explored through other studies.

AUTHOR'S CONTRIBUTIONS

Study design. Samara Eliane Rabelo Suplici. Betina Hörner Schlindwein Meirelles. Denise Maria Guerreiro Vieira da Silva. Julia Estela Willrich Boell.

Data acquisition, data analysis, and interpretation of results. Samara Eliane Rabelo Suplici. Betina Hörner Schlindwein Meirelles. Denise Maria Guerreiro Vieira da Silva. Julia Estela Willrich Boell.

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