Health monitoring and decision-making by older adults

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Background Home monitoring of chronic diseases has been understood as an important aspect of comprehensive care and has been facilitated by the development of portable electronic equipment. **Aim** This study aims to identify the decision-making of older adults regarding the altered results obtained by home health monitoring through the use of glucometers and digital blood pressure monitors. **Method** Quantitative, exploratory and cross-sectional study. Data collection: Socioeconomic questionnaire and interview "Decision-making in home health monitoring". A descriptive statistical analysis was performed. **Results** Participants were 150 older adults. The immediate decisions refer to the search for medical help, administration of the prescribed medication, alternative options of treatment and third-party assistance, mainly due to the need for fast solutions and previous experience with the problem. In the mid-term, the search for professional help is greater than 90%. Gender and schooling were not influential factors among users of blood pressure monitor. Among the users of the glucometer, in immediate people who have spent more years in education tend to make more reasonable decisions regarding medical guidance with reference to the administration of prescribed medication and regarding the search for professional help, while those who have spent fewer years in education tend to search for alternative treatment options. In the mid-term, education was not an influential factor. **Conclusion** Older adults are often responsible for monitoring and deciding on health at home. This reinforces the need for investment in health education, mainly on diseases and the available resources in the community for prevention and treatment. Instrumentation actions for the use of monitoring health equipment are necessary since this is the initial stage for the decision-making process.

Keywords: older adults, chronic disease, technology, decision-making

Introduction

The population is ageing and the increasing prevalence of chronic diseases, such as cardiovascular diseases, diabetes, cancers, and chronic respiratory diseases (Ministry of Health, 2018), places before us the challenge of allocating strategies and services that supply the resulting demand for continuous and long-term care. With this in mind, the Brazilian government has invested effort into creating policies for prevention and treatment, such as the Non-Communicable Diseases Surveillance Organization, the National Health Promotion Policy (PNPS), the Health Academy Program, measures to fight smoking, publication of a guide to healthy eating, an increase in primary health care and pharmaceutical care and other expedients (Ministry of Health, 2011).

As part of these actions, home monitoring of chronic diseases has been understood as an important aspect of comprehensive care and has been facilitated by the development of portable electronic equipment (such as the glucometer, the digital blood pressure monitor, the oximeter, the digital pill box, and the heart rate monitor) to which the public has easy commercial access. Besides facilitating health daily management, these devices enable the subject to be actively involved in his/her treatment, becoming the main character in care actions (Santana et al., 2014). According to Veras (2009), home monitoring of chronic diseases makes it possible to anticipate medical complications, avoid worsening conditions and develop skills for self-management.

Self-management is a complex activity and includes all actions by the person to recognize the signs and symptoms of the disease, choose the appropriate treatment and managing long-term health conditions, developing an active role in own health and care (The Health Foundation, 2016). For older adults, this process can be even

more burdensome considering the complexity of their health, which is often characterized by the presence of two or more simultaneous chronic diseases, use of polypharmacy (Bernardes, 2016) and possible difficulties in handling the monitoring equipment.

A more complex health condition requires greater knowledge and skills for efficient self-monitoring since chronic diseases demand daily care related to medication adherence, daily parameter monitoring, and management in situations of decompensated results. In this context, self-management implies decision-making regarding altered results and requiring the person to choose between possible alternatives and select the one that best meets their needs.

We make decisions all the time, whether in daily situations or in more complex ones that demand a thorough analysis of choices and consequences. For Chiavenato (2003), the decision-making process consists of six essential elements: (1) Subject: the person who makes a choice; (2) Aim: what the subject intends to achieve; (3) Preferences: the criteria for making a choice; (4) Strategy: the action plan to achieve a goal; (5) Situation: the aspects of the environment that affect the choice; and (6) Result: the strategy consequence.

Decision-making can be affected by subject perceptions and personal characteristics, as well as by external factors, such as access to health services and the necessary medication. These directly interfere with the choice of taking a positive or a negative attitude to a health condition, which represents the degree of commitment and responsibility for self-management (Medeiros, Araújo, Vianna & Moraes, 2014). As a result, the way people make decisions may vary considerably. As the population of older adults is most affected by chronic disease, it is necessary to develop educational and care strategies for this group of people to provide quality information and easy access to services so as to guarantee conscious decisions, avoiding the worsening of the disease and enabling a better quality of life even at an advanced age (Bernardes, 2016).

Table 1. Characterization of the sample (n=150) regarding gender, marital status, occupation, who they live with, education and income

	N=150	%
Gender		
Female	117	78%
Male	33	22%
Marital status		
Married	79	52.6%
Widow(er)	43	28.6%
Divorced	15	10%
Single	13	8.6%
Occupation		
Retired	127	84.6%
Pensioner	15	10%
Informal worker	05	3.3%
Formal worker	02	1.3%
Retired and pensioner	01	0.6%
Who they live with		
Spouse	78	52%
Alone	35	23.3%
Children	28	18.6%
Other people from the family	08	5.3%
Grandchildren	01	0.6%
Education		
No education	08	5.3%
Up to 2 years of education	14	9.3%
Up to 5 years of education	57	38%
Up to 8 years of education	19	12.6%
Up to 11 years of education	17	11.3%
Up to 15 years of education	21	14%
More than 15 years of education	14	9.3%
Monthly family income* **		
Up to 1 minimum wage	29	19.3%
Up to 3 minimum wages	72	48%
Up to 5 minimum wages	28	18.6%
Up to 7 minimum wages	04	2.6%
More than 7 minimum wages	13	8.6%
No answer	04	2.6%

In the past, monitoring and health care were performed exclusively in a hospital setting by professionals trained to perform the activity. Nowadays, with the advent of technology and easy access to digital devices, the number of people who manage and decide on their own health at home has been increasing, particularly among older adults. Considering this situation, this study aims to identify the decision of older adults regarding altered results obtained by home monitoring of chronic diseases and to identify their perception about performing this activity at home.

Method

Research population and recruitment

This is a quantitative, exploratory and cross-sectional study. The cross-sectional study has a well-defined sample, the data is collected only once and it is possible to recognize the prevalence/frequency of responses in the sample. The criteria for inclusion in the study were people aged 60 or older who perform home monitoring of Systemic Arterial Hypertension (SAH) and Diabetes Mellitus (DM) through the use of a glucometer and/or digital blood pressure monitor. The exclusion criteria in the study were people with cognitive impairment, symptoms of depression, total dependence in performing instrumental activities of daily living or residents in long-term institutions.

Table 2. Immediate decision-making among users of glucometers (n=62) and digital blood pressure monitors (n=128)

Immediate decision-making regarding altered results					
Glucometer users (n=62)			Digital blood pressure monitor users(n=128)		
Decision	**n**	**Reason**	**Decision**	**n**	**Reason**
Search for medical help	18	They believe it to be the most appropriate thing to do (n= 14); they are afraid to make decisions about their own heath (n=03); need for medical guidance (n=01).	The search for medical help	40	It is the most appropriate thing to do (n= 27); they are afraid to make decisions about their own heath (n=07); need for medical guidance (n=06)
Administration of the prescribed medication	17	They need medical guidance (n=07); it is the fastest and easiest alternative (n=04); previous experience of the problem (n=03); it is the most appropriate thing to do (n=01); they don't know how to act (n=01); they need third-party guidance (n=01)	Administration of the prescribed medication	34	They need medical guidance (n=15); it is the fastest and easiest alternative (n=11); previous experience of the problem (n=05); it is the most appropriate thing to do (n=03)
Alternative options of treatment	16	Previous experience of the problem (n=09); they need medical guidance (n=03); it is the fastest and easiest alternative (n=02); they need third party guidance (n=02)	Alternative treatment options	31	Previous experience with the problem (n=12); it is the fastest and easiest alternative (n=13); they need medical guidance (n=02); they need third-party guidance (n=02); they don't know how to act (n=01); they know what to do even without a prescription (n=01)
Help from close people	06	It is the fastest and easiest alternative (n=04); they are afraid to make decisions about their own heath (n=01); they don't know how to act (n=01)	Help from close people	14	It is the fastest and easiest alternative (n=08); it is the most appropriate thing to do (n=03); they are afraid to make decisions about their own heath (n=02); they don't know how to act (n=01)
Food intervention	02	Previous experience of the problem (n=02)	Pharmacist help	04	It is the fastest and easiest alternative (n=04)
Pharmacist help	01	It is the fastest and easiest alternative (n=01)	Food intervention	02	Previous experience of the problem (n=02)
No action	01	Medical guidance (n=01)	No action	02	It is the most appropriate thing to do (n=01); previous experience of the problem (n=01)

The recruitment of the participants was carried out by the researcher through an active and inviting search in the health services and social projects for older adults at which time the aims and methods of the research were presented. The following instruments were applied to those who accepted the invitation: Mini Mental State Examination (MMSE), with a passing grade of illiterates = 13 points; 1–7 years of education = 18 points; 8 years of education or more = 26 points (Bertolucci, Brucki, Compacci & Juliano, 1994), the Geriatric Depression Scale (GDS), which evaluates aspects relating to satisfaction with life, mood, joy and isolation (Almeida, Almeida, 1999); and Lawton and Brody's IADLScale (IADL), to evaluate independence in performing activities such as shopping, meal preparation, health management and financial management (Lawton, Brody, 1969).

The selected participants answered a socioeconomic questionnaire with information about age, marital status, occupation, education, and income, and participated in a semi-structured interview "Decision-making in the home health monitoring" developed by researchers to acquire information about immediate and mid-term decision-making regarding altered results. In this case, the "immediate" moment was considered to be right after the first gauging, and "mid-term" was considered to be 24 hours after first gauging.

In the instrument, some alternatives were presented as a possibility of decision making. There was also a blank space that could be completed if no option was appropriate for the participant. All responses were transcribed and tabulated. After that, we grouped by similarity of responses to identify the frequency. A descriptive statistical

Table 3. Mid-term decision-making among users of glucometers (n=62) and digital blood pressure monitors (n=128)

Mid-term decision-making regarding altered results					
Glucometer users (n=62)			Digital blood pressure monitor (n=128)		
Decision	**n**	**Reason**	**Decision**	**n**	**Reason**
Medical help	58	It is the most appropriate thing to do (n=53); they need medical guidance (n=03);); they are afraid to make decisions about their own heath (n=01); they don't know how to act (n=01)	Medical help	120	It is the most appropriate thing to do (n=109); they are afraid to make decisions about their own heath (n=05); they need medical guidance (n=04); they don't know how to act (n=02)
Help from close people	02	They are afraid to make decisions about their own heath (n=01); they don't know how to act (n=01)	They need help from close people	04	It is the fastest and easiest alternative (n=01); they are afraid to make decisions about their own heath (n=01); they don't know how to act (n=01); they need third party guidance (n=01)
Administration of the prescribed medication	01	Previous experience of the problem (n=01)	Changing eating habits	02	It is the most appropriate thing to do (n=02)
Pharmacist help	01	It is the fastest and easiest alternative (n=01)	Administration of prescribed medication	01	They need medical guidance (n=01)
			Pharmacist help	01	It is the fastest and easiest alternative (n=01)

Table 4. Immediate decision-making of the users of the glucometer according to the gender

Immediate decision-making	Women	Men	Total
Medical Help	13	5	18
	27.08	35.71	29.03
Help of a pharmacist	0	1	1
	0.00	7.14	1.61
Help from people nearby	6	1	7
	12.50	7.14	11.29
Prescribed medication	14	3	17
	29.17	21.43	27.42
Alternative options	15	3	18
	31.25	21.43	29.03
Food intervention	0	1	1
	0.00	7.14	1.61
Total	48	14	62
	100.0	100.0	100.0

analysis was carried out to present the sample profile, and absolute and percentage quantifications were performed to identify the trends regarding the health decision-making. Statistical associations between categorical variables were determined by Fisher's exact test. The project was approved by the Committee of Ethics in Research, number: 737.032, fulfilling the ethical principles of researches involving human beings.

Table 5. Mid-term decision-making of the users of the glucometer according to the gender

Mid term decision-making	Women	Men	Total
Medical help	46	11	57
	97.87	78.57	93.44
Other alternatives	1	3	4
	2.13	21.43	6.56
Total	47	14	61
	100.0	100.0	100.0

Results

The sample consisted of 150 participants. Regarding the socioeconomic characterization, 78% were female at an average age of 72, mostly married (52.6%), with up to five years of education (38%), a monthly family income composed of up to three minimum wages (48%) and retired (85%). Of the total number of participants, 128 used the digital blood pressure monitor and 62 used the glucometer at home. The complete data is presented in *Table 1*.

Decision-making in the home monitoring of chronic diseases

In both groups the immediate decisions were medical help, medication administration prescribed and alternative treatment options, mainly for the search for quick solutions and previous experience with the problem. The data show that 31% and 29% of users of digital blood pressure monitor and glucometer respectively seek medical help immediately. In the medium term, this percentage is 94% in both groups. The complete data is presented in *Tables 2* and *3*.

Regarding sex, among the users of the glucometer, no statistically significant difference was found for the immediate decision between men and women (p value = 0.222). In the medium term, the data indicate a statistical difference and show that women tend to seek more for medical help when compared to men (p = 0.035) (*Figure 1*).

Table 6. Immediate decision-making of the users of the blood pressure monitors according to the gender

Immediate decision-making	Women	Men	Total
Medical help	31	9	40
	31.31	32.14	31.50
Help of a pharmacist	3	1	4
	3.03	3.57	3.15
Help from people nearby	11	3	14
	11.11	10.71	11.02
Prescribed medication	25	8	33
	25.25	28.57	25.98
Alternative options	27	6	33
	27.27	21.43	25.98
Food intervention	1	0	1
	1.01	00.0	0.79
No action	1	1	2
	1.01	3.57	1.57
Total	99	28	127
	100.0	100.0	100.0

Table 7. Mid-term decision-making of the users of the blood pressure monitors according to the gender

Mid term decision-making	Women	Men	Total
Medical help	93	26	119
	93.94	92.86	93.70
Other alternatives	6	2	8
	6.06	7.14	6.30
Total	99	28	127
	100.0	100.0	100.0

No statistically significant difference was found in the short (p = 0.899) and medium term (p = 1,000) decisions among the users of the blood pressure gauge when compared to the sexes (*Figure 2*).

Regarding schooling, among the users of the glucometer, the test indicates a statistical difference for immediate decision (p = 0.035), in which the elderly with 6 years of studies or more tend to seek medical help and administer the prescribed medication, while that older people with lower education tend to seek alternative treatment options. There is also a difference in the medium-term decision (p value = 0.058), showing that people with no schooling tend to seek more for alternative options while people with higher education seek professional help (*Figure 3*).

Table 8. Immediate decision-making of the users of the glucometer according to years of study

Immediate decision-making	No study	1-5 years	6-11 years	12 or more	Total
Medical help	2	5	8	3	18
	50.0	14.71	50.0	37.50	29.03
Help of a pharmacist	0	0	1	0	1
	0.00	0.00	6.25	0.00	1.61
Help from people nearby	0	5	2	0	7
	0.00	14.71	12.50	0.00	11.29
Prescribed medication	0	10	5	2	17
	0.00	29.41	31.25	25.00	27.42
Alternative options	2	13	0	3	18
	50.00	38.24	0.00	37.50	29.03
Food intervention	0	1	0	0	1
	0.00	2.94	0.00	0.00	1.61
Total	4	34	16	8	62
	100.0	100.0	100.0	100.0	100.0

No statistical difference was found in the short- and medium-term decisions among the users of the blood pressure gauge when compared with the years of studies (p value> 0.05) (*Figure 4*).

Perceptions regarding the performance of home health monitoring

Out of the total participants, 38% preferred to monitor chronic disease at home, mainly due to difficulties in commuting to access medical care at the health care service. The speed in obtaining the results and the possibility of constant monitoring of the disease were also factors influencing this preference. On the other hand, 15% of participants preferred their health to be monitored by professionals. For them, the technological tools were not reliable and might cause dependency and anxiety for their users. For 47% of the participants, performing home monitoring and searching for health care when they consider it to be necessary was the most appropriate thing to do. According to them, performing such an activity at home is more practical and helps in the evaluation of the real need to seek professional help.

Discussion

Due to the high prevalence of chronic diseases and the complexity of their treatment, we are living through a transition in the paradigm of care, with people increasingly being encouraged to monitor their health at home as part of a kind of (co-)responsibility between professional and patient in an attempt to provide more integrated follow-up care (Santana et al. 2014). This is a valuable strategy since the person who engages in self-care adapts better to the treatment and tends to change their behavior in a way that represents responsibility and commitment toward their own health (Medeiros, Araújo, Vianna & Moraes, 2014; Lopes, 2015).

Despite this, home monitoring brings with it the challenge of guaranteeing appropriate decisions regarding altered results. Therefore, investment in instrumentation and educational actions must be encouraged, since well-informed subjects can make better decisions about their own health, which will consequently decrease the number of people using service care.

In this study, the decisions made immediately show that older adults act according to the re-

Table 9. Mid-term decision-making of the users of the glucometer according to years of study

Mid term decision-making	No study	1-5 years	6-11 years	12 or more	Total
Medical help	4	33	13	7	57
	100.0	100.0	81.25	87.50	93.44
Help of a pharmacist	0	0	1	0	1
	0.00	0.00	6.25	0.00	1.64
Help from people nearby	0	0	2	0	2
	0.00	0.00	12.50	0.00	3.28
Prescribed medication	0	0	0	1	1
	0.00	0.00	0.00	12.50	1.64
Total	4	33	16	8	61
	100.0	100.0	100.0	100.0	100.0

Table 10. Immediate decision-making of the users of the blood pressure monitors according to years of study

Immediate decision-making	No study	1-5 years	6-11 years	12 or more	Total
Medical help	1	10	18	11	40
	16.67	18.18	51.43	35.48	31.50
Help of a pharmacist	0	2	1	1	4
	0.00	3.64	2.86	3.23	3.15
Help from people nearby	0	4	6	4	14
	0.00	7.27	17.14	12.90	11.02
Prescribed medication	1	19	6	7	33
	16.67	34.55	17.14	22.58	25.98
Alternative options	4	18	4	7	33
	66.67	32.73	11.43	22.58	25.98
Food intervention	0	1	0	0	1
	0.00	1.82	0.00	0.00	0.79
Self medication	0	1	0	1	2
	0.00	1.82	0.00	3.23	1.57
Total	6	55	35	31	127
	100.0	100.0	100.0	100.0	100.0

sources and knowledge available to them, mostly by choosing a solution inside their own homes. This probably happens due to the difficulties involved in accessing the health service in a functional and geographical way and is also due to the convenience of not leaving home to search for help. Besides, subjects who have already encountered altered results acquire a set of abilities for dealing with the situation again, which is why the previous experience of the problem may influence decision-making (Bernardes, 2016).

Table 11. Mid-term decision-making of the users of the blood pressure monitors according to years of study

Mid-term decision-making	No study	1-5 years	6-11 years	12 or more	Total
Medical help	5	53	31	30	119
	83.33	96.36	88.57	96.77	93.70
Help of a pharmacist	0	0	1	0	1
	00.00	00.00	2.86	00.00	0.79
Help from people nearby	1	0	2	1	4
	16.67	00.00	5.71	3.23	3.15
Prescribed medication	0	0	1	0	1
	00.00	00.00	2.86	00.00	0.79
Food intervention	0	2	0	0	2
	00.00	3.64	00.00	00.00	1.57
Total	6	55	35	31	127
	100.00	100.00	100.00	100.00	100.00

This new dynamic of care requires a constant reinvention of the professional–patient relationship because it undoes the concept that the professional is the only one who knows about the disease. This sharing of responsibility includes the subject as a transforming and active being (Bernardes, 2016). It is expected, therefore, that people might be capable of dealing with the challenges of continuous treatment, considering they are the ones who will actually manage and adjust the demands arising from chronic conditions in daily life (Lopes, 2015).

Despite the practicality and the benefits of home monitoring, some people still do not feel safe performing this activity by themselves. This can be associated with the idea that only professionals are ready to deal with and make decisions in such situations and also springs from a lack of knowledge of the disease, difficulties in handling the equipment and incomprehension of the obtained results. These factors represent an important gap in the matter of health education, mainly focusing on the older population, who are most affected by these conditions.

It is necessary to encourage self-management in an instructed and safe way because when older adults are empowered to take care of their own health, they take over care actions at an individual and at a collective level. According to Taddeo et al. (2012) empowerment is an educational process that enables the development of knowledge, skills, and attitudes for actually taking over the decision-making process regarding their health, ensuring the quality of life even at very advanced ages.

Educational actions in the matter of instrumentation for the correct use of equipment, for the identification of altered results and for quality information regarding treatment and resources are necessary to ensure the participation of a subject who is conscious and capable of managing their own life in an effective way.

Conclusion

In general, older adults have been favorable to the home monitoring of chronic diseases. When faced with impaired results, the majority tend to seek solutions that are practical and solve problems fast, based mainly on agility, difficulty in accessing the health service and previous experience with the situation. In the medium term, there is a predominance of professional help.

Monitoring health at home and making decisions points to the need for greater investment in quality education and information, especially with regard to the disease and resources available in the community for prevention and treatment. In addition, instrumentation actions for the correct use of moni-

toring equipment need to be part of the agenda.

The number of older adults has increased considerably and, as a consequence, the number of people with chronic diseases has also increased. Although the care model is still vertical, which the health professional holds the knowledge and passes the instruction to the patient, today people are able to become more actively involved in self-care through home health monitoring. This reinforces the importance of conducting studies that show how self-management is performed, especially in old age, and which strategies can be implemented to ensure a more integrated attention, seeking quality and independence even in advanced ages.

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