VOLUME 21, NUMBER 3 - MAY / JUNE 2018

Revista Brasileira de Geriatria e Gerontologia

Brazilian Journal of Geriatrics and Gerontology

UnATi
Universidade Aberta da Terceira Idade

UERJ
UNIVERSIDADE DO ESTADO DO RIO DE JANEIRO

ISSN 1981-2256

Revista Brasileira de Geriatria e Gerontologia

Brazilian Journal of Geriatrics and Gerontology

VOLUME 21 NUMBER 3 - MAY/JUNE 2018

Revista Brasileira de Geriatria e Gerontologia é continuação do título *Textos sobre Envelhecimento*, fundado em 1998. Tem por objetivo publicar e disseminar a produção científica no âmbito da Geriatria e Gerontologia, e contribuir para o aprofundamento das questões atinentes ao envelhecimento humano. Categorias de publicação: Artigos originais, Revisões, Relatos, Atualizações e Comunicações breves. Outras categorias podem ser avaliadas, se consideradas relevantes.

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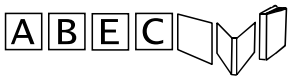

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http://dx.doi.org/10.1590/1981-22562018021.180096

The simultaneous submission of a manuscript to more than one scientific publication: a legitimate strategy?

Authors of scientific articles often ask why they are unable to submit their manuscriptsto more than one journal at the same time.

For the authors, such a rule seems illogical given their urgent need to publish a certain number of articles each year. Faced with such an imperative, anything that expediates publication must seem desirable.

This argument appears less legitimate, however, when considered from a broader perspective that includes all those involved in the publication process. Copyright laws and the possible problems that such behavior can cause the researcher in the world of specialized publications should also be taken into account.

From their standpoint, authorscould submit the manuscript to several journals simultaneously, thus multiplying their chances of successful publication. However, what if their article is acceptedby more than one journal? Obviously, the authors could choose in which journal they prefer to be published and decline the offers from the others. Such an attitude, however, could create gaps in the editorial schedules of the rejected publications. The issue cannot therefore be considered solely from the perspective of the authors.

While acceptance by more than one journal at the same time suggests the production of a highly-regarded study, such an idea is a chimera. The editorial process of evaluating a manuscript involves a series of stages and people at each journal (editors, referees, reviewers), and each publication will have included the article and its attachments (illustrations, figures, images, tables, pictures, flowcharts...) in its editing schedule.

When the authors reject an offer of publicationfrom a scientific journal, the ethical compromise agreed upon during the consideration of the submission is violated, perhaps resulting in the journal beingunable to honor the pre-established schedule of its currentedition, as the editor will have to hastily replace the article with another at the same stage of evaluation.

It should also be emphasized that the theme of "ethics in research" is embodied in all scientific endeavors, as there is a need for rectitude to ensure the credibility of results and sincerity in the relationshipsbetween the different parties involved in the process. Every researcher is duty bound to respect the understandings upon which all scientific communication is based[1].

There is also a range of other actions that can lead to both scientific misconduct and legal consequences[2], about which reviewers and referees are often vigilant, such as theuse of the findings of others without approval; plagiarism; self-plagiarism; improper authorship; non-compliance with legislative and regulatory requirements; transgression of established research practices; simulacrum of data; inconsistency in the validation

of the research; incompetence whenobjecting to unsuccessful validation trials; improper attitudes in the presumption of misconduct; and the inclusion of co-authors who did not actively participate in the study[3].

As the severity of such fraudulent actions can vary, so the punishments for researchersdiffer depending on the infraction. In general, infringements that undermine the integrity of the research process are considered serious and can lead to severe penalties.

The consequences of academic misconduct can beextremely seriousfor a researcher's curriculum due to the harm they can cause the scientific world. The invalidation of an article can result in the loss of financial support from an institution or research fund. Moreover, depending on the type of fraud, the researcher may suffer legal consequences, further compromising the institution which he or she represents. The authors and co-authors of scientific works mustalso assume the professional, public, ethical and social responsibility of publication in accordance with Copyright Law[2].

When deciding to submit an article to a journal, the authorsare granting part of the copyright of their work to the same (if the article is accepted), and so cannot make the same commitment to other publications. In addition, if simultaneous submission is discovered, the author in question will be scorned by the academic world, and will have little chance of future publication.

In 2006, in an editorial in *Revista Química Nova* (the New Journal of Chemistry) entitled "Competition, Success and Ethics in Science", Prof. Fernando Coelho (UNICAMPI), said that: "speedy publication of the results of a study should not always be our driving force; what should always matter is the accuracy and consistency of what we publish"[4].

The exaggerated importancegranted to quantity of publications as the parameter of success of a researcher should be reconsidered, representing as it does the root of academic misconduct both in Brazil and other countries.

Tranquility, balance and serenity are therefore required, with authors always plotting a route towards the seas of academic honesty. If the goal is to increase the possibilities of publication, it is better to producemore articles and submit them to different periodicals. Now, let's get to work and good luck!

Luiz Antonio Costa Tarcitano

Editorial Assistant and Portuguese Reviewer for the Revista Brasileira de Geriatria e Gerontologia.

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http://dx.doi.org/10.1590/1981-22562018021.180008

Palliative care: A proposal for undergraduate education in Medicine

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Abstract

Objective: to propose essential competencies for the teaching of palliative care on undergraduate Medicine courses. *Method:* a documentary analysis of the literature on general competencies in palliative care was initially carried out, to construct a framework with suggestions of essential competencies for undergraduate education in Brazil. The elaborated material was then presented individually to eight professionals from a range of areas for analysis. All the professionals had specialized training in palliative care, and the material was accompanied by an interview with three open questions. The categorical thematic content analysis proposed by Bardin was used in the documentary analysis and the interviews with the professionals. *Results:* the initial documentary analysis resulted in five categories, eight subcategories and 96 units of analysis, based on which the researcher was able to construct the suggestions for competences, which were distributed with their respective contents in a framework with five modules. Six categories, 12 subcategories and 168 analysis units emerged from the interviews with the professionals following a reading of the material. From the discourse contained in the subcategories and units of analysis, suggestions emerged for a better distribution of the modules, resulting in the renaming of the same (*Basic principles of palliative care, Symptom management, Teamwork, Ethical and legal issues, Care in the last moments of life*). *Conclusion:* the discussion and improvement of the palliative care competencies suggested in this study will be essential at medical education forums, providing clarity about what is really required in general practitioner training.

Keywords: Palliative Care. Palliative Medicine. Education, Medical. Curriculum. Qualitative Research.

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INTRODUCTION

The acquiring of competencies and broadening of knowledge in palliative care is of great importance due to the large number of people with diseases that threaten the continuity of life and who require care that goes beyond controlling the actual symptoms of disease and which involves psychosocial and spiritual care and the paying of proper attention to family members. These are the basic principles of palliative care, which stem from a modality of care directed at individuals in the initial stage of progressive, advanced and incurable disease[1]. Within the perspective of this article competencies consist of the integration of knowledge, skills and attitudes that can be used to successfully perform a professional task[2].

One of the earliest attempts to publish a curriculum for the teaching of palliative care at undergraduate level took place in Canadian medical schools in 1993. The American Academy for Hospice and Palliative Medicine subsequently published a core curriculum in 1998[2].

The European Association for Palliative Care (EAPC) established a summary of a proposed curriculum, setting out the minimum of knowledge and skills that a medical student should acquire during his/her undergraduate course [3].

In 2008 the *Société Canadienne des Médecins des Soins Palliatifs* proposed six items in which to divide competencies: medical expertise in pain and other symptoms, medical expertise in psychosocial and spiritual needs, and the roles of administrator, communicator, collaborator and promoter of health[4]. Subsequently, similar projects were implemented in Japan, the United Kingdom and Colombia[5-7].

In Brazil, the Universidade Federal de São Paulo was the first medical school to offer Palliative Care courses on an elective basis to undergraduate students in Medicine, between 1994 to 2008. In 2003, a compulsory Palliative Care discipline was created at the Universidade de Caxias do Sul[8].

Despite these examples of approaches to palliative care in education, which were later followed by other universities, there is a lack of correlation between the provision of instruction in palliative care and the perception of its importance in most medical schools. Such schools have described insufficient time, a lack of faculty expertise and the time-consuming demands of multiple interests as the reasons for the lack of curricular under-representation of palliative care[9].

Yet by placing the student in contact with palliative care during training we can help to improve patient care. This study therefore aimed to propose essential skills for the teaching of palliative care in undergraduate courses in Medicine.

METHOD

A descriptive, exploratory, qualitative study was carried out. Data was obtained through documentary analysis and a case study based on an interview with three open questions. Data was evaluated through the analysis of categorical thematic content based on the dismemberment of the text into units and categories according to analog regroupings, as described by Bardin[10].

Documentary analysis was carried out from January to February 2017, based on the selection by the principal researcher of six relevant scientific articles on the topic[5-7,11-13], two books on palliative care[2,14] and recommendations of online material of the websites of the following international institutions: the European Association for Palliative Care, the *Société Canadienne des Médecins de Soins Palliatifs*, the Australian Government Department of Health through the Palliative Care Curriculum for Undergraduates (PCCAU) and the American Association of Hospice and Palliative Medicine (AAHPM)[3,4,15,16]. The core competencies in palliative care of the AAHPM[16] were used in the documentary analysis as this is considered an important document for basic knowledge, although it is acknowledged that more complex competencies are required for undergraduate study.

After the creation of the documentary *corpus*, exhaustive readings were carried out from which the categories, subcategories and units of analysis emerged on an *a posteriori* basis[10]. When the exploration of the sources became redundant, based on a sense of the integration of the information obtained, the search for new sources was interrupted[17]. Thus, using

Bloom's Taxonomy[18] for clarity in the understanding of the educational objectives, a suggestion of essential competencies for the teaching of palliative care on medical undergraduate courses was created (Table 1).

In the case study section, eight professionals were interviewed individually (three physicians, one nurse, three psychologists and one occupational therapist) between February and March of 2017, in their places of work. The choice of the professionals participating in the research was based on their training in palliative care and having at least two years of practice in the area. Six professionals had worked in undergraduate or postgraduate courses while two were palliative care professionals with information acquired through practical experience. The total of eight participants was defined by the saturation technique[19].

The material with the suggestions for competencies created by the researcher was given to each of the interviewees, who were then informed that these skills could be acquired at any time on the course, depending on the methodology and peculiarities of each course (Table 1). The interview was composed of three open questions: 1) How would you improve the competencies in palliative care in undergraduate medical teaching described in the material delivered to you?; 2) Comment on the importance of an interprofessional approach to teaching in palliative care, emphasizing the biological, psychological, social and spiritual dimensions of care; 3) Talk about the obstacles to the implementation and development of the proposal in undergraduate teaching in Medicine.

For the analysis of the data, the recorded interviews (two hours and fifty minutes) were transcribed and 26 pages of information were obtained. The interviewees were identified in random order and in sequence, starting with I1.

Following an exhaustive reading of the material for a better understanding, the *corpus* was created and the categorization process began, in this case on an *a priori* basis, from which the categories, subcategories and units of analysis emerged, which will be discussed using the theoretical reference[10].

Following approval by the Research Ethics Committee of the Hospital Universitário Onofre Lopes (CEP-HUOL), dated January 27, 2017 and under approval number 1,900,460, the study began. All interviewees invited to participate signed a Free and Informed Consent Form.

RESULTS AND DISCUSSION

Table 1 describes the documentary analysis that resulted in five categories, eight subcategories and 96 units of analysis.

Table 1. Categories, subcategories and units of analysis obtained during the documentary analysis, from the analysis of categorical thematic content. Natal, Rio Grande do Norte, 2017.

Categories	Subcategories	Unit of analysis (n)
Introduction	Concepts, recommendations and epidemiological context	11
	Anamnesis, communication and physical examination	15
Symptom control	Classification, evaluation and treatment of symptoms	18
Interprofessional team	Dynamics of interprofessional relations	11
Topics in Palliative Care	Medical Specialties in Palliative Care	3
	Legislation and bioethics	14
Assistance in the final moments of life	End of life care	11
	Grief and spirituality	13

Following this analysis, a suggestion of essential competencies for the teaching of palliative care in medical undergraduate courses was created (Chart 1). The categories and sub-categories guided the core competencies, which were divided into five modules. The units of analysis guided the content.

Table 2 shows the case study analysis of the transcribed material of the recordings obtained in the interviews, based on the categorization process, which resulted in six categories, 12 subcategories and 168 analysis units.

Chart 1. Suggestion of competencies in palliative care for undergraduate medical courses presented to the interviewees by the researcher. Natal, Rio Grande do Norte, 2017.

Competencies	Content
The student should be able to: • Understand definitions, principles and indications for palliative care. • Understand the geographical distribution of palliative care services. • Perform patient care in palliative care and develop a care plan. • Understand the steps of the SPIKES protocol in communicating bad news. • Understand the functioning of the various palliative care services.	Module I - Introduction: • Definition and principles. • Geographic distribution of palliative care services in Brazil and around the world. • Anamnesis, physical examination and planning of care in palliative care. • Communication in palliative care. • Palliative care services.
The student should be able to: • Evaluate pain and identify the correct pharmacological and non-pharmacological treatment. • Evaluate dyspnea, coughing, nausea and vomiting and know the proper treatment. • Assess constipation, diarrhea, delirium, depression, anxiety and know the proper treatment. • Understand and provide care in controlling the symptoms of major emergencies in palliative care.	Module II - Symptom Control: • Classification, evaluation and treatment of pain. • Evaluation and treatment of dyspnea, cough, nausea, vomiting. • Evaluation and treatment of constipation, diarrhea, delirium, depression and anxiety.
The student should be able to: • Understand the dynamics of interprofessional relations.	Module III - Interprofessional team: • Physician, nurse, psychologist, nutritionist, physiotherapist, speech therapist and occupational therapist, social worker and pharmacist.
The student should be able to: • Understand and technically apply hypodermoclysis. • Understanding oral health care in patients in palliative care. • Differentiate concepts in bioethics, addressing bioethical themes related to the termination of life. • Understand the anticipated directives and their implications on the patient's reality. • Know the importance of Brazilian legislation in the historical process of consolidation of palliative care. • Understand the applicability of palliative care across a range of specialties.	Module IV - Topics in Palliative Care: • Hypodermoclysis - subcutaneous route. • Care of the oral cavity. • Orthothanasia, euthanasia, mysthanasia, dysthanasia. • Living will - advance directives. • Code of medical ethics and Brazilian legislation in relation to palliative care. • Palliative care in pediatrics. • Palliative care in geriatrics.
The student should be able to: • Identify the last 48 hours of life, based on its most frequent symptoms. • Understand the definition of palliative sedation, as well as when it is recommended. • Understand the prospect of terminality in different religions, as well as support for the family in the grief phase.	Module V - Care in the last moments of life: • The last 48 hours of life. • Palliative sedation. • Grief: support life and the patient. • Spirituality, religions, culture, terminality.

Table 2. Categories, subcategories and units of analysis obtained from the categorical thematic content analysis of the discourse of the interviewees on the suggestion of competencies in palliative care in undergraduate teaching in Medicine. Natal, Rio Grande do Norte, 2017.

Categories	Subcategories	Analysis unit (n)
1. Basic principles of palliative care	1.1. Overall assessment of the patient	9
2. Management of symptoms	2.1. Expanding symptom management	10
	2.2. Insertion of palliative care in related clinical areas	7
3. Ethical and legal issues	3.1. The importance of bioethics	11
4. Communication and psychosocial and spiritual aspects	4.1. Communication of bad news	11
	4.2. Process of grief	10
5. Teamwork	5.1. Interprofessionality in clinical practice	30
6. Challenges for the implementation of the proposal	6.1. Did not know about palliative care	10
	6.2. Professor's lack of specialized knowledge	10
	6.3. Resistance to change and bureaucracy	21
	6.4. Excessive curricula workload	25
	6.5. Limited resources for investments in undergraduate education	14

There is an increasing need to define the competencies in palliative care in medical undergraduate teaching in Brazil. We will now present and discuss some of the statements of the interviewees, based on the sequence of categories presented in Table 2.

In the *Basic Principles of Palliative Care* category, the statements agreed with the organization of module 1, "Introduction". Some of the speakers stressed the need to move towards a more overall assessment of the patient as a requirement in the area of palliative care:

> "Congratulations on what you have created! The sequence is very logical. But you've put anamnesis and physical exams in Module 1, and it's a little more than that. It's about getting to know the patient through an overall assessment." (I8).

In this discourse, referring to the overall assessment of palliative care patients, it was observed that professionals referred much more frequently to the way in which the content is developed than to actual changes in what was presented to them.

The need to evaluate the patient in an overall manner has already been discussed in literature which discusses the value of the individuality of patients, facilitating a relationship where the patient feels comfortable sharing information about the chronology of the evolution of their disease and treatment already performed, which can help doctors understand the evolution and prognosis of the condition and their expectations about the proposed treatment[20].

The main suggestions of the interviewees in the symptom management category emphasized the importance of palliative care in different medical specialties, clearly identifying the expansion of palliative care in recent years, in which it has reached several areas, as can be seen in the discourses below:

> "Students need to understand that the definition and principles of palliative care have a certain basic element, but when they are faced with a neurological patient, or an elderly patient, or a cancer patient, they will use slightly different things, their reasoning needs to be a bit different, the natural history of the disease is a bit different." (I6).

A recent study on the definition of competencies in palliative care for physicians emphasized the emergence of acquiring skills in the areas of

cardiology, pneumology, gastroenterology and pediatrics, or in other words clinical segments which until recently were not closely considered for the palliative approach[13]. One interesting suggestion of the interviewees was the need to undo the idea that only areas such as oncology and geriatrics deal with palliative care. As we are proposing competencies for undergraduate students, however, this theme should be approached in a manner that contemplates the generalist training under discussion, but in a selective manner.

The importance the interviewees gave to the topic was evident in the category *Ethical and legal issues*, to the extent that they suggested the creation of a specific module on bioethics and legislation, as can be seen in the following statements:

> "We could create a specific module of bioethics (I have sometimes seen them in in different units) and legislation in palliative care ... I think this part of the legislation would be very important." (I1).

> "I would take the part of module IV about hypodermoclysis and the part of understanding oral health care and put it all together here (Unit II) and leave only the concepts related to bioethics in Module IV. I think it would be more interesting." (I4).

The importance of these two themes (palliative care and bioethics) has already been addressed in other scientific articles, including in Brazilian studies, highlighting their importance for the development of relational skills, which is vital for the care of patients with advanced and terminal disease[21]. Knowledge of Brazilian legislation in the area of palliative care and on the ethical duties of the Brazilian doctor is weak, according to a recent study,[22] as the vast majority of respondents did not mention anything about respecting the patient's autonomy or informing them about the diagnosis and prognosis of their disease, as defined by the Brazilian Code of Medical Ethics[22].

The discourses in the present study also revealed relevant suggestions in the category *Communication and psychosocial and spiritual aspects* for the amplification of techniques of communication, as well as for the entire process of grief and death from a psychosocial and spiritual point of view:

> "On the issue of communication, you can focus much more on the SPIKES protocol, to make it clear that the what you're doing is not rigid. Of course it can serve as a guide. It would not be a suggestion for a fixed protocol, but techniques of approach." (I7).

> "I noticed that death itself wasn't mentioned, the conception of death, the difficulty of speaking about death. The difficulties that the family and the patient will face in relation to palliative care will be based on our paradigms regarding death..." (I7).

> "This anticipatory grief is for the family, the patient, and the team. I think we can expand here. Talking about grief in the post-death phase is aimed at relatives, because it is also part of the guidelines that support the bereaved family." (I4).

According to a recent study, mastery of communication skills enables physicians to be more capable of demonstrating sensitivity, honesty and compassion in difficult communication situations such as those involving death, adverse events at the end of life, bad news and other sensitive topics[23]. As such, communication in palliative care involves a complex mix of spiritual, social, psychological and physical issues in the context of the process of death, resulting in greater dissatisfaction with the care received in the case of ineffective communication[24]. A competency-based training program in palliative care should always aim at continuous professional development and especially communication[25].

The study also highlights the need for discussion, in the area of palliative care, of topics such as: the transmission of bad news, dealing with the approach of death, anticipatory grief, and the grief of family members[23]. These issues were identified in our study as difficulties for the professionals when talking with patients about the aggravation of disease and the possibility of death, as well as the feeling of impotence that these situations provoke.

Interprofessional teamwork, one of the assumptions of palliative care, requires that each of the professionals involved has the ability to communicate with professionals from other areas of knowledge. It is important to understand one's own work and at the same time understand the activities of other

team professionals. These concepts were addressed by the interviewees, who emphasized the importance of interprofessional work in the construction of palliative care competencies, which we grouped in the category *Teamwork*, as described below:

> "You can't carry out palliative care alone! From a conceptual point of view, interprofessional care has to be part of the routine of palliative care. It's difficult for us, as just doctors, like any other professional in the team, to act without the help of everyone else." (I1).

Interprofessional education is understood as an intervention where members of more than one health or social professional area learn by interacting together, aiming to improve interprofessional collaboration and the well-being of patients[26]. In this sense, interprofessional education, according to the references consulted, can only be achieved if educators are willing to be flexible, creative and persistent, displaying mutual respect, valuing each professional area and each member of the interdisciplinary team, with transparent and open communication, shared leadership and the inclusion of the patient and caregiver in the interprofessional team[27].

The discourses below acknowledge the need for education and interprofessional teamwork:

> "The doctor's problem is that he knows how to work with this team, but there is a lack of teamwork, so the doctor knows that he will not be able to provide all the care the patient requires." (I3).

> "Today we know that a palliative care team, according to some authors, includes a palliative physician, a nurse, a psychologist, a social worker with the support of a chaplain, an occupational therapist, a nutritionist, a pharmacist, then you have interprofessional work." (I5).

It is essential, therefore, that in order to achieve excellence in such care, there should be a team of interdisciplinary and interprofessional scope, whose level of dedication will be quantified according to the concrete needs of care[28]. When professionals from different areas work together but do not bring knowledge of their specialized work to the team, however, it represents a lack of teamwork[28].

Some interviewees addressed the need to cross theoretical concepts, seeking to improve student learning through different health professionals:

> "It is important to have theoretical content about the role of professionals, but students should not only spend time with the medical team, but also experience the practices of other professionals, even if only briefly." (I6).

Historically, students learn about palliative care through course readings and content, but this content is best taught through practical experience[29]. While it is not easy to incorporate clinical exposure and face-to-face learning with other professions into crowded curricula, recently published research confirms the benefits of such inclusion[29].

However, research highlights the difficulties of implementing these proposals in a country with a marked uni-professional division of labor in health services and a strong culture of hierarchy among different professions. Thus, there are few opportunities to work collaboratively, and to develop high-quality, patient-centered palliative care[26,30].

The conceptual ignorance of palliative care among a number of professionals was cited as the most important obstacle to be overcome to improve the teaching of such care, as verified in the statements below, which were grouped in the category *Challenges for the implementation of the proposal*:

> "First of all there is a lack of knowledge, few professionals with the ability to manage, to take responsibility. There might be interest, but few who take the initiative." (I2).

> "The vast majority of lecturers, professors and directors don't think it is not important. If it is inside a hospital, the director thinks what they say in the universities isn't important. It's not that there's no knowledge base, it's that no one knows what it even is. There is a lack of general knowledge of the subject. Even before there is resistance to the idea, there is a lack of knowledge of what it is." (I3).

Studies in other countries show that the lack of knowledge about palliative care among health professionals was perceived as an additional barrier to the development of the area and a determining factor for the failure to recognize palliative care as a field of medicine specialization[31]. Moreover, there is a need and the desire to minimize the value of palliative care within the healthcare model geared more towards the curing of disease than care for the patient, which also contributes to the failings of this area[31].

The lack of training and specialization of the teaching staff also emerged as an obstacle:

> "There is a lack of professors who specialize in palliative care. That's a fact. You need a teacher who specializes in palliative care but who has medical skills, or in other words someone who has a "bedside manner" but at the same time knows how to teach. Because it's no use just teaching without a bedside manner or having a bedside manner and not knowing how to teach. So this combination is a very important part of the development of the topic." (I6).

> "Yes, because how can someone (a professional without training in palliative care) show that it's important, if they don't have this training." (I7).

This barrier to the development of palliative care has also been reported in other countries where there a lack of coordination and integration of services and a shortage of qualified professionals in palliative care was identified, with the latter resulting from a lack of educational and training programs[30]. An alternative, in the short and medium term, is the definitive implementation of palliative medicine in the curricula of medical schools[22].

The category *Challenges for the implementation of the proposal* also included questions of bureaucracy and even the educational scope of more conservative schools. The majority of respondents gave objective answers such as: *yes* or *totally* without further details, with their responses accompanied by facial expressions of stress and attempts to change the subject, which could suggest some fear in relation to the subject. Some mentioned the possibility of circumventing the issue:

> "Bureaucracy exists, but we can deal with it if we have the will." (I6).

In a recent study, the students themselves recognized the deficiency of medical teaching in a discipline that deals with issues related to the process of death so that they do not have to learn alone or in an unsuitable manner in the future when dealing with this kind of patient[32]. There is therefore a need to create space to increase awareness and discussion of the topic of death in the training of health professionals, considering that they must deal with the issue in their daily activities[32].

The following statements addressed the lack of space in the curricula to deal with the topic of palliative care:

> "I think we need more time for them to learn about the subject. Sometimes it's not just palliative care, there are clinical topics that they only have a month to learn about. Often it's not enough." (I4).

> "The curriculum is really full, but I think medical course administrators use this more as an excuse than a real reason. It is full, but there is a lot of repeated content, a lot of content that could be rearranged. What is really lacking is the understanding of how this could help the student from the beginning to the end of the course." (I6).

In terms of resistance among the management and educators of more traditional medical schools regarding the creating of space for areas such as palliative care, an important resolution would be the constant participation of such individuals in discussion forums on the reorientation of medical training in Brazil, such as the Brazilian Congress of Medical Education (COBEM) and the regional events of the Brazilian Association of Medical Education (ABEM), especially as ABEM has already emphasized the need for students to be properly trained in palliative care[33].

Consistent with the aim of this study, a recent publication involving several researchers and professionals with experience in palliative care in Latin America, outlined some recommendations for the teaching of the discipline in primary care. According to this publication, at the end of their courses, students should be able to: acquire basic communication skills, apply principles of bioethics related to palliative care, understand basic definitions and principles in palliative care, possess basic

knowledge of palliative care, assess patients and recognize the importance of teamwork[34].

As the demand for the treatment of chronic diseases among the population is likely to increase, there is a need for comprehensive care to maintain the health of the population, as well as investment in the training of health professionals. In Brazil, a number of initiatives have considered the possibility of building a network of end-of-life care within the Unified Health System, such as the implementation of Advanced Oncology Centers, through palliative care teams which also include family support[35]. However, for now there are few palliative care services linked to specialized hospitals. It has already been found in a number of countries that Primary Health Care is the best level of care for the provision and coordination of palliative care for users[35]. It is therefore necessary to focus the training of professionals on the demands that will they will face when performing activities in Primary Health Care, and to configure competencies based on the challenges they will face in the future.

In summary, Chart 2 shows the final suggested competencies in palliative care to be acquired by students during undergraduate medical courses, divided into modules. The italicized items correspond to the changes and additions made by the experts in the area following the interviews conducted by the researcher.

Chart 2. Final suggestion of competencies in palliative care for undergraduate courses in Medicine. Natal, Rio Grande do Norte, 2017.

Competencies in palliative care to be acquired by students in undergraduate courses in Medicine.
Module I - Basic principles of palliative care - Students should be able to: • Understand and *apply* the definitions, principles and indications of palliative care. • To know the geographical distribution of palliative care services in Brazil. • Perform patient care in palliative care and develop a care plan. • *Understand, apply and judge the communication of bad news in palliative care*. • Understand and *help to operationalize* the operation of palliative care services.
Module II - Managing symptoms - Students should be able to: • Evaluate pain, *minimally use* pharmacological treatment and indicate the proper non-pharmacological treatment. • Evaluate dyspnea, coughing, nausea, vomiting, constipation, diarrhea, depression, *insomnia and propose appropriate treatment*. • *Evaluate delirium, anxiety, fatigue, oral health and provide for a more overall treatment*. • *Understand and technically apply hypodermoclysis*. • *Understand and apply continuation or not of nutrition in palliative care*. • Understand and provide care in controlling the symptoms of major emergencies in palliative care. • *Infer the applicability of palliative care in different specialties (Geriatrics, Pediatrics, Oncology, Family and Community Medicine, Pulmonology, Cardiology, Gastroenterology, Rheumatology, Nephrology, Anesthesiology, Neurology, Hematology and other medical specialties) and refer cases appropriately*.
Module III - Teamwork - The student should be able to: • *Judge and conceive in the future* the dynamics of interprofessional relations *in their day to day work*. • *Understand and participate in teamwork, emphasizing their role in total suffering*.
Module IV - Ethical and legal issues - Students should be able to: • Estimate the importance of Brazilian legislation in the historical process of consolidation of palliative care. • Differentiate concepts in bioethics, contrasting the various practical situations that exist. • Employ the anticipated will directives in the reality of the patient.
Module V - Care in the last moments of life - The student should be able to: • *Guide the patient's last 48 hours of life and provide care in the last moments of life*. • Understand the definition of palliative sedation and palliative extubation, as well as when to use them. • *Detect and develop knowledge about patient, family and team anticipatory grief*. • Evaluate the perspective of terminality in different religions, developed through clinical practice.

The main limitations of this study are the need to involve professionals with more experience in curriculum design and the difficulty interviewees experienced in distancing themselves from their role as specialists and focusing on the needs of undergraduate palliative care training.

CONCLUSION

We believe that the competencies suggested here are appropriate for the reality of each course, whether traditional, based on active methodologies, as a single curricular component, or inserted in several components of the course.

In order to teach and implement skills in palliative care in undergraduate education, however, it is vital that educators, public authorities, managers and medical students perceive this topic as essential, since the aging of the population and the increase of the prevalence of chronic diseases will increase the demand for such care in society.

The improvement of the essential competencies in palliative care suggested in this study should be discussed at forums of medical education and health professions to achieve more clarity about what is really necessary for the training of general practitioners.

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Received: January 13, 2018
Reviewed: March 20, 2018
Accepted: April 14, 2018

http://dx.doi.org/10.1590/1981-22562018021.170035

Validation, reliability and operational equivalency of the nutritional screening method "Determine The Nutritional Health Of The Elderly"

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Abstract

Objective: To analyze the reliability, validity and operational equivalence of the nutritional screening method "Assessing The Nutritional Condition Of The Elderly". *Method:* This study was conducted with a subsample of 174 elderly persons from the Health, Welfare and Aging (SABE) study. The "Assessing The Nutritional Condition Of The Elderly" method consists of ten questions which classify individuals according to nutritional risk. Anthropometric and nutritional indicators were adopted as gold standard measures for comparison with the values of the method. Reliability was verified using the McNemar and Bland Altman tests, the validity of the discriminant type was assessed by the Mann-Whitney test and operational equivalence was identified through data relating to the time required to apply the method and the degree of understanding of the same using the Likert scale (1 to 5). *Results:* Of the 174 elderly persons interviewed, 63.8% were women and 52.3% were in the 60-74 years age group. It was found that 43.1% and 33.3% of the subjects had moderate to high nutritional risk, respectively, with a higher prevalence of high nutritional risk among women (33.3%) and those aged 60-74 years (43.4%). The method analyzed showed satisfactory results for reliability and discriminant validity. The average time required to apply this method was approximately seven minutes and the overall mean grade of understanding was 4.8. *Conclusion:* The method studied can be used by health professionals in epidemiological and clinical studies to identify the presence of nutritional risk in elderly persons living at home.

Keywords: Elderly
Nutrition. Triage.
Reproducibility of Results.
Nutritional Assessment.

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Research funding: São Paulo Research Foundation (FAPESP). Research Project no 12/24567-7.

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INTRODUCTION

The association between nutritional risk, especially malnutrition, and outcomes of disease and complications has been identified at all ages[1-3]. In the elderly, this nutritional disorder represents a significant public health problem in both developed and developing countries, including Brazil, due to an increased demand for health services, longer hospital stays, hospital readmission, institutionalization and lower survival rates. Undernutrition is significant among this population group as it has a higher incidence and/or prevalence[4,5].

The identification of elderly people at nutritional risk, especially those living at home, is an important research topic, as it aims to guide the population and prevent future health problems due to malnutrition at an early stage[6,7]. In non-Brazilian studies, nutritional screening methods are recognized as viable alternatives for the identification of nutritional risk in this group, due to their low cost and ease of application, and the fact they can be used by health professionals[7,8].

Different methods for the screening of elderly people at nutritional risk have been described in scientific literature[9-11]. All offer advantages, disadvantages and limitations, and some have obtained satisfactory results regarding their psychometric properties (validity and reliability), operational characteristics and acceptability[7,8]. According to Almeida-Roediger et al.[12], the nutritional screening method "Determine The Nutritional Health Of The Elderly" has been adapted for the Brazilian cultural reality and is available for the verification of psychometric properties.

This method is based on questions that can be answered by the elderly or an accompanying person, does not require specific equipment or training for body measurements, is accessible and accepted by the health professionals and the elderly persons who evaluated the method, and represents a practical, inexpensive and achievable option at the population level[12]. Thus, the present study validated and assessed the reliability of the nutritional screening method "Determine The Nutritional Health Of The Elderly", for use among the Brazilian elderly population.

METHOD

A validation and reproducibility study was performed with elderly persons (≥60 years) of both genders, who were participants in the Health, Welfare and Aging Study (SABE), a longitudinal, epidemiological and home base study which was carried out in the city of São Paulo in 2000, 2006 and 2010 aimed at identifying and monitoring the living conditions of the elderly population as age increases.

The sample size was calculated based on the formula proposed by Machin et al.[13], using a significance level of 5%, with 90% power and a Pearson's correlation coefficient value of 0.3, and a sample size of 80 individuals to be interviewed was identified.

The number of elderly persons (approximately 160 individuals) was doubled, however, to stratify the results of validation and reliability by gender and age group. A simple random sub-sample of 350 participants from the SABE Study was drawn to compensate for the reduction of numbers due to changes of address, death, institutionalization and refusal. Of the total of 350 elderly people, 280 were located by telephone, and of these only 240 agreed to be visited at home to conduct the interview. Of these, only 176 were located and interviewed, and two did not provide all the necessary data for the survey, giving a total of 174 individuals studied.

Two interviewers (both female, as women are more accepted by the elderly) performed data collection. Both were nutritionists, who underwent prior training, based on a general approach to the objectives of the study and guidelines on applying and completing the consent form, field questionnaire, method of nutritional screening and body measurements.

The nutritional screening method "Determine The Nutritional Health Of The Elderly" is composed of ten questions (with a yes and no dichotomous answer), as described by Almeida-Roediger[12], with specific scores are assigned for each question. The sum of these corresponds to the final score which classifies individuals according to the presence or absence of nutritional risk. The questions in this

method evaluate different areas that may affect nutritional status, including the use of medications and/or alcoholic beverages, the presence of chronic illness, inadequate food intake, oral conditions and physical limitations.

Elderly persons who obtained a final score of 0 to 2 points were classified as "good", with the recommendation of a new evaluation in six months. Those with three to five points were classified as having "moderate nutritional risk", with the elderly person being advised to improve their eating habits and lifestyle. Those who scored six or higher were classified as having "high nutritional risk," with the individual advised to seek specialized assistance from a nutritionist or physician[12].

The evaluation of the reliability and validity of the "Determine The Nutritional Health Of The Elderly" method occurred over two periods: between April and July 2014 (100 individuals interviewed) and between January and March 2015 (74 individuals interviewed). The method was performed twice with the study population to evaluate reliability, at different time periods, with intervals of around 15 to 30 days, to compare the values obtained in the first (test) and second interviews (retest).

Nutritional assessment by anthropometry and nutritional indicators was adopted as a gold-standard measure (criterion or objective) to evaluate the validity of the nutritional screening method. The anthropometric variables used were arm circumference (AC), calf circumference (CC) and triceps skinfold thickness (TSF). A 1.5 m inelastic tape was used to perform the anthropometric measurements of AC and CC, and the Lange pachymeter with a constant pressure of 10 g/mm^2 was used to obtain the TSF measurement.

The nutritional indicators used were body mass index (BMI), arm muscle area (AMA) and arm muscle circumference (AMC). Body mass (BM) and height (H) were used to calculate BMI (BM/H^2). Body mass was measured by means of a WISO brand portable scale with a 180kg capacity and sensitivity of 100g; and height was measured with a Sanny brand portable stadiometer with a maximum extension of 210cm. To obtain AMA and AMC, AC and TSF were used, according to equations proposed in the literature[14,15].

All measurements were performed in triplicate, except for BM and H, which were obtained in duplicate, and the mean values were used for the analyzes, based on techniques proposed in the literature to carry out such measurements[16].

The variables AC, TSF, AMA and AMC were categorized according to percentile values, with elderly persons between the 25th and 75th percentile considered adequate and those with a percentile <25 to >75 considered "inadequate". For the CC variable, individuals with a CC ≥31cm were considered adequate and those with CC <31cm were considered inadequate. For BMI, the elderly with BMI ≥24 and <27kg/m^2 were classified as adequate those with BMI <24 and> 27kg/m^2 were considered inadequate [5].

The study population was described using absolute and relative frequencies of socio-demographic variables (gender, age groups, marital status, accompanied or unaccompanied, schooling and income in minimum wages), lifestyle (alcohol intake, physical activity) and clinical data (diabetes mellitus, hypertension, cardiovascular and respiratory diseases and cancer), with the data obtained by the field questionnaire developed for this study.

Continuous variables such as the screening method score, BMI, AMA, AMC, AC, CC, TSF, and test and retest time were described in mean values, with respective standard deviations and minimum and maximum values, according to gender.

In order to perform the reliability and validity analysis, non-parametric statistical tests were used, based on the assumption that the nutrient screening, anthropometric variables and nutritional indicators did not adhere to the normality standard assessed by the Shapiro-Wilk test.

The non-parametric McNemar test and the Bland & Altman graphs were performed for reliability. For the method to be reliable, with similar results in the two interviews, the McNemar test *p* value between the nutritional risk diagnosis classification proposed by the method (good vs. moderate and high nutritional risk) must not be significant (>0.05); and the Bland-Altman graphs must show a random distribution of residuals from the final score of the method in the test and retest stages[17,18].

The discriminant type of method validation was employed, which used the Mann-Whitney non-parametric test to compare the means of the nutritional screening method (from the first interview), with the anthropometric variables and nutritional indicators (categorized as gender and age group (60 to 74 years and 75 years and over)). In order for the method to exactly discriminate those with or without nutritional risk, the Mann-Whitney test must be significant ($p<0.05$).

The analysis of the operational equivalence of the method was performed based on the duration of the interview and the degree of understanding of the method using the Likert scale, which uses values between 0 *I didn't understand it at all* and 5 *I understood perfectly*, and *I had no questions*, as suggested by Reichenheim and Moraes[19,20]. It was established that responses from 0 to 3 on the Likert scale would be indicative of insufficient understanding[21].

The data obtained were entered in duplicate by two interviewers, and for the calculations the statistical programs available in scientific literature were used.

The study was approved by the Ethics Research Committee of the University of Public Health (FSP), of the Universidade de São Paulo (USP), Protocol nº 48305/2012, in 22 June 2012. Once the elderly, relatives or caregivers had agreed to participate and their questions in relation to the present study were clarified they signed a Free and Informed Consent Form.

RESULTS

Of the 174 elderly people interviewed, 63.8% were women and 52.3% were in the 60-74 age group, with a mean age of 74.3 (+9.6) (minimum = 60 and maximum = 96 years). More than 50.0% of the individuals were married, accompanied, had between 1 and 7 years of study and an income of up to two minimum wages. A total of 86.8% of the elderly said they did not drink alcohol, 64.4% did not smoke and 74.7% did not practice any type of physical activity. Among the diseases evaluated, systemic arterial hypertension was most frequently (68.4%) reported by the elderly (Table 1).

Table 1. Description of study population according to socio-demographic, lifestyle and medical variables, SABE Study. São Paulo, 2014/2015.

Variables	n (%)
Sociodemographic	
Gender	
Men	63 (36.2)
Women	111 (63.8)
Age group	
60-74 years	91 (52.3)
≥75 years	83 (47.7)
Marital status	
Married	90 (51.7)
Unmarried	22 (12.7)
Widowed	62 (35.6)
Accompanied/unaccompanied	
Accompanied	156 (89.7)
Unaccompanied	18 (10.3)
Schooling	
Illiterate (years)	21 (12.0)
1-7	116 (66.7)
≥8	37 (21.3)

to be continued

Continuation of Table 1

Variables	n (%)
Salary (in minimum salaries)	
Up to 2	116 (66.7)
>2-4	40 (23.0)
>4	18 (10.3)
Lifestyle	
Alcohol intake	
No	151 (86.8)
Yes	23 (13.2)
Smokes	
No	159 (91.4)
Yes	15 (8.6)
Physical activity	
No	130 (74.7)
Yes	44 (25.3)
Medical	
Diabetes *mellitus*	
No	127 (73.0)
Yes	47 (27.0)
Arterial hypertension	
No	55 (31.6)
Yes	119 (68.4)
Cardiovascular disease	
No	132 (75.9)
Yes	42 (24.1)
Respiratory disease	
No	154 (88.5)
Yes	20 (11.5)
Cancer	
No	166 (95.4)
Yes	8 (4.6)
Total	174

The nutritional screening score was greater in stage 2 than in stage 1 for both the total sample (4.5 x 4.9) and both genders (4.1 x 5.1 for males and 4.7 x 4.8 for women). For women, the highest anthropometric variable values were found for CC and TSF (35.4 and 20.1, respectively), and the highest nutritional variable values were for the indicators of BMI and AMA (27.9 and 38.3, respectively) (Table 2).

Table 2. Mean values of nutritional screening score at stages 1 and 2, objective measures used and time spent applying test and retest of the questionnaire, according to gender and total, SABE Study. São Paulo, 2014/2015.

Variables	Men	Women	Total
	Mean (minimum-maximum)		
Screening score 1	4.1 (0-10)	4.7 (0-14)	4.5 (0-14)
Screening score 2	5.1 (1-14)	4.8 (0-14)	4.9 (0-14)
Body mass index	27.1 (18-45)	27.9 (14-50)	27.6 (14-51)
Arm muscle area	36.5 (13-75)	38.3 (19-65)	37.2 (13-75)
Arm muscle circumference	48.3 (29-75)	43.0 (20-81)	44.9 (20-82)
Arm Circumference	29.9 (22-39)	29.4 (19-41)	29.6 (19-41)
Calf circumference	34.9 (24-46)	35.4 (26-46)	35.1 (24-46)
Triceps skinfold thickness	17.1 (6-39)	20.1 (6-39)	19.1 (6-40)
Time test 1	6.9 (2-20)	6.6 (3-19)	6.8 (2-20)
Time retest 2	5.3 (2-19)	5.1 (2-21)	5.2 (2-21)

When the reliability of the method was analyzed by the McNemar test, it was found that there was no significant difference between the assessment of nutritional risk (good and moderate to high nutritional risk) of the method between test and retest ($p = 0.0764$) (data not shown). The Bland-Altman graphs were used for total, gender and age groups, and showed random distribution of residuals (Figure 1).

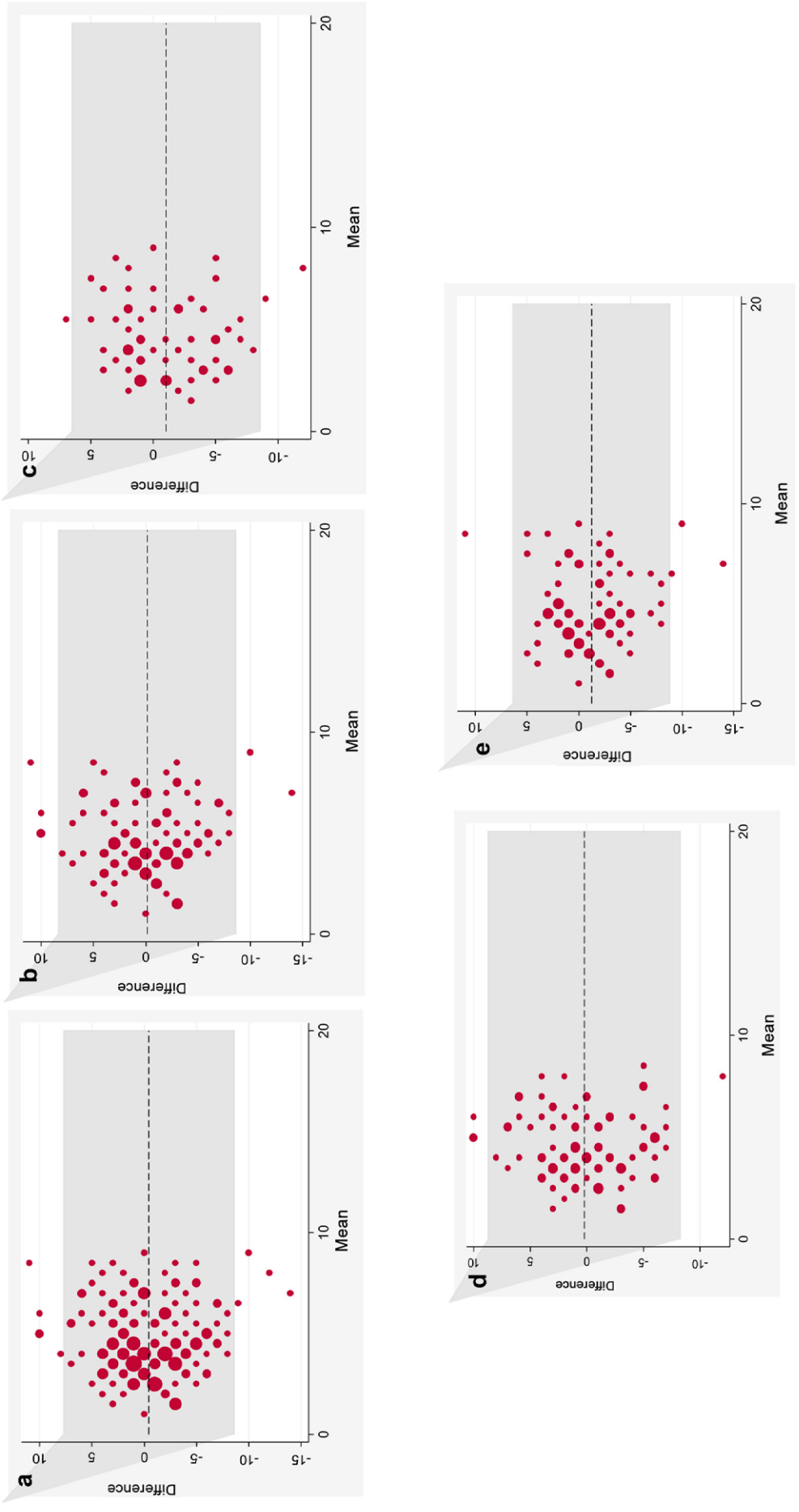

Figure 1. Bland Altman method of concordance evaluation of nutritional screening score at stage 1 and 2, total (a), gender (b-men and c-woman) and age groups (d- 60 to 74 years, e- 75 years and over), SABE Study. São Paulo, 2014/2015.

The operational equivalence of the method showed that the mean total time for performing the method was approximately seven minutes, and that application was quicker during the retest (about five minutes) and for women in both situations. The 75 years and over age group took a longer time (approximately 10 minutes) to answer the questionnaire, both in the test and in the retest, with $p<0.05$ (data not presented).

The mean overall agreement of the method by the Likert scale (between 0 and 5) was 4.8 (+0.52) (minimum = 3 and maximum = 5), and the age group of 75 years and over had the lowest reported value [mean 4.6 (+0.64); minimum =3 and maximum=5]. Question 6 *Do you sometimes not have enough money to buy food?* and Question 10 *Are you sometimes physically unable to shop, cook or eat alone*? had the lowest understanding scores (data not shown).

In the discriminant validity results, a significant difference was observed for BMI, AMC, CC and AC in the Mann-Whitney analysis in comparison with the nutritional screening score of the method. The mean scores of those classified as adequate were lower than those of individuals identified as inadequate. These differences remained significant when stratification by gender and age group was analyzed. These results show that the method studied is capable of correctly discriminating nutritional risk (Table 3).

Table 3. Discriminant validation of the method "Determine The Nutritional Health Of The Elderly" according to measures adopted by total, gender and age group, SABE Study, São Paulo, 2014/2015.

Variables / Criteria measured	Nutritional screening score	Mann-Whitney *p* value				
	Mean (sd)	Total	Men	Women	60-74 years	≥75 years
Body mass index Adequate Inadequate	 3.8 (0.32) 4.9 (0.25)	0.0191*	0.1277	0.1277	0.0102*	0.4651
Arm muscle area Adequate Inadequate	 4.2 (0.29) 4.8 (0.29)	0.0813	0.4948	0.0553*	0.0657	0.3716
Arm muscle circumference Adequate Inadequate	 4.1 (0.29) 4.8 (0.28)	0.0379*	0.0478*	0.2207	0.1849	0.0475*
Arm circumference Adequate Inadequate	 4.0 (0.29) 4.9 (0.28)	0.0174*	0.3025	0.0438*	0.0639	0.1288
Calf circumference Adequate Inadequate	 4.3 (0.22) 5.8 (0.48)	0.0005*	0.0261*	0.0825	0.0400*	0.0191*
Triceps skinfold thickness Adequate Inadequate	 4.1 (0.27) 4.9 (0.30)	0.0257*	0.1062	0.0908	0.0249*	0.3398

*Non-parametric Mann-Whitney test, with 5% level of significance; sd=standard-deviation.

DISCUSSION

This is the first Brazilian study to describe the psychometric properties of the method "Determine The Nutritional Health Of The Elderly" through an analysis of reliability, discriminant validity and operational equivalence, for use by health professionals, especially nutritionists, with elderly persons residing in the home.

The results of the present study showed that the method analyzed presented higher values for reliability than the original (Determine Your Nutrition Health® - DNH) even when using another statistical test to

confirm this psychometric property. According to Wojszel[22], the internal consistency analysis of the DNH method was used to determine its reliability through the Cronbach's Alpha coefficient, obtaining a value of 0.44, which was considered by the author as insufficient. Based on these considerations, the quality of the process of cross-cultural adaptation of the method analyzed, performed by Almeida-Roediger et al., can be confirmed[12].

No study was found in scientific literature using the "adequate" statistical test for validation analysis of the DNH method. The localized studies[23,24] used "sensitivity and specificity" analyzes as an alternative validation method, with these analyzes performed after the validation process to obtain reference values. Nevertheless, the discriminant validation results of the method analyzed in this study showed that it could correctly discriminate those with nutritional risk, attesting to the ability of the method to confirm the characteristic it proposed to measure, in this case the presence or absence of nutritional risk.

The operational equivalence of a method is an indispensable item for analyzing how easy it is to understand and thus provide results in relation to its acceptability by the population studied[7,8,25,26]. In the present study the method analyzed exhibited sufficient results (average of 4.8 by the Likert scale) in relation to understanding, with answers between 0 and 3 considered indicators of insufficient understanding. It can be inferred that the method was accepted by the elderly persons interviewed, as was verified in other studies using the original DNH[7] method[8,23,24].

Based on the results obtained, it is found that approximately 75.0% of the elderly interviewed were at nutritional risk, and that women had a higher prevalence of high nutritional risk than men. A cross-sectional and multicentric study in Spain involving 1,320 elderly people over 65 years old and another in Turkey with the same age group, also identified a higher prevalence of high nutritional risk in women (46.2% and 36.9%, respectively) than men (43.2% and 34.3%, respectively)[27,28].

Based on the considerations presented, it can be affirmed that the nutritional screening method "Determine The Nutritional Health Of The Elderly" is not a method of clinically diagnosing malnutrition in the elderly, nor is it intended to replace comprehensive assessments of nutritional status as recommended in other nutritional screening methods[23,29]. Nevertheless, it can predict the general state of health and nutrition, identifying those who may or may not be at moderate to high nutritional risk[22,23]. This method was originally conceived as an educational alternative designed to alert elderly persons or those responsible for them to the health problems related to the presence of nutritional risk[29]. In clinical practice it can be used as a preliminary method to track or identify individuals at nutritional risk and to subsequently direct them to a more complete and detailed nutritional assessment[22-24,29].

Some limitations of the present study were identified. The method analyzed is based on questions that assess the most common risk conditions for the development of nutritional disorders such as malnutrition and/or obesity, and many "risk group" individuals are therefore identified. However, it is emphasized that only through an accurate evaluation of nutritional status can real cases of such disorders be identified[8].

Another limitation refers to the cognitive limitations of the elderly and memory bias, which may interfere in the answering of the questions of the method studied, but which can be minimized with the presence of another responsible person such as a son or daughter or caregiver to help with clarifications where necessary. The lack of gold standard methods for assessing nutritional risk in individuals also represents a limitation, favoring the use of methods that are less "precise" for the analysis of this issue, as well as studies for the validation and reliability of the original DNH method using standardized or even "adequate" statistical tests for the analysis of such psychometric properties, thus recommending further evaluation of this method in other cultures or countries.

Despite these limitations, the original DNH method has been used in several studies worldwide[22-24,30,31] and in Brazil[32-34] to evaluate the nutritional risk of the elderly. Due to its simplicity, which is a great advantage, and the fact that it does not rely on anthropometric indicators or laboratory data (difficult to evaluate in epidemiological studies and especially among elderly persons residing in the community seeking basic health care) and allows the evaluation of the impact of individual and population

risk factors on health and nutrition, the validation of the nutritional screening method, "Determine The Nutritional Health Of The Elderly" addresses the lack of methods of this nature validated for use among the Brazilian elderly population, aimed at the early identification of nutritional disorders and subsequent nutritional intervention.

CONCLUSION

The nutritional screening method, "Determine The Nutritional Health Of The Elderly" presented satisfactory results for reliability, discriminant validity and operational equivalence, and can be used in epidemiological and clinical studies to identify the presence of nutritional risk in domiciled elderly persons. It is recommended that Brazilian health professionals, especially those working in Geriatrics and Gerontology, consider applying this method in the first appointments of individuals in various care settings, such as in the community, clinics, hospitals, outpatient clinics and long-term care facilities for the elderly (LTCFs), with the purpose of identifying, at an early age, elderly persons at nutritional risk, to subsidize nutritional intervention strategies before the problem worsens. A method such as this, which raises awareness and promotes an increase in the knowledge of individuals regarding health, food and nutrition conditions, is essential and of great potential benefit in preventing nutritional disorders and associated complications.

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Received: June 28, 2017
Reviewed: December 14, 2017
Accepted: February 26, 2018

http://dx.doi.org/10.1590/1981-22562018021.170210

Factors determining the negative perception of the health of Brazilian elderly people

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Abstract

Objective: To identify factors that determine the negative perception of the health of the Brazilian elderly, considering sociodemographic conditions, functional limitations and illness, patterns of utilization of health services and oral health condition. *Method*: A cross-sectional study with data from the National Health Survey (2013), involving 23,815 elderly persons was carried out. Once the database was treated, dimensionality reduction was performed using the Waikato Environment for Knowledge Analysis. The variables related to health perception were evaluated through logistic regression to measure the magnitude of the associations. Health perception and 36 independent variables were considered as outcome variables. *Results*: The variables most strongly related to the negative perception of the health of the elderly were illiteracy (OR=1.48), low educational level, total difficulty in performing instrumental activities of daily living (OR=2.04), impossibility of performing any activity (OR=3.20), presence of a diagnosis of physical or mental illness (OR=2.44), negative self-perception of oral health (OR=1.92), an increased need for health services in recent weeks (OR=1.16), medical visits and hospitalization in the last 12 months (OR=1.40). *Conclusion*: The use of multidimensional methodologies can identify the influence of determinants of a negative perception of health among Brazilian elderly persons, and can support the formulation of public health policies aimed at the elderly population.

Keywords: Self Concept. Self-Assessment. Health of the Elderly. Perception.

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INTRODUCTION

A reversal in the global aging pyramid is currently underway, resulting in an increase in life expectancy and a reduction in birth rates, a process that is more intense in developing countries. The exponential increase in individuals aged 60 years or older, considered elderly, has resulted in a number of concerns and challenges for global health services[1-3]. It is projected that around 33.7% of the total population of Brazil will be considered elderly by 2060[4].

Reaching the age of 60 and over has become accessible to different social classes. At the same time, literature reveals that being elderly is associated with a loss of functional capacity in a natural, gradual and progressive manner, with this process intensified by the presence of diseases and other situations. The profile resulting from limitations and coerced partial or total dependence in the performance of basic or instrumental activities of daily living influences the individual's perception of their own health, and is comprised of a vast group of aspects important for quality of life, many of which remain unknown and which can precede profiles of functional weakness[3,5,6].

Health surveys that draw on cultural plurality and the different social realities at national and global levels represent a solid source of information. The Pesquisa Nacional de Saúde (PNS) (National Health Survey) was a household-based survey which aimed to describe the panorama of the health situation in terms of the care, access to and use of health resources of the entire Brazilian population. It also sought to identify other aspects such as lifestyle, perception of health, and the resources provided in the field of care[6-9].

The PNS allowed the identification of aspects that directly contribute to the perception of health of the elderly individual. Such information is essential and represents a basis for planning and projections in the field of health. The perception of health is based on the complete range of factors perceived by an individual regarding their true state of health, has multidimensional influence and expresses objective and subjective aspects[10-12]. A positive perception of one's health condition is essential among elderly persons so that they can live in a balanced manner and continue to interact with their families and society[6].

While much literature is available on the perceived health condition of the elderly, studies that consider small population groups in relation to a specific health situation or service predominate[6,10,13-16]. Surveys that evaluate wider influences on the negative perception of health of the elderly, through national-based surveys, were not found, despite the need to consider this data source due to its magnitude and scope and potential use as a benchmark for policy planning and health actions[6,7,10-12].

In this context, the aim of the present study was to identify the factors that determine the negative perception of the health of Brazilian elderly persons, considering socio-demographic conditions, functional limitations and illness, the pattern of health service use and oral health conditions.

METHOD

A cross-sectional, quantitative study was carried out with data from the population-based survey (PNS) proposed by the Ministry of Health and conducted in 2013 by the Brazilian Institute of Geography and Statistics (IBGE)[17].

The study was carried out at a household level and the sampling plan used was based on probabilistic sampling by clusters in three stages, with census tract sectors or groups used as the primary sampling units, households as the secondary units and the selected elderly inhabitants taken as the tertiary units[8,9,17].

The sample size was defined based on the level of precision required to estimate some of the indicators of interest. As a result, the information of 205,546 individuals residing in 60,900 households was acquired[8,9,17]. Details on the sampling and weighting process are available in the PNS report[17].

The data were collected by previously calibrated researchers. The information was obtained through individual interviews and stored on handheld computers. Individuals aged older than 18 years participated in the research. The interview was based on three forms: the household form, referring to

the characteristics of the household; a form relating to all the residents of the home; and an individual form, answered by a resident of the household aged 18 years or older selected by random draw[8,9,17]. The present study considered only the data of individuals aged over 60 years, taken from the last two forms (N= 23,815).

The national survey was approved by the National Commission of Ethics in Research for Humans of the Ministry of Health, under approval Nº 328.159, dated June 26, 2013.

The outcome variable *Perception of health* was the result of the question: *In general, how is your overall state of health*? The answers were: *very good, good, regular, poor* and *very poor*. For the purpose of analysis, the responses were grouped into positive (response patterns: *very good* and *good*) and negative (response patterns: *regular, poor* and *very poor*) categories[10,14]. This question was answered by a single resident for all the members of the household and, therefore, was not answered specifically by the elderly.

In the pre-exploration phase of the data, 36 variables of interest were included to compose the independent variables related to: sociodemographic characteristics; functional limitations and illness; use of health services, hospitalizations and medical emergencies; and oral health status (Chart 1). All the variables were treated. The numerical variables were categorized, some variables were recategorized, and others were dichotomized in accordance with literature[18].

For the purposes of this study, the variable *Total Difficulty in Performing Basic Activities of Daily Living* (BADL) was developed through a combination of the variables: difficulty eating alone with a dish placed in front of the individual; difficulty in bathing alone; difficulty going to the bathroom alone; difficulty in dressing alone; difficulty walking from one room to another in the house; difficulty in lying down or getting out of bed alone; difficulty sitting or standing up alone. *Total Difficulty in Performing Instrumental Activities of Daily Living* (IADL) came from the questions: difficulty shopping alone; difficulty managing finances alone; difficulty taking medicines alone; difficulty going to the doctor alone; difficulty going out in the car alone, and difficulty managing finances alone (taking care of one's own money). The variables were dichotomized in terms of difficulty, covering the response patterns: *cannot, great difficulty, little difficulty* and *without difficulty*, based on the response pattern *no difficulty*. Functional difficulty for BADL and IADL were defined in the same way: difficulty, regardless of the degree, for all the activities of daily living investigated, based on similar studies in literature[5,12,18].

Following the complete treatment of the database, the dimensionality reduction test was performed. For this, the Selecting Attributes method was applied based on the filter approach using a Data Mining environment, namely the Waikato Environment for Knowledge Analysis (WEKA). This approach used the Correlation-based Feature Selection (CFS)[19] algorithm in tandem with the 10-fold cross validation. This test analyzes all the variables included in the analysis at the same time and identifies which are the independent variables, with a heightened relationship with the dependent variable and a low relationship between each other, eliminating any confounding relationships. The final model considered only the variables with great potential for explaining the outcome variable, which allowed the validation of the pure and strict relationships between the independent variables and the outcome variable, with much more precision than other tests frequently used in literature. In addition, the models generated in this way provide greater explanatory capacity and hit rate, as well as the extraction of potentially useful and previously unknown knowledge in a large database[19], as was the case in the present analysis.

The variables related to perception of health were then evaluated through logistic regression to measure the magnitude of the associations. The model had an explanatory capacity of 68.76%. All analyzes were performed in the WEKA environment[19].

Chart 1. Description of independent variables used in the study. PNS, Brazil, 2013.

Sociodemographic characteristics	
Gender	Literacy
Age	Level of schooling
Skin color/ethnicity	Income
Lives with partner	Region of residence
Marital status	
Functional limitations and illness	
Presence of any chronic, physical or mental illness	Was bedridden
The presence of chronic illness, physical or mental, which somehow limits usual activities	Number of days bedridden
Stopped performing any of usual health activities	Total difficulty in performing Basic Activities of Daily Living
Number of days stopped doing usual activities for health reasons	Total difficulty in performing Instrumental Activities of Daily Living
Use of health services	
Location where usually seeks care when sick	Reason for seeking health care
Time since last medical appointment	Location where last sought health care
Number of visits in last year	Had drugs prescribed at last visit
Seek a place, service or health professional for care related to own health in the last two weeks	Used some integrative or complementary practice or treatment such as acupuncture, homeopathy, medicinal plants or phytotherapy
Hospitals and medical emergencies	
Hospitalizations in the last year	Length of hospital stay
Number of hospitalizations in the last year	Emergency care at home
Reason for hospitalization	
Oral health condition	
Perception of oral health	Upper dental loss
Difficulty eating	Number of natural teeth present
Lower dental loss	Use of dentures

RESULTS

Attribute selection analysis revealed that the variables most strongly related to health perception among Brazilian elderly persons were: literacy (100%); level of schooling (100%); impossibility of performing any usual activities due to health reasons (100%); diagnosis of any chronic, physical or mental illness (100%); seeking a place, service or health professional for care related to one's own health in the last two weeks (100%); number of visits to the doctor in the previous 12 months (100%); hospitalization in the previous 12 months (100%); difficulty in performing IADL (100%) and perception of oral health (80%). According to the methodological proposal, only these variables were considered for the present analysis.

The descriptive analysis of variables strongly associated with the health perception of the elderly can be seen in Table 1 and the odds ratios for reporting negative health perceptions in Table 2. This negative evaluation was present in 56% of the elderly persons who comprised the study sample.

The majority of the elderly persons (76%) were literate, with a low level of schooling. It was found that the lower the educational level, the greater the chances of having a negative perception of health. A total of 89% of the elderly reported that none of their usual activities were made impossible due to health reasons, while 93% said they did not have total difficulty in performing IADL. When these limitations were present, however, the chances of individuals reporting a negative perception of

health were 3.20 and 2.04 times greater. Regarding morbidities, 62% had had either a physical or mental chronic disease diagnosed, and this condition was responsible for increasing the chances of the individual having a negative perception of health 2.44-fold. In elderly persons with a negative perception of oral health (19%), the odds ratio for assessing overall health negatively was 1.92 times greater than those who considered their oral health to be positive.

Regarding the use of health services, 76% of respondents had required treatment at a health service in the two-week period prior to the collection of PNS data. The majority of the elderly persons had had up to three medical appointments in the previous year (42%) and 90% of the participants were hospitalized in the same period (Table 1). The higher frequencies of these events were associated with a greater chance of an elderly patient having a negative perception of health (Table 2).

Table 1. Descriptive analysis of the independent variables related to the health perception of the Brazilian elderly. PNS, Brazil, 2013.

Dependent variable	Total	Positive perception	Negative perception
Overall perception of health	N (%)	N (%)	N (%)
	23.815 (100)	10.461 (44)	13.354 (56)
Independent variables and classes	Total	Positive perception	Negative perception
	N (%)	N (%)	N (%)
Literate			
Yes	17.985 (76)	8.676 (52)	9.309 (48)
No	5.830 (24)	1.785 (31)	4.045 (69)
Level of schooling			
University or higher	2.343 (10)	1.680 (72)	663 (28)
High School	3.253 (14)	1.917 (59)	1.336 (41)
Elementary school	2.247 (9)	955 (43)	1.292 (57)
Literate	10.142 (43)	3.908 (39)	6.234 (61)
Did not answer	5.830 (24)	---	---
Performance of any usual activities made impossible due to health reasons			
No	21.141 (89)	10.070 (48)	11.071 (52)
Yes	2.674 (11)	391 (15)	2.283 (85)
Total Difficulty in Performing Instrumental Activities of Daily Living			
No	22.265 (93)	10.194 (46)	12.071 (54)
Yes	1.550 (7)	266 (17)	1.282 (83)
Diagnosis of any chronic, physical or mental illness			
No	8.988 (38)	2.551 (28)	6.437 (72)
Yes	14.827 (62)	7.910 (53)	6.917 (47)
Oral Health Assessment			
Positive	6.734 (28)	3.613 (46)	3.121 (54)
Negative	4.443 (19)	1.319 (30)	3.124 (70)
Did not respond	12.638 (53)	--	--
Sought a place, service or health professional for care related to own health in last two weeks			
No	5.605 (24)	1.774 (32)	3.831 (68)
Yes	18.210 (76)	8.687 (48)	9.523 (52)

to be continued

Continuation of Table 1

Dependent variable	Total	Positive perception	Negative perception
Number of doctor visits in the last 12 months			
Up to 3 times	10.079 (42	5.035 (50)	5.044 (50)
4 to 6 times	5.490 (23)	1.916 (35)	3.574 (65)
7 to 9 times	1.007 (4)	295 (29)	712 (71)
10 to 14 times	2.125 (9)	511 (24)	1.614 (76)
15 to 19 times	270 (1)	59 (22)	211 (78)
From 20 to 29 times	348 (1)	60 (17)	288 (83)
30 or more times	184 (1)	26 914)	158 (86)
Did not respond	4.312 (18)	--	--
Hospitalization in previous 12 months			
No	21.438 (90)	9.864 (46)	11.574 (74)
Yes	2.377 (10)	597 (25)	1.780 (75)

Table 2. Odds ratio for negative perception of overall health according to independent variables. PNS, Brazil, 2013.

Variable	Odds Ratio (OR)
Literate	
Yes	1.00
No	1.48
Level of schooling	
University	1.00
High school	1.11
Elementary	1.42
Literate	1.77
Perform of any usual activities made impossible health reasons	
No	1.00
Yes	3.20
Total Difficulty in Performing Instrumental Activities of Daily Living	
No	1.00
Yes	2.04
Diagnosis of any chronic, physical or mental illness	
No	1.00
Yes	2.44
Oral Health Assessment	
Positive	1.00
Negative	1.92
Sought a place, service or health professional for care related to own health in last two weeks	
No	1.00
Yes	1.16

to be continued

Continuation of Table 2

Variable	Odds Ratio (OR)
Number of doctor visits in the last 12 months	
Up to 3 times	1.00
4 to 6 times	1.17
7 to 9 times	1.27
10 to 14 times	1.62
15 to 19 times	1.52
From 20 to 29 times	2.00
30 or more times	2.70
Hospitalization in previous 12 months	
No	1.00
Yes	1.40

DISCUSSION

The prevalence of the total number of elderly persons assessed by the PNS and who formed part of the present study with a negative perception of health was 56%. This finding diverged from smaller-scale Brazilian studies, which identified a prevalence of a negative perception of health of between 17.1%[6] and 35.0%[15] of elderly participants, respectively.

The data of the present study regarding a negative perception of health are similar to the results of studies involving institutionalized or co-resident elderly persons, which revealed that approximately 60% of such individuals were dissatisfied with their own health[6,12]. These findings are worrying as a negative perception of health can predict or be related to situations of functional decline, dependency, hospitalizations, and have a direct influence on the mortality rates of the elderly[6,10-12].

The data from the PNS 2013 study in relation to those aged 60 years or older were collected through interviews with the elderly person in question or another resident of the household, a strategy frequently used in Brazilian surveys[20]. Despite initial fears that such responses may not reflect the real situation of the individual, available scientific studies have shown that the selection of the respondent for data acquisition does not contribute significantly to changes in results[20,21], justifying the use of this method.

Some factors that directly interfere in the perception of health have previously been identified, such as schooling. Illiterate individuals have a higher tendency to perceive themselves as having a poor health situation[10,14], in line with the results found here, where the odds ratio of a poor health assessment generally underwent a gradual decline as years of schooling increased. The role of schooling as a protective factor in relation to the health of the individual is intertwined with the opportunity to obtain knowledge and access to information, aspects that affect the way that these elderly people conduct their daily routines and their choice of life of habits, improving self-care and reducing the propensity to develop diseases[14].

The results also show that individuals who are unable to perform any of their usual activities due to health are more likely to describe their health as bad than those who do not have such difficulties. The same is true with total difficulty in the performance of IADL. Such activities are considered more complex than BADL as they include independence within the community as well as cognitive aspects[3]. The reduction or deprivation of autonomy, due to the limitations repeatedly imposed by the presence of diseases and their aggravations, can make individuals feel incapable, which is a contributing factor to a negative perception of health[3,22,23].

In addition to the aforementioned aspects, it was also found that elderly people with a diagnosis of chronic physical or mental illness are more likely (OR =2.44) to perceive themselves as having poor health than individuals who do not have such a diagnosis. The conditions imposed by the presence

of diseases influence physical, social, cultural and economic aspects, modifying the quality of life of subjects and contributing to a negative perception of health. Studies show that a greater number of diseases present is linked to inferior functional capacity and worsened perception of health among individuals[6,10]. Knowledge and reflection about the perception of health of the elderly allow health professionals to individualize strategies of education and care, generating greater adherence to treatment and improvement in quality of life.

A similar condition was also observed in relation to oral health, where the data showed that a negative classification of disease results in a greater possibility of elderly persons also considering their general health to be poor (OR =1.92). This is unsurprising, as the oral cavity is part of the individual and is today considered to have a direct influence on overall health, contributing to high levels of quality of life and health perception[24-26].

In elderly individuals, oral health conditions are directly influenced by functional conditions, which may compromise dental hygiene capacity. This in turn can make the elderly person dependent on relatives or caregivers for the performance of such actions, a situation that can be difficult to accept[27]. Despite its growing importance in the field of health, the area of oral health still has room to develop, focusing on actions aimed at groups who previously lacked access to dental care or suffered invasive treatment, as is the case with the elderly population. Reinserting or inserting these individuals into public health policies is a constant challenge for administrators[24,27,28], as oral health conditions lead to negative outcomes for nutritional, social and health aspects[29].

Elderly persons who sought health services in the two weeks prior to the original study were more likely to evaluate their overall health as poor, as were those with a large number of annual medical visits and individuals who had been hospitalized in the previous 12 months. The great demand for the use of services among individuals with negative self-perceptions of health may reflect the presence of diseases, especially those that are chronic and degenerative, and functional incapacity, relationships described above. Studies show that elderly people with more severe functional limitations and a diagnosis of more diseases require greater use of health services than those who have diseases that do not impose physical limitations[3,10,23,28,30]. The difficulties experienced by individuals in situations of chronic illness and hospitalization, such as the efforts expended to gain access to the health services, are therefore directly related to their negative health evaluation.

Appointments with a medical professional, however, may not only involve treatment, but can also represent an early opportunity to perform diagnoses, referrals to other services and actions related to disease prevention[28]. State protocols, such as in the state of Paraná, recommend three annual consultations for elderly individuals at risk of frailty[31], consistent with the average number of consultations described by the majority of elderly persons investigated. To minimize superfluous use, the improvement of guidelines and adequate follow-up among family members and caregivers is suggested[32].

Excessive consultations in a short period of time, as in the case of a group of individuals in the present study, may be related to the resolutive nature of health services[28]. These aspects are worth reflecting on, as often the direction taken by health administrators and professionals does not offer satisfactory answers to the real health needs of the population, generating gaps and dysfunctions in the effectiveness of a health service or system.

One limitation of the present study is that the outcome variable *Perception of health* could be responded to by a member of the household and not necessarily by the elderly individual; and that such a variable relies on the intrinsic subjectivity of the perception of health. As such it can be altered by contextual conditions and the emotional and physical state in which the individual finds themselves at the time when data collection takes place[10-12]. However, such subjectivity does not remove its relevance for guiding policy decisions and health planning [33].

CONCLUSION

The influence of multiple aspects that determine the negative perception of the health of Brazilian elderly persons was identified, namely: level of educational instruction, difficulty in performing instrumental activities of daily living, impossibility

of performing any usual activity for a reason of health, diagnosis of chronic disease, poor oral health condition, a heightened demand for health services, medical consultations and hospitalizations.

The broad theoretical and methodological analysis of the present study provides thorough knowledge of the factors that result in the negative health perception of the elderly population. This allows the potential use of such knowledge in the formulation of public health policies aimed at such a population, supporting the planning of more preventive strategies and improving the quality of the services offered, providing a higher quality of life in longevity.

It is reiterated here that the findings of this study are applicable for strategies in the fields of individual empowerment, health promotion and the provision of early access to health services.

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Received: December 23, 2017
Reviewed: March 12, 2018
Accepted: April 20, 2018

http://dx.doi.org/10.1590/1981-22562018021.180011

The experience of spirituality among institutionalized elderly people

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Abstract

Objective: To identify the meanings attributed to the experience of spirituality when faced with life situations among elderly persons living in a long-term care facility. *Method*: A qualitative, exploratory and descriptive survey was carried out, based on interviews with eight elderly people living in a long-term care facility for the elderly in the state of Rio Grande do Sul, Brazil. *Results*: The content that emerged from the interviews underwent qualitative analysis for the extraction of units of significance and the elaboration of two thematic categories: *Spirituality/religiosity as a direction of life* and *spirituality/religiosity as a meaning for life and a source of renewal, fulfilment and happiness*. *Conclusion*: When describing the experience of spirituality as an important strategy for finding meaning in life, the elderly persons in this study revealed it to be a psychic and emotional support for coping with existential challenges. This knowledge allows professionals working in these institutions to invest in practices that incorporate spirituality as an element of the comprehensive care of the elderly.

Keywords: Aging. Homes for the Aged. Spirituality. Religion and Science.

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INTRODUCTION

According to the Demographic Census of 2015 elderly persons in Brazil represent about 14.3% of the population[1]. Furthermore, according to data from the Institute of Applied Economic Research, 83,870 elderly people currently live in more than 3,500 long-term care facilities (LTCF) in the country. The option to seek an LTCF as a care option can mean protection and safety for the elderly[2].

The contemporary reality of the demographic and epidemiological transformation of the Brazilian population, coupled with a marked transformation of family arrangements, has been reflected in the growing demand for such facilities as a form of social care.

This situation has created many challenges for health professionals, researchers, LTCF administrators, and the state itself, such as the fight against diseases and the provision of suitable environments for the carrying out of comprehensive, multidimensional care of the elderly, which should include reference to spirituality[3]. In this context, another challenge faced by LTCF professionals and managers is the provision of qualified care that respects the individuality and heterogeneity of each elderly person, considering the different postures of the elderly towards life[4].

An LTCF, based on the National Policy for the Health of the Elderly Person regarding multidimensional care, should include not only physical, psychic, social and environmental factors, but also spiritual aspects, as a fundamental necessity for this stage of life[5].

Spirituality, relating to questions of life and health, dates back to 2000-1800 BC, and remained an important part of caregiving until the middle of the fourteenth century, when Galileo brought about a separation of philosophy, science and religion. Since the end of the twentieth century, there has been a resumption of the approximation of these elements through the publications of epidemiological studies that have demonstrated the relationship between spirituality/religiosity and the health of patients[6]. Corroborating these results, studies on the topic of spirituality have found favorable outcomes for the improvement of the health and well-being of those who experience this phenomenon[7,8].

Faced with this evidence, many studies have sought to address the issue of spirituality, based on the understanding that it has a beneficial influence in coping with diseases and adverse situations, having a protective effect against their negative impact on daily life[9,10]. Thauvoye et al.[11], however, stated that some research on religion and spirituality is inspired by religious traditions and lifestyles, using a unilateral religious focus for the elaboration of instruments incorporated in a specific religious context, usually the Judeo-Christian tradition. The same authors also argue that it is necessary to gauge the three dimensions of spirituality: connectivity with the transcendent, with others and with nature.

Spirituality, although of a complex nature, has shown a positive association with well-being, constituting an important predictor of late life functioning, in relation to the care of the elderly. However, it is important to understand how each spiritual path is related to well-being, considering the individual preferences for one or more types of spiritual connection[11].

As a concept, while spirituality differs from religiosity, both are based on the presence of something transcendent, experienced in the everyday as a capacity to transform life. Religion or religiosity comes from the Latin *religio* and the means to reconnect man with the supernatural, as a guarantee of salvation, based on a set of techniques, creeds, dogmas and rites instituted by institutions that profess such religions, such as Judaism, Christianity, Islam. Spirituality, meanwhile, has a more encompassing existential meaning. It deals with meaning, care, freedom, friendship, fraternity, hospitality, communion, quality of life and happiness. Its scope extends "beyond the biological dimension and logic dictated by time, the absolute carnality of the body and the preoccupation with unlimited material production""[12]. Furthermore, "spirituality refers to a universal question related to the meaning and purpose of life"[13].

According to Pessini[14], in the new millennium, universities and science have been surprised by the "rebirth of religion", that is, the emergence "of

religions in all spheres of human life". In view of this, spirituality and/or religiosity are often employed by the elderly as a form of shelter during exposure to stressful situations, such as family problems, illness, their awareness of existential finitude and the process of institutionalization, which often occurs against their will[15].

The present study contributes to the discussion of how spirituality/religiosity, as an intrinsic characteristic of being, can be seen as a mediator for institutionalized elderly persons when facing existential challenges, sufferings, anguish and as a support through faith. It can also be seen as a support for professionals when incorporating spirituality as an element in the integral care of the elderly.

Drawing on the understanding of Born[16] that human beings have two significant dimensions in life – spiritual and material – and that, over time, the former grows in importance, and that caregivers of the elderly need to address the spiritual experience and not merely restrict their attention to physical aspects, the purpose of the present study was to identify the meanings attributed to the experience of spirituality when faced with the situations of life of elderly people living in a long-term care facility.

METHOD

An exploratory and descriptive study was performed as a subproject of the *Scenarios of long-term care: Evaluation, intervention and educational possibilities in gerontological care* integrated project.

The study was carried out in a private institution, located in a rural municipal region in the state of Rio Grande do Sul, Brazil, with a maximum capacity for 30 elderly people. The choice was intentional and based on the fact that the center offered spiritual care to the elderly.

Eight (26.6%) elderly residents participated in this study after signing a Free and Informed Consent Term. The selection of the participants met the inclusion criteria: age 60 or older, residing in the LTCF, being male or female, voluntarily participating and having sufficient cognitive understanding to answer the questions. Elderly persons with a diagnosis of dementia and those with cognitive impairment, classified as grade III for dependence, were excluded[17].

In order to collect data, the participants were approached inside the facility and chose a location where they would respond to the interview on an individual basis. This took place in April 2016, at a date and time arranged with the LTCF manager, respecting the programmed activities of the institution. A semi-structured questionnaire was used, with questions about the spirituality/religiosity of the elderly; the importance attributed to the same in coping with and understanding the difficulties of life, and the frequency of its practice. The material that was obtained from the interviews underwent thematic content analysis, in accordance with Bardin[18], which took the form of pre-analysis, investigation and interpretation of the material, allowing the extraction of units of significance and the elaboration of thematic categories through established semantic criteria based on the objective of the study.

In order to preserve the anonymity of the interviewees, in accordance with the ethical principles established by Resolution Nº 466/12 of the National Health Council, their names were substituted with the names of flowers. The study was approved by the Ethics Research Committee of the Universidade de Passo Fundo (approval nº. 393/2011).

RESULTS AND DISCUSSION

The LTCF is home to more women than men, which reflected the profile of those selected for the study in terms of gender, as of the eight elderly participants, seven were female and one was male. The ages ranged from 61 to 88 years, with the mean age being 75 years. The female prevalence in this study agrees with studies performed with this population and reflects the feminization of old age[19]. All the interviewees said they were religious and actively experienced their spirituality/religiosity.

From the investigation of the material it was possible to construct the following categories: *Spirituality/religiosity as a direction and encouragement for*

life; spirituality/religiosity as a meaning for life and a source of renewal, fulfillment and happiness.

It is worth noting that the findings identified a relationship between spirituality and religiosity in the discourse of the elderly. This, according to Vitorino and Vianna,[15] is not exclusive to the elderly, but a mixture of concepts that permeates much of society.

Spirituality/religiosity as a direction and encouragement for life

From the expressions of the elderly about spirituality and its importance for their direction of life, this concept can be seen as a substantial support for the good quality of life of these elders, according to the dictates of their conscience. When questioned about the importance of spirituality, the elderly referred to it as a tool to avoid deviating from the right path and remaining firm in what they have learnt, as can be seen below:

> "To avoid going down the wrong path [...] stealing, prostitution and so on. Dishonesty. When this new generation was born responsibility was taking a holiday. They lost their balance. The parents aren't to blame, they were born this way" (Rose).

> "People need to know what they're doing" (Lily).

> "I like my children, they don't smoke, they don't drink, they do the right thing" (Bromeliad).

> "It's important to hold the word of God in our hearts and not sin against the Lord" (Narcissus).

In this sense, Gutz and Camargo[13] identified that the social representation of spirituality for the elderly is anchored in divine protection in the face of everyday situations; in the transcendence of worldly existence; in the quality of thought, considering the importance of honesty in interpersonal living and human responsibility in the choices and possible consequences of life.

The experience of practicing religion in the family emerged in the discourse, revealing the importance of tradition, taught by their parents while still in infancy, as a factor of the significant presence of religiosity, even in the advanced phases of life, illustrated in the following discourses:

> "We feel good about how we were brought up. Our parents said that the Catholic religion is living with God, and I want to live with Him" (Daisy).

> "I'm not going to renounce the baptism that my parents gave me. It's everything" (Hydrangea.

Spirituality/religiosity and their importance in encouraging life emerged in the statements of participants in sentences such as "gives us strength to cope with difficulties" and "gives courage by prayer" (Lily).

> "Religion gives you an inner strength" (Amaryllis).

> "There is prayer in everything [...] it gives us courage" (Rose).

The answers were varied, however, in relation to the experience of religiosity and prayer, as the elderly did not always find solace in spirituality/religion when faced with the obstacles and difficulties of life. Narcissus reported that he was a "consecrated pastor" and that he "worked as an evangelizer with his church" before coming to the LTCF. He said that his religion is like a "mission, because he prays for the many who need it and this is the work he is doing now".

Bromeliad says that religiosity has helped her through the most difficult times, such as when her husband had a stroke. In the case of Azalea and Hortensia, however, the confrontation of affective losses and the loss of autonomy proved difficult, resulting in reflection and questioning about the spiritual dimension, as expressed in the following discourse:

> "Religion isn't very important. I miss my family. I've been a widow for six years. It changed my life and not for the better" (Azalea).

> "Is it worth it? I've lived here for three years, against my wishes" (Hydrangea).

Hydrangea also said: "I pray that I will die, I'm tired". The expression suggests that she believes in the comfort of faith in a higher being.

Old age, considered the last stage of life, refers to finitude. When a person becomes aware of existential finitude, the dimension of spirituality emerges and becomes a recurring issue. The death of parents, family and friends causes feelings suppressed during most of our lives but which now become significant. The importance of spirituality or religion is also exalted as capable of diminishing the despair that individuals feel with the approach of the end of their biological life[6,14,20].

When exploring the relationship between the different facets of spirituality and positive mental well-being in old age it was observed that well-being was positively predicted both by the transcendental dimension and by the dimension of others. This reveals that when faced with stressful situations the elderly can find comfort in a sense of connection with something that goes beyond the self, in the same way that they find solace in a sense of connection with others, if this is their main way of experiencing spirituality[11].

When questioned about the frequency with which they participate in religious ceremonies or attend religious service, seven of the elderly persons responded that they do so monthly or weekly, depending on the provision of these ceremonies by the institution; only one reported never participating in such ceremonies, expressing, however, the will to do so. This result collaborates the findings of a study that sought to analyze whether religiosity exerts a mediating effect on the relationship between socio-demographic factors, multimorbidity and health-related quality of life in the elderly living in the community, in which religious practice was weekly and performed mainly by elderly women. The practice of religiosity in this study suggests an association with quality of life as it provides adherence to a religious community and can thus generate social support[21].

In a study that investigated the relationship between spiritual/religious coping strategies and quality of life in institutionalized elderly people, religiosity/spirituality was shown to play a significant role in preventing problems, helping with coping, recovering or adapting to health situations, and also played a comforting role, being applied in cases of stress, such as the institutionalization of the elderly[15].

Illness and healing are often attributed to a superior being, specific to each religion, which leads to cognitive strategies in which the individual appeals to God in search of improvement in their health[14]. This search for meaning encourages people to overcome and understand the difficulties that arise during life. However, it is observed that not all people who declare that they belong to a religion have such an experience, which is demonstrated in the statements of Hydrangea and Azalea, who claim not to see religion as a source of overcoming their difficulties.

However, other elderly persons expressed the view that the experience of spirituality/religiosity "helps a lot", as it places more importance on the spiritual plane, such as Narcissus, who says: "After I discovered the gospel I learned a lot", and "I accept the changes", and when Hydrangea says bluntly: "If I am here it is because of my faith, otherwise I would have killed myself".

Spirituality/religiosity as a meaning for life and a source of renewal, fulfillment and happiness

Regarding degrees of spirituality/religiosity, seven participants classified themselves as "very religious and/or spiritual", highlighting the important role of prayers to serve others and to feel happy.

> "Spirituality gives meaning to my life" (Narcissus).
>
> "Prayer is important for helping others" (Bromeliad).
>
> "Doing good gives me peace of mind [...] it gives me an inner strength to help people" (Amaryllis).
>
> "It does me good when I do good" (Jasmin).
>
> "If I wasn't happy in my religion, I was sad. So I'm happy with it, with my religion" (Daisy).

In a study about happy aging and its association with positive psychological sources carried out with 279 elderly people in Belgium, the results indicated that well-being was positively predicted by the

spirituality experienced through the connection with the transcendent and with others[11].

Spirituality supports finding meaning in existence, capable of generating psychic forces to face the anguish, disease and dilemmas that occur on a daily basis and especially in situations of suffering and death[22]. It is possible to establish connections between spirituality, religion, fulfillment and happiness as promoters of meaning in life and "share our values with those who believe in the realization of the vocation of man as a happy being [...] [and] in the construction of a decent and better future for all"[14].

Old age is a privileged period for valuing and enjoying these motivating qualities of subjective well-being. However, the pursuit and achievement of these subjective values of well-being stem from an educational process. "Education about longevity is an obligation that brings the challenge of greater understanding about the existential and finite human condition of us all"[12].

In terms of the religious and/or spiritual practices of the elderly in this study, the majority of prayer was performed in the LTCF itself. There were also practices of reading the sacred text of a religion and retreating to an isolated place for prayer. But Azalea describes a lack of religious ceremonies when she says "I think it is important to participate in church activities".

The understanding of spirituality/religiosity as renewal and fulfillment emerges in the discourse of Narcissus and Daisy:

> "Because it fills all the gaps I had before. Now I have Jesus in my heart [...]. I hope that the day I leave here I'll be with Jesus" (Narcissus).

> "It makes sense of things. Not a lot, but enough. We sit in silence and speak to God and renew our lives" (Daisy).

For Kuznier[23], the elderly understand that life only makes sense when there is harmony in coexistence with others and spirituality is a key point in achieving this goal, enabling the fullest possible experience. This understanding is in line with the results of a comparative study conducted with 196 subjects, which aimed to evaluate whether the perception of quality of life is associated with strategies of religious-spiritual coping of patients in palliative care. The present study revealed that healthy participants with better quality of life scores had greater religious-spiritual coping[24]. Another study, which evaluated the quality of life of chronic kidney patients on hemodialysis, through the WHOQOL-bref and WHOQOL-Spirituality, Religion and Personal Beliefs, found that the participants presented high quality of life scores, specifically in the dimensions related to the aforementioned spirituality , religion and personal beliefs[25].

In the process of aging, joy, happiness, hope, motivation and life goals or projects, as well as feelings of sadness, insecurity and abandonment are "closely related to the psychic dimension, to personality, optimism, resilience, gratitude and the presence of high scores for positive emotions"[26].

In summary, spirituality as a promoter of renewal, fulfilment and happiness is structured around subjective well-being, autonomy, independence, creativity; being able to set goals and having the means to execute them; in coping with the challenges of life; acting in accordance with the inner values of consciousness; having individual or motivational expectations, being cheerful, content and trying to overcome anxiety and anguish; enjoying one's home environment and cultivating friendship; dealing with losses and exercising resilience; having personal beliefs and being able to exercise self-care until death.

The limitations of the present study are related to its transversal design and the impossibility of generalizing the results for the wider elderly population residing in LTCF. We therefore suggest the carrying out of further studies, as the experience of spirituality in institutionalized elderly people and its meaning in the context of situations of life needs to be broadened by scientific evidence. The present study could also be complemented by extending the sample to include elderly people from different institutions and cities, and even expanding the instrument used to investigate other aspects of the life of the elderly in LTCF and their relationships with spirituality.

CONCLUSION

All the elderly people who composed the sample were religious and considered it to be important in their lives, suggesting, on several occasions, the presence of a cultural and traditional tradition, transmitted from parents to children, that makes religion so present in their lives.

The reasons given by the interviewees for dedicating themselves to their spirituality/religiosity were diverse, predominating the view that spiritual practice is related to positive events and in the perseverance to face difficult moments. However, since most believe that religion helps them face difficulties, it was found that when affective losses are involved, the importance attributed to religion is questioned, a reflection of the limited religious activities offered to the elderly residents in the long-term care facility compared to what they were used to before institutionalization.

All participants reported that spirituality/religiosity provides meaning in their lives. The practices used to worship the religion/spirituality of each subject in the study can be diverse: individual prayers or experience and reflection on their own existence.

The elderly in this study emphasized the practice of spirituality in its different forms of manifestation as a way of coping with difficulties, morbid conditions and the finitude of life, which were subtly present in this segment of the institutionalized elderly population.

The experience of spirituality/religiosity proved to be an important strategy for achieving well-being when faced with life situations. For its effective application as a way of caring for institutionalized elderly people, however, it is important to identify and understand their preferences and spiritual practices more accurately, as well as the relationship between such aspects and well-being, considering the subjectivities and context of how they are expressed.

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Received: January 23, 2018
Reviewed: April 14, 2018
Accepted: May 17, 2018

http://dx.doi.org/10.1590/1981-22562018021.180050

The double vulnerability of elderly caregivers: multimorbidity and perceived burden and their associations with frailty

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Abstract

Objective: To identify if multimorbidity and burden are associated with a greater likelihood of frailty in elderly caregivers of other elderly persons within the family context. *Method:* 148 elderly caregivers caring for other elderly persons [M=69.7 (±7.0) years old] were recruited using a criterion of convenience in public and private health services in the city of Campinas and surrounding areas. Information was gathered about socio-demographic context, context of care, physical health, care burden using the Zarit Burden Scale, and frailty, measured by subjective evaluation. Four groups of vulnerability were created based on the presence or absence of multimorbidities and high or low burden, in order to verify which group was most strongly associated with frailty. Data were analyzed using descriptive analysis, measurements of association and multivariate hierarchical logistic regression. *Results:* The prevalence of multimorbidity was 55.4%. The Zarit Burden Scale presented a median of 23 out of a total of 88 points. Of the sample, 35.1% were frail, 46.0% intermediate, and 18.9% robust. Elderly caregivers with multimorbidity and high burden had a greater probability of frailty (OR=3.6; CI 1.55-8.36), followed by those with multimorbidity and low burden (OR=2.8; CI 1.13-6.79). *Conclusion:* The sensation of burden among caregivers was reduced; those with double vulnerability were most prevalent among the four groups and had the greatest association with the occurrence of frailty; multimorbidity was associated with frailty. If combined with perceived burden, however, the *odds ratios* of the elderly caregivers being frail increased.

Keywords: Caregivers. Frail Elderly. Health of the Elderly.

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Research funding: Coordination for the Improvement of Higher Education Personnel (Capes). Process 1657822.

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INTRODUCTION

Becoming the caregiver of a dependent elderly person represents a stressful event at any age. Care comprises the characteristics of a chronic stress experience as it generates physical and psychological stress over long periods of time; is accompanied by high levels of unpredictability and lack of control of the situation; has the ability to create secondary stress in various domains of life, such as work and family relationships; and often requires high levels of surveillance[1]. Becoming a caregiver in old age, or even aging while providing care, may mean facing challenges linked to stressors, as coping with daily care requires various types of resources, which may be scarce or insufficient in old age, hindering appropriate adaptive responses.

Elderly caregivers usually take care of someone of their own age group, which predisposes them to cope with the increasing dependence of the individual receiving care and often requires them to invest a great deal of physical effort into tasks that are strenuous for a body that is also in the process of aging, increasing the risk of becoming ill[2]. In caregivers of spouses who age while performing this role, the risk of illness can also occur due to a shared life course, reflected in health habits and other similar life circumstances that may pose risks, such as social and financial disadvantages or access to opportunities and services[3].

Literature diverges as to the burden and benefits of the task of caring and its repercussions for health. Two studies clearly demonstrate this contrast. The first is the longitudinal Study with data from the Caregiver-Study of Osteoporotic Fractures, which found a lower mortality rate among elderly caregivers than among the non-caring elderly. This finding supports the "Healthy Caregiver" hypothesis, which suggests that being a caregiver in old age reflects better physical and functional conditions, inherent in those selected to perform the role of caregiver[4,5].

In contrast, a second study demonstrated through biochemical evidence that the state of exhaustion caused by care may result in marked coagulation. To reach this conclusion, Swiss researchers investigated spouses aged 55 and over who were caregivers of patients with dementia, as well as non-caregivers, and observed that the blood tests of caregivers showed higher levels of the procoagulant molecule D-Dimer. These elevated levels were related to the role of caregiver, not age, as is the case with IL-6, which makes caregivers more susceptible to the development of cardiovascular diseases than non-caregivers[6].

Another risk is the increased chance of becoming frail. French researchers[7] argue that older people who care for other elderly persons are often at risk of succumbing to frailty, due to the ability of chronic stress to result in physical and emotional exhaustion for which the physiological reserves of an aging person are insufficient.

The term frailty is used in gerontological literature to refer to a syndrome involving energy reduction, neuroendocrine dysregulation and decline of immune function, resulting in the reduction of physiological reserves and the ability of the individual to adapt adequately to stressful conditions[8]. According to the definition and proposition of Fried et al.[9], such syndrome is identified in the elderly population through the manifestation of a specific phenotype composed of unintentional weight loss, reduced gait speed, a decrease in grip strength, fatigue, and lower levels of physical activity. Although they are distinct phenomena, frailty and comorbidity are often associated and conducive to negative outcomes such as disability and mortality. The identification of frailty usually occurs through objective measures of physical performance plus the self-reporting of fatigue. The self-evaluation of the elderly of their own performance has also been proven to be a valid way of tracking elderly persons in a process of frailty in larger populations[8].

Elderly caregivers of older people have been studied as part of the wider group of caregivers[10], and there are no specific descriptors for such individuals in the search databases. This hinders a greater understanding of the needs and repercussions of exercising the caregiver activity in parallel with the deterioration involved in aging itself. The present study therefore sought to identify whether multimorbidity and burden are associated with a greater likelihood of frailty in elderly persons who care for other elderly individuals in a family context.

METHOD

This is a cross-sectional, descriptive and analytical study based on data from a larger study entitled "The Psychological Well-Being of Elderly Persons Who Care for Other Elderly People in A Family Context", developed by researchers linked to the Postgraduate Program in Gerontology of the Universidade Estadual de Campinas, São Paulo, Brazil.

Data collection was carried out from October 2014 to July 2015, following the approval of the Research Ethics Committee of the Universidade Estadual de Campinas (Protocol No. 35868514.8.0000.5404). Subjects were recruited on a convenience basis in health services of the public and private network of the cities of Campinas, Indaiatuba, Jundiaí and Vinhedo, located in the state of São Paulo, Brazil. After the participants signed a Free and Informed Consent Form, the interviews were carried out at the health service units or at the caregivers' homes, by trained researchers, in a single session with an average duration of 60 minutes. At the end, the participants and their families received an information manual to optimize communication with the elderly.

The inclusion criteria were 60 years and over, have cared for a sick elderly relative with some degree of dependency for six months or more, and agree to participate in the survey. Caregivers who scored below the cut-off score established by the Cognitive Trace instrument CASI-S[11], the abbreviated version of the Cognitive Abilities Screening Instrument - Short Form, validated for Brazil, were excluded.

For the present study, sociodemographic data, data related to the context of care, health variables, and data on burden and frailty were extracted from the original study. The cognition of the elderly person receiving care was evaluated based on the reports of the caregiver using the Clinical Dementia Rating (CDR)[12] instrument, which investigates memory, orientation, judgment or problem solving, community relations, leisure and personal care. The attributable scores for both the individual items and the overall scale score are 0 (absent), 0.5 (questionable), 1 (mild), 2 (moderate), and 3 (severe). Adapted versions of the scales used to assess performance in the six Basic Activities of Daily Living (BADL) of Katz et al.[13] and the seven Instrumental Activities of Daily Living (IADL) of the Lawton and Brody Scale[14] were applied to evaluate the intensity of the care provided by the caregivers. The intensity of care was identified from the number of activities in the scales in which the individual declared themselves to be the main source of helping with or completing the activity, with the possibilities ranging from 0 to 13 activities, for which categories of low, medium intensity or high were applied, based on the distribution of the sample in terciles.

From the self-reported diseases it was possible to identify whether there was the presence or absence of multimorbidity (considered in this study as the presence of two or more chronic diseases) for each caregiver.

Caregiver burden was evaluated by the Zarit Burden Scale[15], which consists of 22 items with responses ranging from 0 (never) to 4 (always). This instrument generates a total score ranging from 0 to 88 and reflects the level of caregiver burden in the domains discomfort with health, personal and social life, financial situation, emotional well-being and interpersonal relationships. The total score of the interviewee was classified as low or high burden from the median score of the total study sample.

From the presence or absence of multimorbidity and low or high burden, four groups of vulnerability were created in order to verify which was most strongly associated with frailty. The groups of vulnerability generated were: Group 1 (without multimorbidity and low burden), Group 2 (without multimorbidity and high burden), Group 3 (with multimorbidity and low burden), Group 4 (with multimorbidity and high burden).

In order to measure frailty, the subjective criteria of the frailty syndrome validated by Nunes et al.[8] was used. This is composed of five dichotomous questions directly related to the components of the frailty phenotype measured by Fried et al.[9] Caregivers were categorized as frail when they had three or more components, pre-frail when presenting one or two components and robust when they did not have any of the components.

The Statistical Analysis System version 9.2 was used for statistical analyzes. The Chi-squared and Fisher's exact tests were used to compare the categorical variables. The Kruskal-Wallis test was used to compare the variables with three or more categories, and Dunn's post-hoc multiple comparisons test was used to find where the difference, if there was one, resided. To study the factors associated with the presence of frailty, univariate and multivariate hierarchical logistic regression analysis was used, applying a Stepwise criterion of variable selection. The level of significance adopted for the statistical tests was 5%, or $p<0.05$.

RESULTS

Table 1 shows the sociodemographic characteristics and the context of care. There was a predominance of female caregivers (77.0%). Age ranged from 60 to 86 years, with a mean of 69.73 (+7.0) years.

In terms of the context of care, the age of the individual receiving care ranged from 60 to 104 years. Most caregivers took care of their spouses (62.0%). Of the recipients of care, 55.4% had cognitive impairment (mild, moderate or severe) and 77.0% had six or seven impaired IADL. Approximately one third of the caregivers (33.1%) were the main source of support for all 13 activities investigated.

Table 2 shows the distribution of the presence of multimorbidity, perceived burden, the vulnerability groups and the frailty of the caregivers. The average amount of illness per caregiver was 1.86 (+1.4). The most prevalent diseases were systemic hypertension (58.8%), arthritis (34.4%), diabetes (23.6%), osteoporosis (20.9%), heart disease (15.5%) and depression (14.2%). Multimorbidity was present in 55.4% of the individuals and frailty in 35.1%, with the group classified as pre-frail being the most prevalent (45.9%). The Zarit Burden Scale had a mean of 26.1 (+13.5) points and a median of 23 points, which was used to divide the sample between those with a low level (<23 points) and a high level of burden (>23 points).

In this way, 48,6% caregivers presented low burden while 51.3% had high burden. The group with concomitant presence of multimorbidity and a high level of perceived burden, or in other words, those with double vulnerability, was the prevalent in the sample (32.4%).

Table 1. Frequencies, means and standard deviations of the sample in relation to sociodemographic variables and the context of care (N=148). Campinas, São Paulo, 2015.

Variable	n (%)	Mean (±sd*)	Minimum-Maximum
Gender			
Male	34 (23.0)	-	-
Female	114 (77.0)	-	-
Age (years)		69.7 (7.0)	60-86
60-70	85 (57.5)	-	-
≥71	63 (42.5)	-	-
Marital status			
Married	118 (80.3)	-	-
Single	14 (9.5)	-	-
Widowed	9 (6.1)	-	-
Divorced	6 (4.1)	-	-
Schooling (years)		5.61 (4.2)	0-19
0-4	87 (60.0)	-	-
≥5	58 (40.0)	-	-

to be continued

Continuation of Table 1

Variable	n (%)	Mean (±sd*)	Minimum-Maximum
Income (minimum salary)**		4.01 (3.6)	1.0-27.6
0-3	71 (51.4)	-	-
3.1-5	41 (29.7)	-	-
≥5.1	26 (18.8)	-	-
Age of care recipient		81.2 (9.8)	60-104
60-69	20 (13.5)		-
70-79	43 (29.0)		-
≥80	85 (57.4)		
Relationship with caregiver			
Spouse	92 (62.2)	-	-
Parent	41 (27.7)	-	-
Father/Mother in law	5 (3.4)	-	-
Brother	3 (2.0)	-	-
Uncle	3 (2.0)	-	-
Son	4 (2.7)	-	-
Duration of care (years)		4.56 (4.0)	0.5-20
<2	41 (28.5)	-	-
2.0-4.9	52 (36.1)	-	-
≥5	51 (35.4)	-	-
CDR Classification***			-
Absent / questionable	66 (44.6)	-	-
Mild / moderate	36 (24.3)	-	-
Serious	46 (31.1)	-	-
Dependence in IADL †			-
0-2	10 (6.8)	-	-
3-5	24 (16.2)	-	-
6-7	114 (77.0)	-	-
Dependence in BADL††			-
0-1	63 (42.6)	-	-
2-4	23 (15.5)	-	-
5-6	62 (41.9)	-	-
Intensity of care		9.0 (3.8)	0-13
0-6 activities	38 (25.7)	-	-
7-12 activities	61 (41.2)	-	-
13 activities	49 (33.1)	-	-

* sd=standard deviation; **Brazilian minimum wage of R$788.00 in the period of data collection; ***CDR= Clinical Dementia Rating; †IADL= Instrumental Activities of Daily Living; ††BADL= Basic Activities of Daily Living.

Table 2. Distribution of multimorbidity, frailty, burden and the groups of vulnerability in the sample of elderly caregivers. Campinas, São Paulo, 2015.

Variable	n (%)	Mean (±sd*)
Multimorbidity		
Yes	82 (55.4)	-
No	66 (44.6)	-
Components of frailty		-
Weight loss	41 (27.7)	-
Loss of grip strength	79 (53.4)	-
Low level of physical activity	63 (42.5)	-
Reduction of gait speed	80 (54.0)	-
Fatigue/exhaustion	32 (21.8)	-
Level of frailty		
Robust	28 (19.0)	-
Pre-frail	68 (46.0)	-
Frail	52 (35.0)	-
Perceived burden		26.1 (13.5)
Low (<23points)	72 (48.6)	-
High (≥23points)	76 (51.3)	-
Vulnerability groups		
1 (without multimorbidity and low burden)	38 (25.7)	-
2 (without multimorbidity and high burden)	28 (18.9)	-
3 (with multimorbidity and low burden)	34 (22.9)	-
4 (with multimorbidity and high burden)	48 (32.4)	-

* sd=standard-deviation.

The profile of the individuals who composed each of the vulnerability groups is shown in Table 3, along with the statistically significant variables. Male subjects, with a high level of schooling, without the loss of grip strength, with no reduction in gait speed, who did not suffer fatigue, and who were robust were concentrated in the groups without multimorbidity.

Table 3. Distribution of the number and proportion of elderly persons among the four groups of vulnerability according to the significant sociodemographic variables, context of care and frailty. Campinas, São Paulo, 2015.

Variable	Group 1 n (%)	Group 2 n (%)	Group 3 n (%)	Group 4 n (%)	*p*-value*
Gender					
Male	12 (31.6)	11 (39.3)	6 (17.7)	5 (10.4)	0.014
Female	26 (68.4)	17 (60.7)	28 (82.3)	42 (89.6)	
Schooling (years)					
0-4	18 (47.4)	12 (44.5)	25 (78.1)	32 (66.7)	0.015
> 5	20 (52.6)	15 (55.5)	7 (21.9)	16 (33.3)	
Loss of grip strength					
Yes	13 (34.2)	12 (42.9)	21 (61.8)	33 (68.7)	0.006
No	25 (65.8)	16 (57.1)	13 (38.2)	15 (31.3)	
Reduced gait speed					
Yes	13 (34.2)	14 (50.0)	20 (58.8)	33 (68.7)	0.014
No	25 (65.8)	14 (50.0)	14 (41.2)	15 (31.3)	
Fatigue / exhaustion					
Yes	3 (8.1)	3 (10.7)	10 (29.4)	16 (33.3)	0.012
No	34 (91.9)	25 (89.3)	24 (70.6)	32 (66.7)	
Levels of frailty					
Robust	12 (31.6)	8 (28.6)	5 (14.7)	3 (6.3)	0.040
Pre-frail	18 (47.4)	11 (39.3)	16 (47.1)	23 (47.9)	
Frail	8 (21.0)	9 (32.1)	13 (38.2)	22 (45.8)	

*Probability of significance by chi-squared test.

The association between the study variables and profiles of frailty were also evaluated. It was found that the most prevalent subjects at the pre-frail and frail levels (in the process of becoming frail) had lower levels of education, declared themselves to be spouses of the care recipients, suffered from multimorbidity, and were in vulnerability groups 3 and 4.

Table 4 shows the results of the univariate and multivariate hierarchical logistic regression analysis to identify the odds ratios for frailty. The variables that make up blocks 1, 2 and 3 represent, respectively, the sociodemographic characteristics, the care context and the vulnerability groups. It was observed in both the univariate and multivariate analyzes that only vulnerability groups 3 and 4 had a statistically significant probability of frailty. Elderly caregivers with greater chances of frailty were: those with multimorbidity and low burden (2.8 times greater risk), and those with multimorbidity and high burden (3.6 times greater risk).

Table 4. Results of univariate and multivariate logistic regression analysis for frailty (N=148). Campinas, São Paulo, 2015.

	Variable	Univariate logistical regression		Multivariate hierarchical logistical regression	
		OR* (CI95%)**	*p*-value	OR* (CI95%)**	*p*-value
Block 1	Gender				
	Male (ref.)***	1.00 (-)	-	-	-
	Female	1.20 (0.59-2.47)	0.612	-	-
	Age				
	60-70 years (ref.)	1.00 (-)	-	-	-
	≥71 years	0.90 (0.49-1.65)	0.726	-	-
Block 2	Duration of care (years)				
	<2 (ref.)	1.00 (-)	-	-	-
	2-4.9	1.11 (0.51-2.40)	0.790	-	-
	≥5	0.89 (0.41-1.92)	0.756	-	-
	Dependence in IADL † and BADL††				
	0-6 (ref.)	1.00 (-)	-	-	-
	7-12	1.10 (0.52-2.36)	0.798	-	-
	13	1.74 (0.78- 3.87)	0.176	-	-
	CDR Classification†††				
	0-0.5 (ref.)	1.00 (-)	-	-	-
	1-2	1.39 (0.65-2.99)	0.398	-	-
	3	1.87 (0.91-3.81)	0.088	-	-
Block 3	Vulnerability groups				
	1 (ref.)	1.00 (-)	-	1.00 (-)	-
	2	1.47 (0.59-3.71)	0.410	1.48 (0.59-3.73)	0.406
	3	2.50 (1.03-6.06)	0.043	2.76 (1.13-6.79)	0.027
	4	3.74 (1.63-8.59)	0.002	3.60 (1.55-8.36)	0.003

*OR=Odds Ratio for frailty (n=28 robust. n=68 pre-frail and n=52 frail); **CI95%= Confidence interval 95%; ***ref= reference value; †IADL= Instrumental Activities of Daily Living; ††BADL= Basic Activities of Daily Living; †††CDR= Clinical Dementia Rating.

DISCUSSION

The present study represents an advance in that it provides data relating to elderly persons who care for other elderly persons in a family context. Although much literature exists on the perceived burden of caregivers, few studies have investigated the characteristics of this role when the caregivers of the elderly are elderly themselves. The present study was based on the theory that the condition of double vulnerability could be associated with a greater chance of the occurrence of frailty, a hypothesis confirmed by the results.

Like other studies[16-19] of elderly caregivers, the sample consisted predominantly of female subjects, who most frequently cared for a spouse or surviving parent. The feminization of care remains a reality, despite the increasing numbers of male caregivers. While elderly women face greater challenges in adapting declining health conditions to the tasks of caring, elderly men are faced with the challenges of being a caregiver, a role which involves skills rarely acquired during the lives of this cohort, for the first time. It is believed that care for spouses will become increasingly important given tendencies such as increased life expectancy, reduced support

relationships in old age, reduced parent-child cohabiting, the increased participation of women in the workforce outside the home, a reduction in the number of children, and the improvement of male health[20-22].

The low mean and median values of perceived burden found in the sample are notable in comparison with studies of younger caregivers[23,24]. Low to moderate burden in elderly caregivers is not uncommon in literature. This finding corroborates the results of an Irish population study[25] which, when applying the same instrument as the present study, found lower scores in a group of caregivers aged 65 years or over (31.3 points) than in groups aged 46-64 years (34.3 points) and those younger than 46 years (33.2 points). There are three major justifications for the low perceived burden found. The first is the simple fact of being old. It is possible that evaluations of stressful events are less intense among the elderly, thanks to the presence of adaptive coping strategies, although such individuals are more affected by the physical burden of care[26,27]. The second cause is reduced competition between the demands of work and the demands of care, a conflict which is often found in young and middle-aged caregivers. The third is that burden may be attenuated by the predominance of female caregivers of spouses in this sample, individuals for whom the task of caring is considered socially normative[28]. The role is often confused with the tasks of marriage among the elderly, such as preparing and serving meals to a husband on a daily basis[29].

The prevalence of self-reported diseases found in the present study meant that the morbidity profile was similar to that found in other studies in Brazil[30]. This contradicts the "Healthy Caregiver" hypothesis as a general rule for elderly caregivers, although it may be applicable to the 25% of the sample without multimorbidity and a low level of burden.

The proportional distribution of the frailty profiles in the sample is similar to most other studies on the subject, including those on community-dwelling elderly persons and convenience samples, and studies using both objective and subjective measures[9]. The pre-frail profile was the most frequent. There was also a large percentage of frail caregivers, a finding from which two explanatory hypotheses can be derived. One is due to the fact that such elderly persons perform the special role of caregiver. Another hypothesis relates to the instrument used to calculate frailty, which, because of its subjective nature, opens up greater possibilities for complaints related to the performance of the role, such as physical problems and discomfort, including a perception of slowness, fatigue, weight loss, strength and less involvement in physical activities. Literature has found that the elderly tend to complain of psychological discomfort through physical and functional references[31]. The components that refer to deterioration in physical performance were the most reported. This may be due to the physical burden of providing care in an aged body, considering the high intensity of the care found here, or the ease with which these deficits are perceived in the task of caring, as it is a self-reported instrument[8].

The elderly were evenly distributed among the four groups of vulnerability, indicating the heterogeneity of this condition. It is worthy of note, however, that group 4, representing multimorbidity and high burden, was the most prevalent of the groups. This supports double vulnerability as a recurrent factor among elderly caregivers.

Regression analysis revealed that the chances of being frail in groups 3 and 4 were significant, as the two groups represented the presence of multimorbidity. A greater chance of being frail was observed in the group with the greatest perceived burden (group 4). It can therefore be understood that multimorbidity plays a primary role in the association with frailty in elderly caregivers. When added to the condition of burden, the chances of suffering from the syndrome increase.

Due to these findings, it can be inferred that the double vulnerability of elderly caregivers increases the chance of the negative outcomes for the frailty syndrome described in literature, such as falls, hospitalization, institutionalization and death[9,32], which will only be confirmed in a longitudinal follow-up study.

The fact that the other variables in the study did not remain in the regression model is believed to be due to the explanatory power of the multimorbidity variable, which is associated with disadvantageous conditions of caring such as the female gender, advanced age and duration of care, variables which are intrinsic to multimorbidity.

Among the limitations of the study are the use of a convenience-based sample, which limits the generalization of the findings, and the non-functional evaluation of the elderly caregivers. However, the study represents an advance by warning of the need to observe a specific group of caregivers, which tends to increase in coming decades. The challenge facing the health system and its professionals is to support the daily practices of such caregivers. There is therefore a need for more caregiver care programs that provide, as well as guidelines on care, assistance with the maintenance and promotion of the physical and mental health condition of caregivers.

CONCLUSION

The results indicate the need to consider the needs of elderly caregivers, a specific group of caregivers that is likely to increase in the coming decades. In view of the behavior of this sample, it can be concluded that: (1) the burden of caring was attenuated in elderly caregivers; (2) for a significant group there is an overlap between variables of vulnerability associated with aging and care; (3) multimorbidity was associated with frailty, and if combined with perceived burden the chances of the elderly caregiver being frail are greater.

We have therefore identified a need for future research to monitor the transition in levels of frailty over the duration of care and to explore further the behavior and needs of these groups. There is also a need for further training and preparation in the social and health care network, so that the physical and psychological demands of these caregivers can be identified.

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Received: November 06, 2017
Reviewed: February 27, 2018
Accepted: April 20, 2018

http://dx.doi.org/10.1590/1981-22562018021.170118

The fabric of resilience among the elderly and the reinvention of the self despite the difficulties faced

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Abstract

Objective: To seek an understanding of how frail elderly persons construct resilience. *Method:* The "signs, meanings and actions" model was used. The population was randomly selected among elderly persons classified as *robust* or *pre-frail* in the FIBRA-study, Belo Horizonte, Minas Gerais, Brazil. Thirteen elderly persons (aged 69 to 86) were interviewed. *Results:* a) the construction of bonds - a healthy relationship with spouses, sons, daughters, grandchildren and great-grandchildren brings meaning to and sustains life and contributes to its organization; b) the reinvention of oneself - when suffering trauma, elderly people seek paths that can give sense to life, even if difficult memories persist; c) religiosity: catholic, evangelical or spiritualist experiences strengthen; cures, protections and so-called miracles are valued, and the religious community represents a space for belonging. *Conclusion:* Resilience is constructed through the bonds between the elderly person and those close to them, and in the search for solutions, including through the religious experience.

Keywords: Elderly. Psychological Resilience. Frail Elderly.

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Research funding: Minas Gerais Research Support Foundation (FAPEMIG) (APQ-00703-17), National Council for Scientific and Technological Development (CNPq) (research grant 303372/2014-1)

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INTRODUCTION

The term "resilience" conjures of the image of a leap forward, falling and getting back up again, flexibility, adaptation, resistance, overcoming, strengthening and recovery[1]. Individuals, although struck down by trauma, rebuild and resist. They suffer, but despite everything, maintain hope[2].

Human resilience refers to the strategies used to remove the barriers that limit us[3]. Everyone, at some point, must learn to endure and do the best they can: to step outside themselves and look within to recognize their inner resistance, compassion, courage and humanity, in order to support or help make the difficult paths of others bearable[4].

In old age, resilience forms part of coping strategies[5]. Literature describes how the development of these strategies[6] is important for the elderly person to assign meanings to the difficult events of life, transforming suffering into meaningful experiences. Frankl[7] states that finding a meaning for life provides the individual with great strength: a person can be deprived of everything but the ultimate freedom to take an alternative approach to situations. Goldemberg[8] describes the results of interviews with elderly people from the southern part of Rio de Janeiro, who state that a *beautiful old age* can be built through a life plan.

The authors of a review article describe the path that the concept of resilience must take[9], with three different generations of researchers addressing the theme. The first focuses on children and young people subjected to situations of extreme poverty and trauma yet who did not demonstrate problems with psychological or social adaptation in the future. The second phase went beyond personal qualities and processes of adaptability and asked about the psychosocial conditions and social and cultural processes that favor or hinder the response of the subject to adversity. Finally, the third phase recognized that resilience contains an element of social construction, a sharing of life with others. Although individuals can move forward through their own efforts, resilience is strengthened through the involvement of others. In this sense, resilience can favor the promotion of integrated health and the recovery of the human and social fabric, allowing the possibility of a dignified existence in unfavorable contexts. The question that arises, therefore, is how resilience occurs in a context of markedly unequal population aging, such as in Brazil?

One of the consequences of population aging is the increased number of frail elderly people[9]. Frailty can be defined by objective criteria, such as those proposed by Fried et al.[10], but also refers to the human condition of finitude and vulnerability, including the contradictions present in relationships[11]. A review on Brazilian academic production on the resilience of the elderly between 2000 to 2015 found low productivity on this theme [6]. Among elderly persons from the city of Belo Horizonte who participated in a multicentric study on frailty (the FIBRA Network), Vieira et al.[12] found a prevalence of frailty of 8.7%. The question then arises: how do these elderly persons create and/or seek resources to deal with their adversities? This study aims to seek an understanding, from the perspective of elderly persons who are becoming frail, about how they develop resilience to the troubles they perceive in their life.

METHOD

The sample of the present study was selected from the participants of a study that investigated the profile, associated factors and prevalence of frailty among the elderly, based on the criteria of Fried et al.[10] - the Study Network on Frailty Among The Brazilian Elderly (FIBRA Network). This was a cross-sectional, multidisciplinary and multi-centered study, based on five hubs (Universidade Federal de Minas Gerais, Universidade de Campinas, Universidade de São Paulo-Ribeirão Preto and the Universidade do Estado do Rio de Janeiro). For the present study, elderly persons classified as *robust* or *pre-frail* in 2009 were randomly selected from the database of the Belo Horizonte hub[13]. The increased morbidity and mortality observed in the frail group made their eligibility for the study impractical.

The interviews were conducted between January and August 2016 and included people of different genders, ages, functional status and place of residence. After being informed about the study and signing a Free and Informed Consent Form, the selected individuals were interviewed in person at their homes using a semi-structured script. The sample size was regulated by the saturation criterion[14].

Two generative questions were applied: a) *Is anything troubling you now*? and b) *How do you deal with what is troubling you?* These questions were used to understand perceptions about the process of becoming frail and the possible coping strategies developed.

Data collection and analysis were based on the "Signs, meanings and actions" model,[15] which allows an understanding of the significant elements of how the universe of health problems of each community is constructed, highlighting a particular symptom and encouraging an explanation and certain types of reactions and actions. This model departs from the pragmatic approach and instead functions at a semantic level. In it, the concrete behaviors of individuals can be identified along with the conceptual logics linked to such actions, as well as the different factors that influence them[15].

All the interviews were recorded, transcribed and exhaustively and closely read, to identify the analytical categories and their interaction between them, as well as their articulation with the current sociocultural context.

The analysis of the data included a descriptive organization, a panoramic reading, the identification of categories, an in-depth reading, modifications of categories; and a deeper theoretical investigation of relationships with other findings and interpretations present in literature and in secondary data.

To preserve anonymity, respondents were identified by order of interview, gender and age in years.

This study is part of the *Frailty among the elderly: perceptions, cultural mediation, coping and care*, approved by the Ethics Research Committee of the René Rachou da Fundação Oswaldo Cruz Research Center (Fiocruz) (CAE: 49173415.8.0000.5091).

RESULTS AND DISCUSSION

A total of thirteen elderly individuals aged 69-86 years (five men and eight women) were interviewed.

During the analysis the term "frailty" as defined in biomedical knowledge was not used by the interviewees. The perception of the process of becoming frail appears linked to the aging revealed in the suffering that reflects the life history, illnesses and other current problems of the elderly, such as a lack of financial resources and urban security. The terms "*my age*" and "*we can't do things like we used to*" refer both to the process of frailty linked to biological aging and to a broader existential sense of the term.

To deal with these frustrations, three nuclei of significance emerged on aspects of the fabric of resilience: *the construction of bonds*, *reinventing oneself*, and *religiosity*.

The construction of bonds

This category describes the different relationships that sustain resilience among frail elderly people. One woman who had taken care of her bedridden husband for more than two years, with limited financial resources, attributed the success of their 61 years of marriage to faithfulness, and repeated maxims like mantras, as they provided them with sustenance to deal with the life ahead: "That's the way life is: one day you're laughing, and one day you're crying. That's what the life of a couple is like. One day you're laughing, and the next you're crying." (I1, F, 83).

One participant who lived with his wife and was being treated for cancer (leukemia) explained: "On Sunday they (their grandchildren) come here and it turns into a party. Two of them are always here, so we take them to school. We take them there and pick them up afterwards. That's life." (I4, M, 69).

An elderly couple displayed affection, consideration, partnership and complicity in their gestures and speeches. The husband explained:

> "Over time we realize there are some things we can no longer do the way we used to. We need to be more cautious, more careful ... So we try to do them, but without ... getting frustrated. We think, well we're at that age, but the goal is to keep going as long as we can. If you work at it, I think you can extend it a little longer, in terms of what you want to do, you can live a little more peacefully with the family. Helping people calmly, the ones we need to help ... It's about talking, (...) not fighting for silly reasons" (I7, M, 78).

The same interviewee said the couple adopts an attitude of prevention:

> "I think they (others from the same age group) stop too early. They stop going for walks before they have to, and don't take care of their diet (...). We try and prevent things ... by taking a walk, or going to the doctor. (...) We do everything on the National Health Service, and we're doing well..." (I7, M, 78).

One elderly woman tried to understand the behavior of her grandchildren: "There are some things we are practically obliged to accept, and we can't get annoyed. [Laughs] ... they always come here for support." (I7, F, 73).

The presence of grandchildren brings pleasure and responsibility so that the elderly renew themselves, teaching and learning with the younger generation. This contributes to their satisfaction and feeling of belonging, which strengthens resilience.

One interviewee explained how to cultivate family harmony by avoiding conflicts and concerns:

> "My husband and I live alone, as our three children are married. (...) They don't cause us problems. We don't think we create problems for them either. (...) I think you need to have ... patience, to coexist together ... try and avoid things that are annoying, not suffer by anticipating things." (I9, F, 74).

One couple displayed a lack of affection through a tense and aggressive atmosphere. The wife, although she spoke about care and religiosity, externally, verbally and nonverbally exhibited resentment about dealing with her physically incapacitated husband. She says:

> "I feel sad when I look at my husband. (...) my life was supposed to be more than this, physically healthier, but I stopped doing my physical exercise, I stopped going out, I stopped dancing, I stopped everything – because of my husband." (I10, F, 72).

Another respondent, whose husband has Alzheimer's disease, said that in order to reduce her husband's suffering and irritation, she tried to minimize memory loss by making him feel comfortable. She sought and found strength in the happy memories of when they were dating. These findings agree with those of Frankl[7], for whom the positive moments lived become part of a body of achievements: reminiscing about them provides comfort and strength in the search for the meaning for life, despite current suffering.

The presence of friends and a support network is very important, as this elderly woman explained:

> "I have a great friend, who he (the sick husband) likes very much. She comes over and spends time with him so I can go out, and he sings the carnival songs, remembering all the old songs (...). It's not as hard for us nowadays. (...) I have organized my life, I have a taxi driver that takes him ... to physiotherapy ... he stays with him there, it's really good, he checks that he is doing it right. Meanwhile I get some time alone - because I need to be alone once in a while - I can go out a little." (I7, F, 86).

Social support is fundamental to the fabric of resilience. All the interviewees who were married, lived with their spouses, and described a good relationship with their partner demonstrated the fact that such a bond gives meaning to and sustains life, representing an organizing factor of comfort and well-being. These include affective experiences with friends and the support of children, grandchildren and great-grandchildren.

These findings agree with the reflections of Karin et al.[16], for whom, in the face of adversity, secure affective bonds provide support and a framework for summoning help, and are fertile ground for creating meaning that sustains life. Life can bring lasting pain which arises in unfavorable contexts, such as urban infrastructure, financial difficulties and chronic and/or progressive illnesses. Surviving each day becomes arduous, and affectionate bonding facilitates and encourages comfort and strength, motivating the individual to look for strategies that can create joy[17-19].

When social support is not present, the individual must reinvent themselves, as can be seen in the next category.

Reinventing oneself

The narratives demonstrate the experience of reinventing oneself with and despite adversities. One participant reported suffering that began in childhood, due to having suffered a congenital disease (toxoplasmosis) and being taken to live with another, evangelical family, because of his mother's disease (tuberculosis), following medical orders. When aged 22, he moved to the capital, lived in a rooming house, and suffered financial and food deprivation. He said that he developed, throughout his life, a dependent personality:

> "I have a very serious problem, because I was raised away from my family, and in a home. (...) I have become a very dependent person. I started to develop my independence after I turned 40. (...) I went for a civil service job (...) and I passed. After that, after the age of 40, I felt freer. I said 'I can't carry on like this, being dependent all my life, I have to do something'. That's when I woke up" (I12, M, 74).

Increased self-awareness has raised his awareness of his life process and brought a number of benefits. On the other hand, the interviewee acknowledged that if "I get worried about things, I suffer health problems." He said he currently had a healthy lifestyle with a balanced diet, health care through the National Health Service, and that he went for walks and was being treated for various medical problems: depression, prostate illness, hypertension and insomnia.

Another interviewee had a nervous breakdown when she was 25 and was thereafter labeled "crazy" and stigmatized:

> "The prejudice is enormous, the stigma is enormous, everyone calls you 'Crazy'. (...)I suffered a lot because of that, and I've been working with therapists and especially religious people." (I8, F, 69).

When asked about how she dealt with this, she explained that financial resources help a lot: "It's because you can pay a therapist, (...), pay a lawyer ... buy the medicine ..."

Other interviewees experienced financial difficulties, as in this extract:

> "I buy what I can, what I can afford, but I have debts. The bills are late, the water bill is late. But it's not just me. I heard on the radio that practically 64% of people are in this situation. So I don't spend more than I can." (I11, F, 74).

In the present study, experiences in childhood, youth, and old age, with or without financial resources, affected the lives of these individuals despite the fact they did not choose them. These frustrations and adversities have become the ingredients for a (re) construction of the self, as far as possible.

The perception of the interviewees about how they deal with what makes them frail relates to the experience of Cyrulnik[2]: resilience is metamorphosing, a re-creation of oneself. Metaphorically, in the fabric of resilience, when suffering a trauma, one part of the person becomes necrotic, while another seeks, through the strength that despair can bring, ways that give meaning to life, reaching out towards living and building. From this point on, a new philosophy emerges, a vision of one's own that gives meaning to the trauma, even if the memories of the suffering persist, such as in the form of flashbacks. The traumatized person seeks all that they can enable them to live with pleasure and meaning[2].

Religiosity

The presence of religiosity among the interviewees represented a pillar in the fabric of resilience, whether through contact with Catholicism, the evangelical church, or Kardecist spiritualism.

One Spiritist interviewed said:

> "(Religion) is something else that makes it much easier for us. I am a medium, I participate in a Spiritist group. He also works as a medium (...). I read a lot ... And we both talk about it". (I7, F, 73).

For her husband, religion allows one to deal more peacefully with death and life: "We are not afraid of the future or of dying". (I71, M, 78).

When faced with adversity, the expression of relief through spiritual healing, faith and contentment in the face of spirituality, represented a great facilitator of resilience for this elderly woman:

> "I had a serious heart problem, I was hospitalized. (...) I felt very low, and so on, but ... we don't go before we're called. (...) I underwent spiritual treatment, spiritual surgery, you know? And the results were excellent. (...) When I went back to the cardiologist, he said: 'You have an incredible physiognomy, you've improved so much, what happened?" (I11, F, 74).

With her income, she helps her grandchildren and children, including her unemployed daughter, as well as a brother with mental problems, who lives with her and brought 16 street dogs, which give off a strong odor of urine and feces, into the house.

For one evangelical man, who studied theology, religion brings "the guarantee of a future life, beyond this earth (...). This belief is vital for life to have meaning" (I12, M, 74).

Among the elderly Catholics interviewed, one elderly man commented that he goes to Mass occasionally, but prays every day, asking for: "Safety, health. Illumination of the lives of all his children, both the older and the younger ones". (I4, M, 69). He recognizes the importance of his father's teachings, the values he was taught, which he made a point of passing on to his children: "Work and honesty, and respect for others. So, today, they are all on the right track." (I4, M, 69).

One elderly woman (I1, F, 83) attributed miracles such as the identification of a painless gastric tumor to her devotion to St. Lazarus. The early detection of her condition meant it could be operated on and she subsequently regained her health. When faced with greater pain – the death of her son, which resulted in her voice breaking up during the interview – she also sought solace in faith.

Regardless of the faith professed, the interviewees sought meanings to make sense of life in their religiosity. In religious experience, the individual is guided by the voice of transcendence and the moral conscience, which provides answers to the questions that arise in everyday situations[20].

A qualitative study on the perception of the elderly about functional incapacity, carried out in Bambuí (Minas Gerais), demonstrated that religiosity works as a form of emotional regulation, and provides the experience of acceptance by an Other, a God that keeps one company, fulfills one, brings peace, and allows the individual to endure the vicissitudes of life more calmly[21]. Our interviewees in Belo Horizonte (Minas Gerais), construct solutions to their suffering and tend to set aside the acceptance that religion provides, only applying it in situations which truly cannot be changed.

As such, religiosity serves as a supportive medium for accepting what cannot be changed and living with it, but/and at the same time actively striving to change what is possible, working towards the solution of problems and the construction of happiness, through a belief in cures, protections, miracles.

The religious community has been valued as a space of belonging, coexistence and well-being, as it allows a sense of connection and brings meaning to life.[16] The individual discovers, through faith, the chance to be accepted in this or another life(s). This certainty and the confidence that is constructed allow strategies to take an active attitude towards reconnecting (the word stems from the Latin "*ligare*", meaning to join or link) with the world.

The responses of the elderly interviewed in this research are consistent with the research of Job[22], which focuses on the resilience of thirty elderly Jewish people living in São Paulo, survivors of Nazism, and the research by Molton and Yorston[23] whose participants emphasized that for them, autonomy meant the ability to exert choices, but that this often required negotiation with and assistance from others. Both considered the support of secure bonds, faith and coping skills to be essential factors. Job[22] pointed out that the survivors found meanings of creation and freedom for their lives. Congruent meanings were found among the elderly in Sweden interviewed by Ebrahimi et al.[24], who identified the following factors as contributing to resilience in old age: reinforcing a positive outlook; the good humor and the willingness to carry on and continue living; remaining in family surroundings; having good health and the ability to manage daily activities; keeping busy and engaged in useful activities, and not feeling like a burden to others. Social interaction validated a sense of connection

with others, including acknowledging that there was someone in their lives who cared about them: the elderly Swedish people recognized, as a principle for good health, the need to feel capable, to have control over their body and their psychosocial context.

The construction of resilience allows us to resume/construct our development, to be affected by situations in a new way, to learn through experiences that restore our vital force, and requires the participation of another (who encourages the well-being and active lifestyle of the individual)[17].

It should be stated that resilience is not a search for perfection or complete joy. Nor is it a capacity, a set of attributes that allows one to overcome obstacles and become more resilient, happy and productive. It does include, however, a reflexivity regarding social contradictions and attitudes toward sociopolitical changes[24] which can generate suffering.

Among the limitations of the present study is the impossibility of interviewing elderly people who were very frail/incapacitated, which prevents us from understanding the strategies of resilience used by those individuals in such conditions. Another is the possibility that frailty manifests itself in situations that could not be captured in the interviews. It was sought to minimize this concern through careful observation throughout the entire process of data collection and analysis.

Adversities have an impact through the inner representation that each person constructs of them, which is based on the way in which their narrative is received in the family and social context. History is not a destiny but an opening. In old age, resilience is maintained through the use of various coping strategies, based on personal, social and spiritual resources[5,23-25]. Aging, too, allows one to say yes to life, despite everything[7].

CONCLUSION

The elderly persons interviewed in the present study dealt with the process of becoming frail as a natural consequence of aging and, when faced with the perceived troubles of their lives, build resilience from the resources they have, such as socio-family relationships and religion. Understanding how the elderly deal with frailty can help professionals, families and administrators involved in elderly care develop strategies to raise awareness about creative and healthy ways to care for and promote quality of life; by developing policies aimed at improving the quality of life of the aging population that is more focused on health, autonomy and potential than on their diseases, losses and limits.

In old age, we can see resilience in the affective fabric between the suffering elderly person and their surroundings. In this movement of seeking strategies to deal with suffering, the narratives highlighted the importance of affectionate bonds for all respondents, such as support and a suitable environment to develop strategies to deal with suffering and motivation for life. The possibility of being loved and faith allow us to resume our development and continue to reinvent ourselves, despite everything ...

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Received: August 02, 2017
Reviewed: March 27, 2018
Accepted: May 15, 2018

http://dx.doi.org/10.1590/1981-22562018021.170168

Scientific production on falls and deaths among elderly persons: a bibliometric analysis

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Abstract

Objective: To map international scientific production on falls and deaths among the elderly. *Method:* A bibliometric study of academic papers was carried out in the ISI Web of Knowledge/Web of Science™. The search terms "elderly*", "fall*" and "death*" were used for studies between 1990 and 2016. Articles from events or those still in the editing process and studies in the form of "conference proceedings", "editorial material" and "letters" were excluded, with only finished studies and complete "articles" and "reviews" considered. *Results:* After applying the refinement filters, 668 articles were identified during the 26 year evaluation period, published in 364 different journals indexed to the database in question. These were written by 2,958 authors with links to 1131 research institutions located in 63 countries. The articles included 22,093 references, with an average of approximately 33 references per study. *Conclusion:* The articles on falls and deaths among the elderly emphasize the need for more specific studies on the subject and its potential for exploration in future research. This study revealed the need for this issue to be discussed in the training of health professionals, as it represents an opportunity to deconstruct and reconstruct concepts and values that are established throughout the life of individuals, such as care related to the avoidability of falls, to improve the quality of life of this population.

Keywords: Health of the Elderly. Accidental Falls. Mortality. Bibliometrics.

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INTRODUCTION

Population aging is natural and universal phenomenon, and can result in individuals reducing their normal functional capacities, culminating in recurrent illnesses and accidents. In Brazil, the numbers of elderly persons are increasing, reflecting a real and characteristic panorama of demographic transition and a reduction in mortality and fertility rates[1].This profile raises questions and challenges that require new studies and reflections in order to meet the demands of this age group. Aspects related to comorbidities and the disorders that arise with age are therefore of particular importance, notably postural instability and falls, geriatric syndromes that encompass the alterations relevant to the elderly person, and thus representing a key public health problem due to their high rates of occurrence and intercurrence among this population, resulting in costs to the health service[2].

The World Health Organization (WHO) conceptualizes falls as "an event that results in a person coming to rest inadvertently on the ground or floor or other lower level, excluding intentional changes of position to support themselves on furniture, walls or other objects." The organization reports that 28% to 35% of people over 65 years of age suffer falls each year, with this proportion increasing to 32% to 42% among those aged over 70 years[3].

The risk of falls is pertinent to the entire population. Among the elderly, however, it has a more significant meaning, as such events "can lead to incapacity, injury and death", thus generating psychological, social and economic costs, directly resulting in the reduced autonomy of the elderly[4]. Brazilian[5,6]and non-Brazilian[7,8]studies cite falls as one of the significant causes of mortality, morbidity and disability among the elderly population.

The relationship of death and falls and elderly persons is a highly relevant topic, as the mortality of the elderly in health services has not yet been satisfactorily recorded, either due to under-informing or under reporting. The initial cause of the process of morbidity, namely the fall itself, is often neglected, and the diseases resulting from falls or hospitalization, such as infections, after the elderly person enters the health service, are prioritized[9].

Under-informing consists of the incorrect completion of death certificates. This fact arises from a lack of knowledge among professionals responsible for the proper completion of the Death Certificate (DC) and the importance of this document as a source of health data. Underreporting, meanwhile, consists of not reporting deaths to the Mortality Information System (MIS), a frequent problem in the north, northeast and central-west regions[9] of Brazil. Thus, under-informing and underreporting can mask the true scale of the disease, omitting death rates due to falls and hindering the planning of public health policies[10].

Due to the importance attributed to studies that focus on the health of the elderly, especially those seeking strategies to improve the quality of life of this population, there is a clear need for researchers to focus their work on new ways of caring for the elderly. The state of the art on this subject may therefore benefit from bibliometric studies.

Bibliometrics is formed of a group of laws and empirical principles derived from the science of information, whose primary purpose is to explore the quantitative aspects of findings from literature, dissipate available and recorded information, and identify the most prolific research areas, researchers, periodicals and institutions in a certain theme or related areas, as well as frequently cited works[11].

Moura et al[12]state that the analysis of citations allows the measuring of the repercussion and visibility of certain authors, which institutions are most active in the subject and which is the most frequently used source of information, or in other words, provide a mapping of a certain area of knowledge and identify consolidated theories and methodologies.

In the present article, bibliometric research was applied to answer the following question: *what is the scientific production regarding the association between fallsand death among elderly people?*

By answering this question through the use of bibliometric metrics, the objective was to map the

international scientific production on falls and deaths among elderly persons.

METHOD

An exploratory and descriptive bibliometric study was performed. This data collection and analysis technique has been identified as an argumentative source in the battle for research investment resources, academic rankings and as a basis for choosing scientific productions ona theme[13].

The steps for the analysis performed here follow three procedures: the definition of the database to be consulted and the criteria to be used for collection; the collection of data; and the representation and analysis of the same[14].

The ISI Web of Knowledge/Web of Science database was selected due to its "academic recognition as one of the most comprehensive databases of journals covering several areas of scientific knowledge", and its important and pioneering role in bringing together journals from more than 100 areas of knowledge[12].

For data collection, carried out between July and August 2017, the search period was established as the complete years covered by the database (1945-2016), in order to allow the replication or updating of this study without the need to start again from the beginning.

The descriptors were defined from the Descriptors in Health Sciences (DeCS) catalog, with the following search terms selected: "elderly*", "fall*" and "death*". Other commonly used terms, such as "older" or "frail", were not included in the search terms as they are synonyms for "elderly" within the DeCS library. The quotation marks indicate the exact representation of terms with more than one word and the asterisks identify the inclusion of plurals. These terms represent the intended combinations used for the purpose of the study.

Data collection was performed by searching for these terms in the "topic" area, which represents the titles, abstracts, author's keywords and keywords created (keywords plus) of articles.

After the search, the works found were refined through the application of the filters provided by the database search engine. No refinement filter was applied for the areas of knowledge, countries or languages of the studies, and so all records of publications that had a combination of the three terms were included. Articles from events or considered to be in the editing process (conference proceedings), records arising from proceedings papers, editorial material and letters were excluded from the results, resulting in the inclusion of final and complete articles and reviews only. A total of 668 studies were thus identified, which were used as the set of articles for the bibliometric analysis proposed in this article.

The material was then analyzed by exporting the data into the HistCite™ bibliometric analysis software package in order to organize the information and facilitate analysis. The following items were analyzed: the trajectory of the annual evolution of publications; the journals with the greatest number of records; the authors with the most publications; and the number of articles distributed by author's country of origin. In addition to these data generated by the software, the ten articles most cited globally and the ten most cited articles locally were elucidated in order to identify their main contributions to the subject of falls and death among elderly persons.

As this was a bibliometric study, it was not required to be submitted to the Ethics Committee For Research Involving Human Beings. However, the researchers committed to maintaining the ethical principles advocated for research of this nature, respecting the ideas and citations and referencing the authors and their publications.

RESULTS

The search conducted for the period from 1945 to 2016 identified the first article as appearing in 1990. The results evaluated therefore covered the period from 1990 to 2016.

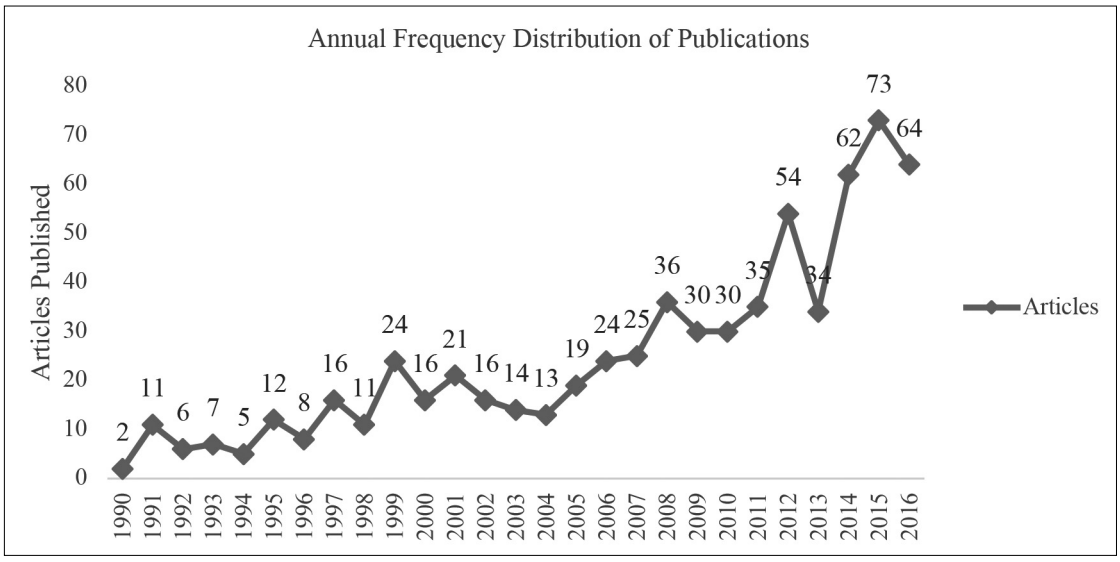
Following the bibliometric survey, 668 articles were identified that included the descriptors related to the study within their scope. These articles

were published in 364 different journals indexed to the database in question and written by 2,958 authors linked to 1,131 research institutions located in 63 countries. These articles employed 22,093 references, with an average of approximately 33 references per article.

The evolution of scientific production in the field of study of falls and death among the elderly is shown in Figure 1, which shows the annual number of publications in the period studied. It is notable that international interest on the subject began in the nineties and has increased since this period, with some peaks and troughs over time.

In order to identify the most heavily represented international journals in the area of research on falls and death in the elderly, the 364 journals were analyzed based on the number of articles published on the subject and the total number of citations.

Table 1 shows the list of the most representative journals in terms of the number of publications on the topic under study. The relationship between the number of citations and the number of articles published in each of the journals can also be seen, providing initial information on the impact of articles identified in these journals through the total number of citations received.



Source: Web of Science, 2017.

Figure 1. Distribution of publications on falls and deaths among the elderly from 1990 to 2016.

Table 1. Top Ten Journals with most articles published between1990and2016in the Web Of Science database (2017).

Journals	Quantity of articles	Citations	Citations/ Quantity
Journal of the American Geriatrics Society	24	1,373	57.21
Injury-International Journal of the Care of the Injured	17	242	14.24
Age and Ageing	14	506	36.14
Archives of Gerontology and Geriatrics	13	182	14.00
Plos One	12	80	6.67
Journals of Gerontology Series A-Biological Sciences and Medical Sciences	10	4,378	**437.80**
Aging Clinical and Experimental Research	9	65	7.20
Drugs & Aging	9	405	45.00
European Journal of Epidemiology	9	103	11.45
Journal of Trauma-Injury Infection and Critical Care	9	410	45.56
Total	126	7,744	-

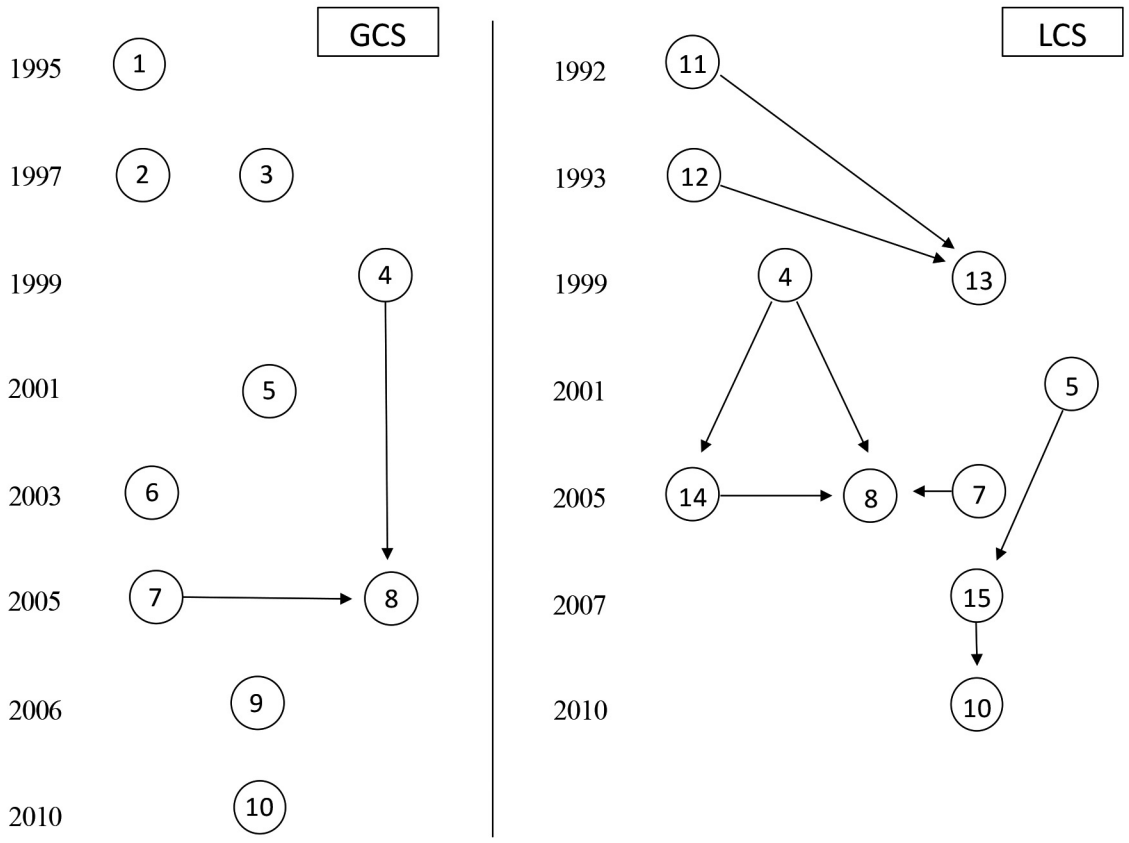
The authors with the most publications on the subject, their institutional links and the country of origin of the institution were then identified. Among the authors with the most publications on the subject in the Web of Science database are Krannus P. with ten publications, Parkkari J. with eight and Palvanen M. with seven. These authors are all from the University of Tampere in Finland.

The most representative countries, with most of the scientific production in the field studied, were Australia, Canada, Finland, the UK and the USA. Although the USA has the greatest number of publications, with 233 articles, representing 35% of the published works, Finland, with only 19 articles (3% of the total), is home to the institution linked to the most frequently cited authors.

The classification of scientific studies by the number of citations received reveals the works that are considered the fundamental basis for the subject. While it takes some time for articles to begin to be cited by other researchers, the evaluation of the citations in the present study sought to establish the state of the art in the area of research on falls and deaths among the elderly, based on articles with titles that include the terms used in the searches and indexed in one of the previously identified journals with the highest number of citations on the subject.

With these criteria, ten articles were selected, which were analyzed with the Historiograph/ HistCite tool, through which it was possible to identify articles that are related to one other, mainly through the references used and/or cited (Figure 2), where each "circle" represents an article, the number of which identifies the work (author(s), year); each "arrow" shows the links between the articles, and the direction of the arrows indicates the relationship between the work and the study that later cites it; the "GCS" side represents the Global Citation Score of the Top Ten articles on the topic which received the greatest amount of citations in the *Web of Science*™; and the "LCS" side represents the Local Citations Score of the ten articles on the topic that received the greatest number of citations of the selected articles. This graphic representation allowed the time line and main articles of the studied subject to be defined.

Within the GCS, the first article cited, the study by Abraira et al. (1)[15], was not included in the discussion of this study as the keyword "fall" does not refer to an accident as described by the WHO[3], but to a drop in glycohemoglobin levels. The studies by Staessen et al. (2)[16], Keatinge et al. (3)[17], Kario et al. (6)[20]and Duncan et al. (9)[23], also described falls as something other than a physical accident, and were therefore not included in the present study.



GCS:*Global Citation Score* (Top Ten articles on the theme that received the greatest number of citations on the *Web of Science*™); LCS:*Local Citation Score* (Top Ten articles on the theme that received the greatest number of citations from the articles selected).

1. Abraira et al. (1995)[15]
2. Staessen et al. (1997)[16]
3. Keatinge et al. (1997)[17]
4. Kannus et al. (1999)[18]
5. Fried et al (2001)[19]
6. Kario et al. (2003)[20]
7. Grant et al. (2005)[21]
8. Kannus et al. (2005)[22]
9. Duncan et al. (2006)[23]
10. Deandrea et al. (2010)[24]
11. Wolinsky et al. (1992)[25]
12. Tinetti et al. (1993)[26]
13.Donald et Bulpitt (1999)[27]
14. Kannus et al. (2005a)[28]
15. Ensrud et al. (2007)[29]

Figure 2. Top Tenmost cited articles on Web of Science™ (Global Citation Score) and Top Tenmost cited articles in the group of selected articles (Local Citation Score) within the selected group.

DISCUSSION

The results of the present bibliometric review identified few articles on the subject of death due to falls among elderly persons in the Web of Science database.

In terms of the evolution of scientific production, Figure 1 shows that the number of articles published remained low during the first half of the 2000s, with a slight peak in 1999, most likely because this year was proclaimed the International Year of the Elderly by the United Nations, which may have increased interest in research in this area of study. Production increased slightly from 2005 onwards, with the small decline in 2016 reflecting the fact that the databases or indexations for this year were incomplete at the time of collection of this study.

The trend line of the subject shows a discrete increase in the number of publications, indicating that there is renewed interest among the international

scientific community in disseminating knowledge from this field of study, while gaps to be addressed in the topic of study remain.

The ten most cited journals (Table 1) comprised approximately 19% of the total articles retrieved. The Journal of the American Geriatrics Society had the largest number of publications, with approximately 4% of the total articles, but the Journals of Gerontology Series A-Biological Sciences and Medical Sciences had ten publications and 4,378 citations, considerably increasing its impact factor in the subject studied, since the amount of citations a journal obtains can serve as an indicator of the relevance of the works.

With regard to the most representative authors and institutions in this subject, the most cited authors were linked to only seven universities in five countries, most notably the University of Tampere in Finland, with 31 publications, approximately5% of the papers. This represents a share greater than the sum of articles of the other countries combined, identifying Finland as a leading nation in research on falls and deaths in the elderly.

The list does not include Brazilian researchers, or researchers linked to Brazilian institutions, revealing the scarcity of publications on the subject in journals indexed by the Web of Science from this country, and indicating a gap in its knowledge base.

The relationship between the articles in Figure 2 revealed numbers (4)[18] and (7)[21] to be considered "authority articles" or "base articles" which are the main references for other authors and the subject of the greatest number of citations[14, 30]

In addition to the authority articles, there are also "hub" or "connection" articles[14],which condense important information from previous works, connecting them with more recent studies, and which are frequently cited, identified by numbers(8)[22], (10)[24], (13)[27]and (15)[29].

The first study on the proposed theme was found in 1999 in the form of the publication by Kannus et al. (4)[25], which was considered both a global and a local authority article in the relationship shown in Figure 2. This study verified lesions and death-induced deaths among older adults in a white population aged over 50 years in Finland from 1970 to 1995. It found that the number of falls-induced deaths increased considerably over the years studied, with an overall increase of 136%, and concluded that the number of elderly persons with fall-induced injuries increased at a rate that cannot be explained simply by demographic changes. This study suggested the adoption of large-scale preventive measures to control the increase of these lesions, recommendations that were reinforced by later studies[2,31,32].

The study by Grant et al. (7)[26] evaluated whether the consumption of supplements such as vitamin D and calcium could prevent low trauma secondary fractures. The results showed that there was no difference in fracture incidence, number of falls or quality of life, concluding that oral supplementation is not a protective factor against fractures among the elderly. This is a subject that deserves further evaluation, since there are studies that indicate that the use of supplements is a protective factor[33,28], while others have found no impact through the use of these supplements[34].

Of the Hub articles, the first study with a major impact was that of Kannus et al.(8)[28]which analyzed the effectiveness of prevention when reducing the risk of falls of the elderly person. The study found that there are prevention programs, such as regular exercises; vitamin D and/or calcium supplementation; suspension of psychotropics; ocular surgeries; evaluation and professional modification of environmental risks; hip protectors and multifactorial preventive programs to evaluate and reduce many of the predisposed and situational risk factors both at home and in hospitals and long-term institutions, similar to thereview study by Falsarella et al[33]. The study by Kannus et al[32] also contributed to the identification of gaps in the implementation of these programs aimed at the elderly, thus demonstrating the importance of new research for the scientific environment.

In Hub article No. 13[27], the authors carried out a study that aimed to determine results among elderly persons who fell once or more than once in their homes, indicating a stronger relationship between

individuals who suffered falls and admission to long-term care facilities than the between falls and death, results corroborated by the study of Souza et al[35], where institutionalized elderly people were found to be at a greater risk of falls than those living in the community, reinforcing family and domestic support as a vitally important factor for the quality of life of the elderly person.

Ensrud et al[19], in study No. 15, found a standard frailty phenotype associated with the risk of falls, fractures and mortality in elderly women, following a cohort of 6,724 women over 68 years of age; and concluded that frail women were at increased risk of recurrent falls, various fractures and death. Similar results were found in the Nascimento and Tavares study[2], indicating that the frailty of an elderly person is an important predisposing factor to falls.

Study No.10 by Deandrea et al[24] investigated risk factors for falls among elderly people living in the community, namely history of falls; gait problems; use of walking aids; vertigo; Parkinson's disease and the use of psychotropic drugs, with a higher risk of recurrent falls. Rodrigues et al[36] found similar factors in a study carried out in 2014.

The present study has some limitations, one of which is the use of a single database, the Web Of Science, for analysis. Another limitation relates to the use of the descriptor "fall", which identified results not only for the fall as a physical accident, but for falls of rates, among other factors, which hindered the evaluation of the final results.

It is important to consider that there are few findings in literature that address this problem as a factor with social and professional impact, as there is a need to consider old age as an important aspect of life and the locus of new health policies, as this population continues to grow and demands specific products and services.

CONCLUSION

The present study carried out a bibliometric mapping of international scientific evidence about falls and deaths among the elderly in the ISI Web of Knowledge/Web of Science database, allowing the identification of bibliometric indicators to characterize the state of the art related to the subject and presenting the relevant works on the subject, periodicals, countries and the authors with the greatest number of publications and citations.

Because it is a specific population, there is a need to discuss this issue in the training of health professionals, as it constitutes a possibility for reviewing lifelong concepts and for avoiding falls, so improving the quality of life of this population.

The present study also found that there are gaps and research opportunities to be explored, in addition to conflicting results, and recommends further studies that compare the results presented in this work in international and national databases, as well as investigating the representativeness and profile of publications of Brazilian authors, which were not identified in this bibliometric analysis.

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Received: October 30, 2017
Reviewed: March 13, 2018
Accepted: May 01, 2018

http://dx.doi.org/10.1590/1981-22562018021.170177

Satisfaction with family relations and support according to elderly persons caring for elderly relatives

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Abstract

Objective: The aim of the presentstudy was to investigate the associations between the satisfaction of family caregivers and family relations; sociodemographic variables; the type and direction, sufficiency and burden of family support, and the number of social partners involved. *Method:* A total of 148 caregivers of elderly relatives who were physically and cognitively dependent were recruited from medical clinics and home care services in cities in the state of São Paulo and invited to respond to a questionnaire about family support, and to a scale of satisfaction with family relationships with reference to adaptation, partnership, growth, affection and resolutive capacity. The chi-squared and Fisher's exact tests were used to compare frequencies for the scores of the two satisfaction levels (low and intermediate, and high). To analyze the relationship between high levels of satisfaction and other variables, univariate and hierarchical logistic regression analysis was used. *Results:* High levels of satisfaction were related to the reciprocity and suffiency of received emotional support, and absence of burden associated to giving support. The adequacy of emotional support was most strongly associated with high levels of satisfaction with family relationships. *Conclusion:* For the satisfaction of caregivers of elderly persons with family functioning, quality of support is better than quantity, reciprocity is more important than unidirectionality and emotional is the most important type of support.

Keywords: Family Dynamics. Social Support. Evaluation. Frail Elderly. Family Caregiver.

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INTRODUCTION

Family support involves complex relations of giving and receiving material assistance, instrumental support aimed at behavior or the context of care and emotional support expressed through presence, companionship, affection, empathy, listening, and confirmation[1]. Several questions permeate the theoretical study of such assistance and the intervention itself, aimed at understanding and managing support and relationships with elderly persons within the family. What is more important for the elderly person: providing or receiving support? There is no single answer to this question, which is related to age, gender, the size of the closest social network of the individual and the motives of those involved[1-3]. Who helps more in family relationships, elderly women or men? In general, women offer more instrumental and affective support to their peers and descendants than men, who in turn offer more material support to their children[2]. By behaving in this way, both respond to social norms associated with gender and specific conditions of the possession of material goods[4,5]. What offers the greater assurance of help to the elderly, home-based intergenerational arrangements or marriage? The answer is that it depends. Where there is marked physical and cognitive dependence of a spouse, when their partner is no longer able to offer the necessary instrumental assistance, co-dependence with descendants may favor protection[3,4]. Often, co-residence functions as an arrangement of survival or convenience for members of two or more impoverished generations, with care provided to the elderly within this context of needs[4]. Intergenerationality is not necessarily a guarantee of the adequate supply of care[2,4,5].

The majority of elderly persons value the support they receive as a reinforcement of the affective ties constructed within the family. Others perceive the risk of appearing dependent and incompetent in the support received[1,6]. Providing support in a positive emotional setting, combined with personal characteristics among the recipients of care that predispose them to accepting help increases the chance of the subjective well-being of such individuals[6]. However, support that is considered exaggerated or disruptive and a lack of contact with partners of their choosing can generate more stress and harm to the well-being of the elderly than a lack of support[7].

Smilkstein[8,9] describes family functionality in terms of five resources: adaptability, partnership, growth, affectivity, and resolutive capacity. In the daily routine of caring for the elderly, the functionality of family relations is constantly subjected to cognitive evaluation, a process that consists of comparing what is observed with individual and group norms, values and expectations. Satisfaction with the dynamics of family relations is a strong determinant of subjective well-being which, in turn, is related to other positive outcomes in the physical and mental health of caregivers[8,10].

Knowing how elderly caregivers of other elderly persons perceives the dynamics of family functionality and the exchanges of support in the context of care is fundamental to understanding how families organize themselves to meet the demands of everyday life and provide the necessary resources for the well-being of family members.

The present study aimed to investigate associations between the satisfaction of family caregivers of the elderly with family relations; sociodemographic variables; the type, direction, adequacy and burden of family support; and the number of social partners involved.

METHOD

Adopting a descriptive and analytical cross-sectional perspective, the present study used the database of the "Psychological Well-Being of Elderly Persons who Care for Other Elderly Persons in a Family Context" study, from which the variables of interest were extracted. The sample size was calculated as 148 individuals, based on the correlations between quality of life measures[11,12] and perceived burden[13,14], which were part of the main survey protocol (significance level 1%, test power 90% and minimum correlations of 0.40).

The eligibility criteria for the sample were: aged 60 or older, have cared for a sick elderly relative with some degree of dependence for six months or more, and score above the cut-off point in the CASI-S (Cognitive Abilities Screening Instrument - mini-test)[15,16] at an initial interview. Based on these criteria, 148 participants were selected, 48.0% of whom were indicated by public services; 8.8% by private

home care services; 39.9% by geriatricians or related specialties where the care recipients were elderly; and professionals of the Family Health Program (3.4%) in the cities of Jundiaí (38.5%), Indaiatuba (29 , 1%), Campinas (18.2%) and Vinhedo (14.2%) in the state of São Paulo.

In order to evaluate satisfaction with family relations, the family APGAR measure was adopted[8,9], an acronym that corresponds to adaptability, partnership, growth, affectivity, and resolutive capacity. These resources of family functionality were evaluated by caregivers through five three-point scales (0=never, 1=sometimes, or 2=always). Total scores from 0 to 4 indicated low levels of satisfaction; 5 and 6 intermediate satisfaction, and 7 to 10 high levels of satisfaction.

The sociodemographic variables considered were gender, based on a yes or no answer to the alternatives male and female; age, which asked for the number of years lived since the date of birth; living arrangements, which included the questions "do you live alone?" (yes x no) and "who do you live with?" for those who answered no, with the alternatives being husband, wife or partner, father or mother, father-in-law or mother-in-law, daughter or son, husband or wife of daughter or son, grandchildren, great-grandchildren, other relatives and non-family members, all with yes or no answers. Cohabiting was evaluated by the question "do you live with the person you care for?" with a yes or no answer.

The variables *dynamic of material, instrumental and emotional support in the family* and *nature of the link with the social partners involved* were evaluated through two questions. The first focused on whether the caregiver received and provided material, emotional and instrumental support for Instrumental Activities of Daily Living (IADL) and Basic Activities of Daily Living (BADL) in the context of the family. The second identified the person with whom the individual exchanged support. The options were: spouse or partner; parents and in-laws; children, son-in-law/daughter-in-law, grandchild and great-grandchild; other relatives; friends or neighbors; volunteers; domestic employees; health professionals and the person cared for. The answers were recorded in a matrix derived from the study of Allen and Wiles[1], together with the results of the application of the assessment items described below.

The evaluation of the adequacy of the support received and the burden caused by the provision of support was made shortly after the introduction of the items on the support received and provided. Those who received support were asked if it met their needs or expectations. In order to identify whether each type of support offered was a generator of burden for the caregiver, direct questions were asked, with yes or no alternatives.

Seven trained interviewers carried out interviews in homes (61.5%), private doctor's offices (25.0%) and the geriatric outpatient clinics of a university hospital (13.5%), duly authorized by those responsible for the services and according to the availability of the caregivers. The mean duration of the single session in which each caregiver participated was 56.0 (+12.2) minutes, which included the items of interest of the present research and the other items of the study on the psychological well-being of caregivers, of which it is part. The project was approved by the Research Ethics Committee of the Universidade Estadual de Campinas (CAAE nº 35868514.8.0000.5404) which also approved the contents of the Free and Informed Consent Form, which was read, discussed and signed by all caregivers.

To analyze the data, two sets of points in the family APGAR were created: 7 to 10 – high levels of satisfaction, and 0 to 6 - low and intermediate levels of satisfaction. The variable *direction of support* was derived from the answers *yes* or *no* to the alternatives *I receive* and *I provide*, with the variations: unidirectional (only receive or only provide), reciprocal (receive and provide) and absence (neither receive nor provide). For each type of support the number of social partners which only provided, only received, or which exchanged reciprocal support was counted. The nature of the bond was not considered. The alternatives for housing arrangements were reduced to five: spouse; spouse and ascendants; spouse, ascendants and descendants; ascendants and descendants, and others (other relatives, friends, people from outside the family, neighbors).

The Shapiro-Wilk test was used to analyze the suitability of the distributions for the use of parametric tests. Based on their non-parametric nature the chi-squared and Fisher exact tests were used to compare the frequencies of the scores of the participants for the two levels of satisfaction (0 to 6

and 7 or more). The Mann-Whitney test was used to compare the distributions of the ordinal variables, according to the two levels of satisfaction.

To analyze the relationship between high levels of satisfaction with family relations and the other variables, univariate logistic regression analyzes were performed, based on which the variables with an association with the dependent variable were selected, with statistical significance indicated by p <0.30. These variables were organized in a hierarchical multivariate regression model, with three blocks of variables, which were introduced consecutively. Block 1 included the types and directions of supports variables; Block 2 the number of social partners available for the exchange of support, and Block 3 the adequacy of the support received and the sense of burden of the support provided. The multivariate analysis data were adjusted for gender and age.

RESULTS

The caregivers had an average age of 69.8 (+7.1) years and the recipients of care an average age of 81.2 (+9.9). The average duration of care, from the outset, was 4.5 (+4.1) years. Of the care recipients, 31.1% had severe dementia, 24.2% mild or moderate dementia, 23.6% questionable dementia and 21.1% an absence of dementia, according to the scores attributed by caregivers using the Clinical Dementia Rating instrument[17,18]; 21.0% were described by their caregivers as having limited mobility; 44.3% as incapable of carrying out five or six BADL without help and 66.2% as incapable of carrying out between five and seven IADL without help.

The majority of caregivers were women (77.0%). There was a predominance of married families (39.9%) and those formed by a pair of elderly persons, their ascendants (parents or in-laws) and descendants (children and grandchildren) (27.7%). The majority resided with the elderly recipient of care (85.7%).

Most caregivers scored high in satisfaction with family relations (68.1%). Among both highly satisfied caregivers and those with low or intermediate satisfaction, there was a significantly higher percentage of people who only received or provided care than there was of those who did not provide and did not receive instrumental support for BADL.

There was a higher percentage of caregivers with high levels of satisfaction among those who reported experiencing reciprocal emotional support, and a higher percentage of caregivers who only received emotional support than those who did not receive and did not provide such support among caregivers with low and intermediate satisfaction with family relations. A higher percentage of elderly persons with high levels of satisfaction was observed among those who had at least one social partner involved in the exchange of support and a higher percentage of caregivers with intermediate and low satisfaction was found among those who had none. There was a higher frequency of caregivers with high levels of satisfaction among those who judged the emotional support they received to be adequate and of low or intermediate satisfaction among those who considered such support to be inadequate. The non-provision or provision of support for IADL, without burden, was related to high satisfaction, while burden associated with the provision of support for IADL was related to low or intermediate satisfaction (Table 1).

Univariate regression analyzes were performed to investigate the associations between high levels of satisfaction with family relations and the independent variables. A p value <0.030 was used as the selection criterion. With respect to the type of support and the nature of the family exchanges, the following were related to high levels of satisfaction with family relations: neither provide nor receive material support, in comparison with only offering and only receiving material support; neither provide nor receive instrumental support for BADL and IADL, in comparison with only offering and only receiving such support; neither provide nor receive emotional support, in comparison with only offering and receiving such support; one or more social partners from whom caregivers receive instrumental support for BADLs and emotional support, in comparison with none; one or more social partners to provide material and instrumental support for BADLs and IADLs, in comparison with no partners (Table 2).

For the association between high levels of satisfaction and the number of social partners involved in the support the following variables were selected: have one or more social partners from whom the individual can receive emotional support versus none, and have one or more social partners to whom the individual can provide instrumental support for BADL and IADL versus none (Table 3).

Table 1. Caregivers according to levels of satisfaction with family relations, considering exchanges of support, number of social partners and the evaluation of the support received and provided. Campinas, São Paulo, 2015-2016.

Variables	n	Satisfaction with family relations		p value
		Low and intermediate (06) n (%)	High (7-10) n (%)	
Support for BADL				
Only receive/only provide	91	32 (**68.08**)	59 (**59.00**)	0.043*
Reciprocity	10	5 (10.64)	5 (5.00)	
Neither receive nor provide	46	10 (**21.28**)	36 **(36.00)**	
Emotional support				
Only receive	12	5 (**10.64**)	7 (7.00)	**<0.001***
Only provide	32	19 (40.43)	13 (13.00)	
Reciprocity	90	19 (40.43)	71 (**71.00**)	
Neither receive nor provide	13	4 (**8.51**)	9 (9.00)	
Social partners				
0	44	5 (**10.64**)	22 (22.22)	**<0.001****
1	58	19 (40.43)	42 (**42.42**)	
≥2	43	19 (40.43)	35 (**35.35**)	
Evaluation of emotional support received				
Do not receive	43	22 (**47.83**)	21 (21.65)	**<0.001****
Adequate	81	15 (32.61)	66 (**68.04**)	
Inadequate	19	9 (**19.57**)	10 (10.31)	
Evaluation of the support provided for IADL				
Do not provide/no burden	107	28 (68.29)	79 (**86.81**)	**0.012****
Burden	25	13 (**31.71**)	12 (13.19)	

*Fisher's Exact Test; **Chi-squared test; BADL = Basic Activities of Daily Living; IADL= Instrumental Activities of Daily Living.

Table 2. Associations between high levels of satisfaction with family relations, sociodemographic variables and exchanges of family support. Campinas, São Paulo, 2015-2016.

Variables	PR*	CI 95%*	*p*
Gender			
Male (ref.)	1.00	---	---
Female	1.02	0.45-2.32	0.957
Age			
60-64 years (ref.)	1.00	---	---
65-74 years	0.85	0.37-1.93	0.694
≥75 years	0.99	0.38-2.58	0.975
Cohabit with recipient of care			
No (ref.)	1.00	---	---
Yes	0.83	0.30-2.29	0.975

to be continued

Continuation of Table 2

Variables	PR*	CI 95%*	*p*
Living arrangements			
Spouse (ref.)	1.00	---	--
Spouse, parents, in-laws	0.66	0.19-2.32	0.521
Spouse, parent, in-laws, children, grandchildren, great-grandchildren	0.89	0.38-2.13	0.798
Parents, in-laws, children, grandchildren, great-grandchildren	0.91	0.28-3.03	0.881
Other, alone	0.71	0.24-2.12	0.539
Material support			
Only provide + only receive (ref.)	1.00	---	---
Reciprocal	0.78	0.37-1.62	0.501
Neither provide nor receive	2.51	0.67-9.44	**0.174**
Instrumental support in BADL			
Only provide + only receive (ref.)	1.00	---	---
Reciprocal	0.54	0.15-2.01	0.361
Neither provide nor receive	1.95	0.86-4.44	**0.111**
Instrumental support in IADL			
Only provide + only receive (ref.)	1.00	---	---
Reciprocal	1.42	0.63-3.16	0.396
Neither provide nor receive	4.87	0.25-2.92	**0.149**
Emotional support			
Only provide + only receive (ref.)	1.00	---	---
Reciprocal	4.48	2.06-9.78	**<0.001**
Neither provide nor receive	2.70	0.72-10.10	0.140

*PR (prevalence ratios for high satisfaction); CI 95% CI = 95% confidence interval for the prevalence ratio; ref: reference level; 47 caregivers scored for low and intermediate satisfaction and 100 for high levels of satisfaction; BADL = Basic Activities of Daily Living; IADL = Instrumental Activities of Daily Living.

Table 3. Associations between high levels of satisfaction with family relations and number of social partners involved in family support exchanges. Campinas, São Paulo, 2015-2016.

Nature, Types of Support and Partners	PR*	CI 95%*	*p*
Receive material support			
None (ref.)	1.00	---	---
≥1	1.72	0.34-1.52	0.393
Receive support for BADL			
None (ref.)	1.00	---	---
≥1	0.29	0.08-1.10	0.069
Reception support for IADL			
None (ref.)	1.00	---	---
≥1	1.34	0.60-2.99	0.479
Receive emotional support			
None (ref.)	1.00	---	---
≥1	3.21	1.52-6.78	0.002
Provide material support			
None (ref.)	1.00	---	---
≥1	0.61	0.30-1.25	0.180

to be continued

Continuation of Table 3

Nature, Types of Support and Partners	PR*	CI 95%*	*p*
Provide instrumental support for BADL			
None (ref.)	1.00	---	---
≥1	0.58	0.27-1.26	0.172
Provide instrumental support for IADL			
None (ref.)	1.00	---	---
≥1	0.60	0.28-1.31	0.199
Provide emotional support			
None (ref.)	1.00	---	---
≥1	1.14	0.47-2.80	0.771

*PR (prevalence ratios for high satisfaction); CI 95% CI = 95% confidence interval for the prevalence ratio; ref: reference level; 47 caregivers scored for low and intermediate satisfaction and 100 for high levels of satisfaction; BADL = Basic Activities of Daily Living; IADL = Instrumental Activities of Daily Living.

For the association between high levels of satisfaction and evaluation of quality of the support, it was selected to evaluate the support for BADL and the emotional support as adequate for the support received, and non-burdensome for the support given support (Table 4).

Using multivariate hierarchical regression analysis, the associations between high levels of satisfaction with family relations and the independent variables with $p \leq 0.30$ in univariate analysis were assessed, which studied the associations between the same and the satisfaction of caregivers with family relations. A model with three blocks, which were included successively, were constructed. Adjustments were made for gender and age. Block 1 included variables that represented the nature of the material and instrumental support for BADL and IADL and the emotional support. In Block 2, the number of social partners involved in the receiving of emotional support and the providing of support for BADL, IADL and emotional support were included. Block 3 included the adequacy of the material and the emotional support and the instrumental support for BADL and IADL received and the sense of burden stemming from the provision of instrumental support for IADL and from emotional support were included.

From Block 1, the analysis identified emotional support and instrumental support for BADL as being significantly associated with high levels of satisfaction with family relations. These variables remained in the model after the 2nd block test, but not in the final result (block 3), where only adequacy of the emotional support received was significantly associated with high levels of satisfaction with family relations. In other words, irrespective of the variables gender and age, the association between high levels of satisfaction with family relations and the evaluation of the emotional support received as adequate was the most robust of the associations tested [PR= 3.8 (CI95% 1.34-11.18); *p*-value = 0.010] (Table 5).

Table 4. Associations between high levels of satisfaction with family relations and evaluation of family support received and provided. Campinas, São Paulo, 2015-2016.

Nature, Type of Support and Partners	PR*	CI 95%*	*p*
Material support received			
Do not receive/inadequate (ref.)	1,00	---	---
Adequate	1,15	0,56-2,37	0,704
BADL support received			
Do not receive/inadequate (ref.)	1,00	---	---
Adequate	0,36	0,10-1,26	**0,110**
IADL support received			
Do not receive/inadequate (ref.)	1,00	---	----
Adequate	1,57	0,67-3,68	0,305
Emotional support received			
Do not receive/inadequate (ref.)	1,00	---	
Adequate	4,40	2,08-9,31	**<0,001**
Material support provided			
Do not provide/burdensome (ref.)	1,00	---	---
Non-burdensome	0,81	0,40-1,64	0,551
Instrumental support provided for BADL			
Do not provide/burdensome (ref.)	1,00	---	---
Non-burdensome	0,96	0,47-1,95	0,910
Instrumental support provided for IADL			
Do not provide/burdensome (ref.)	1,00	---	---
Non-burdensome	1,88	0,82-4,34	**0,138**
Emotional support provided			
Do not provide/burdensome (ref.)	1,00	---	---
Non-burdensome	1,66	0,72-3,85	0,237

*PR (prevalence ratios for high satisfaction); CI 95% CI = 95% confidence interval for the prevalence ratio; ref: reference level; 47 caregivers scored for low and intermediate satisfaction and 100 for high levels of satisfaction; BADL = Basic Activities of Daily Living; IADL = Instrumental Activities of Daily Living.

Table 5. Results of the hierarchical multivariate regression analysis of the associations between high levels of satisfaction with family relations, the types and nature of the family support exchanged, the number of partners involved and the evaluation of the support received and provided. Campinas, São Paulo, 2016-2017.

Variables	1st block			2nd block			3rd block		
Emotional support	PR	CI95%PR	p	PR	CI95%PR	p	PR	CI95%PR	p
Only provided and only received (ref.)	1.00	---	---						
Reciprocal	5.52	2.09-14.55	**<0.001**						
Neither provided nor received	2.06	0.37-11.58	0.411						
Support for BADL									
Only provided and only received (ref.)	1.00	---	---						
Reciprocal	0.66	0.11-3.92	0.650						
Neither provided nor received	3.15	1.01-9.81	**0.048**						

to be continued

Continuation of Table 5

Variables	1st block	2nd block			3rd block		
Emotional support							
Only provided and only received (ref.)		1.00	---	---			
Reciprocal		2.84	0.94-8.65	0.066			
Neither provided nor received		2.98	0.52-1.60	0.220			
Support for BADL							
Only provided and only received (ref.)		1.00	---	---			
Reciprocal		0.69	0.11-4.48	0.695			
Neither provided nor received		2.74	0.85-8.88	0.092			
Nº of partners providing support for BADL							
None (ref.)		1.00	---	---			
1 or +		0.14	0.01-2.58	0.184			
Evaluation of emotional support received							
Did not receive /inadequate (ref.)					1.00	---	---
Adequate					3.87	1.34-11.18	0,013

PR= Prevalence ratio; CI95%PR= Confidence Interval for PR; Stepwise selection of variables with $p<0.030$ in univariate analysis; ref. = reference level; 36 caregivers with low or intermediate levels of satisfaction and 79 with high levels of satisfaction (n=115) participated; variables considered in the 1st block: material, instrumental and emotional support and the nature of the exchange of support, 2nd block: number of social partners involved in exchange of support, 3rd block: adequacy of support received and sense of burden among those providing support; BADL = Basic Activities of Daily Living.

DISCUSSION

The most important finding of the present study was that, in the opinion of caregivers, the quality of the support exchanged is more important than the number of social partners involved. The second most important finding is the primacy of emotional support over other types of support when determining the satisfaction of caregivers with family relations. Both these results are in line with theoretical and empirical literature on social and family support and subjective well-being among the elderly and caregivers[1-3].

No statistically significant relationships were found between the level of satisfaction of the participants with family relations and the variables gender, age, household arrangements and cohabiting, suggesting that the influence of support dynamics and the functionality of family relations override sociodemographic variables. Another possible interpretation is that these results were affected by the small sample size.

Most of the participants were daughters or spouses who were a little younger than the recipients of care. These data are comparable to those of other studies[4,5,19] and relate to social norms of gender, income and solidarity[4,5,18], as well as the high frequency of cohabiting observed, evidencing the search for facilitative arrangements of care[4,5]. When desired by the elderly, cohabiting favors family functionality[2,4].

Bi-generational or tri-generational household arrangements prevailed, representing functional solutions for the distribution of goods and support[4,18-20]. In families with good levels of adaptative and resolutive capacity these translate into more efficient distribution of tasks, effective crisis management, the objective adequacy of support, and social support from other relatives

and friends[10,14]. Having one or more social partners who provide emotional and instrumental support for BADL was related to greater satisfaction with family relations, possibly facilitated by intergenerational living arrangements and cohabiting.

Age brings a reduction in the size of social networks, which tends to affect the peripheral affective relationships of older adults and the elderly more than their close relationships[21]. Influenced by the restrictions of the temporal perspective that characterizes old age, elderly or almost elderly people tend to prioritize relationships that are affectively significant to them and discard those that are not[22]. They also tend to invest in emotional comfort rather than in the pursuit of information and status[22]. With a minimum number of social partners, the quality of support and the affective links between such partners are therefore more conducive to the well-being of older people and the elderly than the number of such individuals[23,24].

The quality of social interactions and affective bonds is more related to reciprocal than to unidirectional support[22-24]. In other words, emotional support is mediated by mechanisms of social-emotional selectivity that favor the sense of adequacy of the same, when it comes from significant people who, for this reason, are selected by the elderly to form part of their close social network[21-24]. These relationships are the main reason why emotional support occupied a privileged place in the satisfaction of caregivers with family relations.

Because of their physical limitations the elderly are not always able to provide instrumental support. At the same time, receiving instrumental assistance can give rise to feelings of ineffectiveness and dependence[2]. This explains the finding of greater satisfaction with family relations among those who neither provided nor received instrumental assistance for IADL and BADL and among those who reported reciprocity in such assistance. To receive instrumental help when needed but also be able to provide it is a critical aspect for the definition of the elderly as autonomous individuals who are able to participate in exchanges of family support. Equally important is the possibility of offering support without a sense of burden, probably associated with the presence of more physical and emotional skills, and more functional and pleasurable family relations[2,5,25-27].

The provision of instrumental and emotional support without feelings of burden is an indicator of solidarity, demystifying negative stereotypes about old age, according to which the elderly are selfish and self-centered. On the other hand, when social support comes from the closest social relationships, feelings of burden among caregivers tends to be reduced[27,28]. When the elderly are part of a dysfunctional family, however, offering instrumental or emotional support may predispose them to the risk of excessive physical and emotional exhaustion[5,28]. The possibility of offering emotional and instrumental support in IADLs contributes to a sense of autonomy and control, and thus to satisfaction with family relations among caregivers[29].

In the sample investigated, the evaluation of the adequacy of emotional support was equivalent to high satisfaction with the functionality of family relations, suggesting the presence of resources to cope with stressors and affective attachment to significant others.

Replicating the design of the present study with a larger sample is one suggestion for further studies. Another is to include the level of dependence of recipients of care and the level of caregiver burden. To control the effects of variables of context, the influence of socioeconomic status and ethnicity as well as the gender and age of caregivers could be included. The complex statistical designs used in comparative and prospective studies with large and probabilistic samples may help to clarify the relationship between satisfaction with relations and family functionality, as well as the objective and subjective quality of support.

CONCLUSION

The most important finding of the present study is that caregivers believe that the quality of

the support exchanged is more important than the number of social partners involved. The second most important result is the primacy of emotional support when determining the satisfaction of caregivers with family relations.

Satisfaction with family dynamics among elderly caregivers who care for other elderly persons involves important relationships with the exchange of the emotional, instrumental and material support that occurs among family members in response to social norms of solidarity and earnings.

The adaptive capacity, companionship and strength of affective bonds of the family, as well as the opportunities for personal growth it provides to its members and its ability to solve problems are central elements to good family functionality.

The results obtained are of considerable importance, both in terms of theory and application, in the context of providing information and emotional support to elderly caregivers, especially when the caregivers themselves are both frail and burdened by the effects of age and caring.

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Received: November 11, 2017
Reviewed: March 03, 2018
Accepted: May 03, 2018

http://dx.doi.org/10.1590/1981-22562018021.170181

Sarcopenia, nutritional status and functionality in elderly women living in the community

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Abstract

Objective: to evaluate the relationship between sarcopenia, functional capacity and nutritional status among elderly women living in the community. Method: an observational, cross-sectional study was performed with 100 elderly women aged over 60 years. A questionnaire containing identification and socioeconomic data and information relating to the practice of physical activity was applied, while anthropometric and body composition data were measured through bioimpedance and functionality data was assessed using the six-minute walk test (6MWT). Independent t-tests were performed for the quantitative variables and analysis of variance (ANOVA) was used to compare the means of the variables. Multiple linear regression analyzes were performed to estimate the mean 6MWTfor each of the variables studied. Results: The average age of the elderly women was 67 (± 8.0) years, 41% practiced physical activity, 38% had at least an elementary school education, 48% received up to two minimum wages and 91% were obese according to waist circumference (WC). The prevalence rates for the presence of sarcopenia were: 5% for sarcopenic obesity (SO), 63% for obesity, 14% for sarcopenia and 18% had adequate weight. Elderly women who practiced physical activity, had at least an elementary education and who were non-obese according to WC, performed better in the 6MWT. There were no significant differences in the 6MWTbased on income or Body Mass Index ($p>0.05$). Non-obese and non-sarcopenic women walked further in the functional test than the other women ($p = 0.021$). Conclusion: SO was present in 5% of the elderly women and is related to poor physical performance, which was also present in elderly women with sarcopenia and obesity.

Keywords: Aging. Nutritional Assessment. Walking Test. Sarcopenia.

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INTRODUCTION

The Brazilian National Health Policy of the Elderly (PNSPI) states that the main problem affecting elderly persons is the loss of functionality. This is due to the progression of illnesses resulting from the greater probability of exposure to chronic noncommunicable diseases (CNCD)[1].

Some of the changes to the body characteristic of aging are the loss of lean mass and skeletal muscle function, which can be associated with functional limitation, disability and even mortality. This age-related muscular atrophy is called sarcopenia[2]. This implies a disturbance in the balance between the synthesis of the muscle proteins and the destruction of these proteins, which is the main contributor to the etiology of sarcopenia. Sarcopenia is multifactorial disease, and includes nutritional, metabolic and hormonal factors[2].

The investigation of conditions that impair functionality is important, as changes in body composition can cause limitations in the physical condition of the individual and lower functional performance[3]. However, there is a lack of studies that evaluate the presence of sarcopenia and the functional deficit and nutritional status of elderly women living in the community in municipal regions in the north east of Brazil.

Based on the foregoing, the assessment of these conditions in elderly women in the municipality of Santa Cruz (Rio Grande do Norte), Brazil, is important, as in keeping with a national trend in Brazil there is a progressive increase of women over 60 years of age with inadequate nutritional status due to obesity in this region[5]. The objective of the present study was to evaluate the relationship between sarcopenia and the functional capacity and nutritional status of the elderly resident in the community.

METHOD

This is an epidemiological, observational cross-sectional, analytical study with a quantitative approach. A total of 100 elderly women over 60 years old registered with the Physiotherapy Clinical School of the Trairi Faculty of Health Sciences of the Universidade Federal do Rio Grande do Norte (FACISA-UFRN) were selected. This is a public service for physiotherapeutic treatment, frequented by socioeconomically vulnerable individuals, and serves residents of the Trairi region and adjacent towns. The period of data collection occurred between September and December 2016, in the municipality of Santa Cruz, Rio Grande do Norte.

Only women were evaluated for this study, because although changes in muscle mass (MM) are common in both sexes, the decrease in strength-associated MM does not occur in the same proportion for both genders over time. A study has suggested there is a rapid loss of strength in women aged 50 and over, while in men this reduction does not begin until at least the age of 60[6].

Inclusion criteria for the study were: women aged 60 years or over who understood the guidelines of the procedures performed, who could walk independently, with or without assistance devices, and who did not have arthroplasty, amputated lower limbs, rheumatologic diseases (chikungunya, for example) or use a pacemaker, because of possible interference with the bioimpedance (BIA) test. The inability to perform any of the procedures of the research protocol was considered to be an exclusion criterion.

The study complied with Resolution n° 466/2012 of the National Health Council which regulates research involving human beings, and was submitted to and approved by the Ethics Research Committee of FACISA-UFRN, under approval number 1.707.598/2016.

Participants were recruited through telephone contact from the patient lists of the clinic. Data collection was performed through the application of a questionnaire standardized by two nutritionists, who were previously trained so that there was no disagreement between the data collected. The instrument was duly validated in a pilot study. This questionnaire was applied in a single sitting and contained information regarding identification, health aspects, quality of life, socioeconomic data, family history, anthropometric data and body composition and functionality. The elderly were evaluated for demographic and socioeconomic data such as age, schooling and family income. The practice of physical activity was self-reported and

defined as the practice of physical activity at least three times a week, with at least thirty minutes for each session.

Weight and height were measured using techniques recommended by the World Health Organization (WHO)[7]. Weight was measured with the individual barefoot and wearing light clothes, using a WELMY® electronic scale (capacity of 150 kg and accuracy of 100 grams). Height was measured with the WELMY® stadiometer (accuracy of 0.5 cm) with the individual barefoot and in the orthostatic position.

These data were obtained for the calculation of body mass index (BMI), which is an index defined by the measurement of weight expressed in kg, divided by height expressed in meters squared (BMI= weight/height^2). The BMI was calculated using the following classification cut-off points: malnutrition (BMI <22 kg/m^2), normal weight (BMI = 22 kg/m^2 and <27 kg/m^2) and obesity (BMI ≥ 27 kg/m^2), which were proposed by Lipchitz[8].

Measurements of the body perimeters were measured with the aid of a 150 cm SANNY® flexible and non-elastic anthropometric scale. Waist circumference (WC) was measured at the midpoint between the last rib and the iliac crest for classification of the risk of metabolic complications associated with obesity. The WHO cut-off points for women[7], which consider moderate risk to be WC between 80 cm and 88 cm and high risk ≥88 cm, were used. BMI is an effective indicator but does not fully correlate with body fat, as it does not define its distribution. It also does not distinguish fat mass from lean mass, and may be less accurate in older individuals, due to the loss of lean mass and weight loss, being overestimated in individuals with high lean mass.

The evaluation of body composition was made by BIA analysis, performed with a portable HBF-514c body mass analyzer. This is an easy-to-use, reproducible, non-invasive, relatively inexpensive and confirmed valid method[9].

For the application of the BIA the elderly women were asked to avoid the use of diuretic medication the day before the exam; not perform physical activity for at least 12 hours preceding the test; urinate prior to the test; not drink alcohol or caffeine drinks; remove jewelry or items containing metal from the body and fast from food and water for at least four hours before the test.

The elderly were placed on the scale platform with electrodes on their feet and instructed to place their hands on the horizontal rod with other electrodes attached, and then to hold the device with their arms extended forwards, forming a 90º angle with the trunk, with both hands over the electrodes, so that the electric current could travel through the upper limbs and upper trunk region. During the test, which lasts on average 30 seconds, the elderly women were instructed not to move or talk and to maintain an upright posture.

Functionality was evaluated through the application of the six-minute walk test (6MWT), which is a field test that consists of instructing the evaluated individual to walk as far as possible for six minutes in a space of 30 meters, with marks on the ground every three meters; at the end of the course, the patient should walk around a cone that delimits the space and change direction[10]. The distance traveled was calculated through the Enright and Sherrill equations and then classified in accordance with the same authors, who consider that healthy people walk around 400 to 700 meters in 12 minutes[11].

Elderly persons with WC≥88 cm were considered obese, as proposed by the Brazilian obesity guidelines defined by the Brazilian Association for the Study of Obesity and Metabolic Syndrome[9]. These guidelines suggest that WC is more sensitive than BMI in obesity screening.

The elderly were classified as sarcopenic when the measured MM provided by the BIA was below the 20th percentile of the study sample (<6.22 kg/m^2)[6]. Sarcopenic obesity (SO) was classified with the concomitant presence of obesity and sarcopenia. The elderly were therefore classified into four groups: sarcopenic, obese, obese and sarcopenic and adequate, which was composed of non-obese and non-sarcopenic elderly women.

A descriptive statistical analysis of the population data was performed. The normality of the data was verified by the Kolmogorov-Smirnov test. For the categorical variables (*practice of physical activity, schooling*

and income) analysis of variance (ANOVA) was used. In order to compare the means of the variables: *physical activity, schooling, income, BMI, WC* and the four 6 MWT classification groups, the independent t-tests and ANOVA were used. Finally, multiple linear regression analyzes were performed by the backward method to estimate the mean 6MWT for each of the variables studied, adjusting for potential confounding factors or covariates, such as practice of physical activity, age and schooling. Confounding factors were identified according to the literature and bivariate analysis.

RESULTS

The socioeconomic characteristics, body composition and physical activity practice of the sample can be seen in Table 1. Initially, the sample included 105 elderly women, but five were excluded due to their inability to carry out the tests. The final sample consisted of 100 elderly women with a mean age of 67 (± 8.0) years.

The distribution of the elderly women into the four classification groups can be seen in Table 2.

Table 1. Characterization of socioeconomic factors, body composition and practice of physical activity of the elderly (N=100). Santa Cruz, Rio Grande do Norte, 2017.

Variable	Mean (standard-deviation)
Age	67,0 (±8.0)
	n (%)
Physical activity	
Yes	41 (41)
No	59 (59)
Schooling	
Illiterate	20 (20)
Elementary School	38 (38)
High school	32 (32)
Higher education	10 (10)
Income (minimum salary)	
Up to 2	48 (48)
2-4	(22)
>4	30 (30)
Body mass index (kg/m²)	
<27kg/m² (non-obese)	26 (26)
≥27 kg/m² (obese)	74 (74)
Waist circumference (cm)	
<88cm (non-obese)	9 (9)
≥88cm (obese)	91 (91)

Table 2. Classification of elderly women in terms of presence of sarcopenia, obesity and sarcopenic obesity (N=100). Santa Cruz, Rio Grande do Norte, 2017.

Classification	n (%)
Adequate	18 (18)
Sarcopenia	14 (14)
Obesity	63 (63)
Sarcopenic obesity	5 (5)

It was found that elderly women who practiced physical activity walked an average of 374.73 m, while those who did not practice such activities covered 318.75m (p=0.007). In relation to schooling, those who were illiterate walked between 288.88 m and 337.18 m; 369.20 m and 369.63 m were walked by those who had an elementary school education, a from elementary to secondary level education, and a higher than secondary level education, respectively (p= 0.045). Elderly women who received up to two minimum wages walked 322.78 m, those who received between four and four minimum wages 373.18 m, and those who received more than four wages 356.73 m (p=0.101).

Table 3 shows 6MWT performance according to the variables of body composition and distribution in the four classification groups.

The multiple linear regression analysis for the 6MWT in relation to the variables of body composition adjusted by the covariables *age, physical activity* and *schooling* can be seen in Table 4.

Multiple linear regression analysis for the 6MWT was also performed in relation to the classification groups adjusted for the covariables age, physical activity and schooling (Table 5). Statistically significant differences in 6MWT were found between the groups (p<0.05).

Table 3. Six-minute walk test (6MWT) results according to body composition variables and classification groups. Santa Cruz, Rio Grande do Norte, 2017.

Variable	Mean and standard-deviation	p-value
Body mass index (kg/m²)		
<27kg/m² (non-obese)	363.71 (±96.03)	0.081
≥27kg/m² (obese)	321.50 (±105.53)	
Waist circumference(cm)		
<88cm (non-obese)	399.33 (±63.82)	0.041*
≥88cm (obese)	336.39 (±104.33)	
Classification in groups		
Adequate	376.28 (±78.73)	0.021*
Sarcopenia	351.14 (±110.04)	
Obesity	333.40 (±107.70)	
Sarcopenic obesity	280.00 (±34.64)	

*Statistical significance (p<0.05) by analysis of variance test (ANOVA).

Table 4. Multiple linear regression analysis for the six-minute walk test (6MWT) in relation to body composition measurements. Santa Cruz, Rio Grande do Norte, 2017.

Variable	6MWT (meters)		
Model 1*	β	CI 95%	p-value**
Body mass index			
<27kg/m2 (non-obese)	28.10	-18.74-74.96	0.236
≥27kg/m² (obese)	0		
Model 2*			
Waist circumference			
<88cm (non-obese)	56.74	-10.25-23.74	0.096
≥88cm (obese)	0		

*Models adjusted by the variables *age, schooling* and *physical activity*; **statistical significance (p<0.05) in linear regression.

Table 5. Multiple linear regression analysis for the six minute walk test (6MWT) in relation to classification groups. Santa Cruz, Rio Grande do Norte, 2017.

Variable	6MWT (meters)		
Model 1*	B	CI 95%	*p*-value**
Adequate	59.64	-62.61-181.89	0.006**
Sarcopenia	37.34	-87.83-162.52	
Obesity	24.63	-89.54-138.813	
Sarcopenic obesity	0		

*Model adjusted by the variables *age, schooling* and *physical activity*; **statistically significant ($p<0.05$) in linear regression.

DISCUSSION

Sarcopenia and SO are considered to be challenges to public health as they are significant causes of frailty among the elderly. Little is known, however, about their relationship with the functional capacity of this population[2]. In the present study, the performance of sarcopenic women in the 6MWT was inferior to that of non-obese and non-sarcopenic elderly women ($p=0.021$), in contrast to the findings of Gadelha et al.[12] and Lima et al.[13] who verified that the performance of the elderly women with sarcopenia, although inferior, did not present a significant association with functional tests. These results indicate that the reduced MM of elderly individuals requires attention and should be maintained at adequate levels, leading to better functional capacity and helping to promote the autonomy of this population.

It is therefore necessary for health services to act in a preventive manner, both to diagnose and reduce risk factors for the loss of lean mass and functionality, as well as to provide guidance about the changes caused by aging or even to rehabilitate those already affected by these deficits. By adopting an expanded approach to care, health services can help not only the elderly, but also their families, to adopt healthy living habits so that they can reduce these changes and their consequences, contributing to the access to and the attainment of a quality of life by overcoming disabilities and age-related limitations. It is therefore possible to increase the ways that the elderly deal with aging, by formulating guidelines for a health policy that introduces new knowledge and practices to healthcare teams, and includes professionals in nutrition and physical therapy[14].

A prevalence of sarcopenia of 14% was found in the present study. It is difficult to compare prevalence among Brazilian and non-Brazilian populations due to the lack of well-defined cut-off points. The value of MM was lower than 6.22 kg/m^2, corroborating the cut-off points found in literature by Santos et al.[15] and Hofmann et al.[16], which were <5.45 kg/m^2 and ≤6.75 kg/m^2, respectively, in populations similar to the present study.

The lack of uniformity in the identification of these conditions makes it difficult to identify their relationship with functionality. The European Consensus on the definition and diagnosis of sarcopenia[17] also recognizes the importance of muscle quality in the diagnosis of sarcopenia and SO, as the infiltration of fat into the muscle tissue can cause a reduction in functional performance. Therefore, while it is important to consider variables such as body mass, muscle strength and physical performance in this diagnosis, the methods of identification require future studies that contemplate such factors[17].

The prevalence of sarcopenia in our study was similar to that of the study by Santos et al.[15] which obtained results of 16.8% with 149 elderly women, with a mean age 67.17 (±6.12) years. Du et al.[18] evaluated the prevalence of sarcopenia in 2,458 volunteers over 65 years of age from different racial/ethnic groups and obtained results similar to the present study in white women, with a prevalence of sarcopenia of 15.1%, while in black women the prevalence was only 1.6%.

In the present study, the majority of the population had an education up to elementary school (38%) and received up to two minimum

wages (48%). Such individuals had an inferior 6MWT performance than those with higher levels of education and better socioeconomic status. The amount of MM can be influenced by factors such as age, height, body weight, ethnicity/skin color, and also by nutrition and the amount of time spent exposed to socioeconomic adversity[18].

The study by Machado and Vieira[19] found that socioeconomic adversities such as a lack of schooling influenced the functionality of the elderly, as those who were illiterate had a 2.61-times greater chance of dependency in instrumental activities of daily living than those who were literate. Schooling allows the elderly to develop skills that facilitate the resolution of health problems and contribute to avoiding or delaying such issues.

It is consistent to assume that the poorer socioeconomic status, lower level of schooling, and miscegenation commonly found in the Brazilian population may in part explain poorer performance in the 6MWT, which may be explained by the inappropriate use of equations from other countries to estimate the distance traveled in the 6MWT in the population of the present study. In a study with Norwegians, the distance walked in the 6MWT was 132m greater in those with better schooling and 30m in those with better socioeconomic status[20].

SO was relatively frequent and associated with poor performance in the 6MWT. While the prevalence of SO in the present study was 5%, other studies have found higher prevalences, such as that of Moreira[6], which had a prevalence of 7.1% in middle-aged women in northeastern Brazil and that of Monteiro et al.[21] with post-menopausal women, which had a prevalence of 9.2%. Oliveira et al.[22] found a prevalence of SO of 19.8% in elderly women with a mean age of 66.8 (± 5.6) years, which was associated with reduced muscle strength and functional deficit. The same was reported by Gadelha et al.[12], with a prevalence of 23.4%.

The practice of physical activity has as a protective effect on the development of sarcopenia and SO, as it helps to maintain or even increase MM and strength, reduce body fat and obesity and, consequently, improve motor performance[23,24]. However, 59% of our sample were elderly women who practiced physical activity less than three times a week, and had a worse performance in the 6MWT ($p<0.05$). A similar result was found by Santos et al.[25] who found that insufficient physical activity was associated with sarcopenia or SO in 770 individuals aged 50 years or older in the southeastern part of Brazil.

Other authors did not find significant correlations between 6MWT and the scores of a questionnaire on daily activity[26] and self-reported physical activities, including habitual walking and regular physical activity[20]. Although physical activity is positively associated with the maintenance of functionality, reducing the deleterious effects of aging[27], specific studies on the influence of physical activities on 6MWT are still needed.

Calculations of obesity detecting possible health risks are often based on BMI, which depicts only one change in the individual's energy balance. It does not, however, allow other factors, such as metabolic and inflammatory disorders and MM/ body mass, to be considered[28].

In the present study, a prevalence of obesity of 91% was found, based on WC. In the National Survey on Health and Nutrition (PNSN) of 1989, approximately half (50.2%) of the elderly women evaluated were overweight, based on BMI[29]. The Telephone Surveillance System for Risks and Preventive Factors for Chronic Diseases (VIGITEL) identified prevalence rates of 53.4% in 2006 and 58.5% in 2012[30].

The results of linear regression analysis shown in Table 5 reveal that elderly women who were only obese had a worse 6MWT performance than elderly women with sarcopenia or who were non-obese and non-sarcopenic (β = 24.63; CI= 89.54-138.81, p=0.006). It is believed that a high BMI limits 6MWT performance, as obesity can influence gait and increase workload[31]. In our study, there was no significant difference between obese and non-obese individuals according to BMI in the 6MWT (p=0.081). Camarri et al.[26] corroborated these results when evaluating the 6MWT in 70 Caucasian adults suggesting that, optionally, other anthropometric variables, such as WC, can be used.

As an alternative to the classification of obesity, WC was assessed in the present study, and the elderly women who presented central obesity (WC≥88cm)

also had worse functional performance, walking significantly less than those without central obesity. One of the explanatory hypotheses proposed by the study of Campanha-Versiani et al.[32], which evaluated the performance of 48 elderly women with WC>88cm and found a similar result to the study under discussion, is that the deposition of visceral fat could influence energy expenditure in the exercise, considering that there are also greater obstacles in walking for obese individuals.

The results obtained show the importance of using different forms of obesity diagnosis (BMI and WC) in the diagnosis of sarcopenia and SO, as highlighted in the study by Souza et al.[32], to identify elderly obesity in individual and collective evaluations, aimed at a more accurate prognosis of health problems through these parameters of adiposity. Health professionals should therefore look beyond BMI, which alone is not sufficient to assess premature risk, as it fails to classify a considerable portion of the population at imminent cardiometabolic risk[33].

One limitation of this study is its transversal design, which did not allow a temporal relationship of cause and effect to be established among the variables. Another is the sample projection which, in addition to working with a small sample to determine prevalence, only allowed the investigation of the inadequacy of functional capacity of elderly women who attended FACISA/ UFRN. The lack of a heterogeneous sample meant the present data could not be extrapolated.

CONCLUSION

Obesity was a highly prevalent condition among the elderly women in the study, with sarcopenia and sarcopenic obesity less frequent conditions in this sample. However, although obesity and sarcopenia were significantly associated with a significantly worse performance on the six-minute walk test, the combination of the two conditions (obesity and sarcopenia) resulted in even worse outcomes than the two conditions separately.

Based on the increase in the disability rates which accompany growing population aging, the results of the present study demonstrate the need to investigate the presence of both conditions among elderly populations, in order to identify those with a higher probability of experiencing changes in functional performance. With this, it will be possible to guide appropriate prevention and rehabilitation strategies, aimed at reducing the functional dependency levels in this population.

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Received: November 18, 2017
Reviewed: March 14, 2018
Accepted: May 25, 2018

http://dx.doi.org/10.1590/1981-22562018021.170158

Changes to the feet of institutionalized elderly persons

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Abstract

Objective: The present study aimed to identify the most frequent changes to the feet of institutionalized elderly persons. *Method:* A descriptive study was conducted with elderly persons living in long-term care facilities in the city of Passo Fundo, Rio Grande do Sul, Brazil. A total of 174 people aged 60 years and over of both genders were surveyed regardless of health conditions. Those with amputations, burns or who were undergoing surgery of the lower limbs were excluded. Data were collected through the application of a structured questionnaire containing sociodemographic variables (age, gender, ethnicity, marital status, schooling, main occupation) and variables related to alterations of the feet (nail, dermatological and bone deformities). The Manchester Scale was subsequently applied to evaluate the degree of hallux deformity. *Results:* The most frequent nail deformities were onychomycosis, onychogryphosis, onycholysis, onychosclerosis; the dermatological findings were callosities, especially interdigital and bromhidrosis; the most prevalent bone deformities were pes cavus and transverse arches. In the assessment of hallux valgus, according to the Manchester Scale, painful feet (38.5%), mild deformities (35.6%) and no deformities (25.3%) were identified. *Conclusion:* The results suggest signs of neglect of the health of the feet of institutionalized elderly persons. There should be more investment in the training of teams responsible for care.

Keywords: Health evaluation. Podiatry. Homes for the Aged.

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Research funding: Coordination for the Improvement of Higher Education Personnel/National Program of Academic Cooperation (CAPES/PROCAD). Call for proposals nº 071/2013.Agreement 2972/14, Research Project no. 88881.068447/2014-01.

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INTRODUCTION

Aging is characterized as a continuous process of transformations experienced differently by each individual, as it is influenced by genetic inheritance, the lifestyle adopted over time, the environment, opportunities or inequalities in health, as well as anatomical, physiological and psychological changes[1]. In the biological dimension, aging is a dynamic, progressive and physiological process, accompanied by morphological and functional modifications, among which are the anatomical and physiological structures of the feet[2].

The feet are parts of the body that, in addition to sustaining the entire bodily structure, are key to mobility, as it is through them that locomotion, balance and motility give individuals their locomotive independence. Chronic obstructive arterial diseases, vascular diseases and diabetes mellitus can make the elderly susceptible to podiatric complications[2,3].

Disorders of the feet, when they form part of the aging process, can be accompanied by a reduction in functionality and an increase in the degree of dependence on third parties for the performance of activities of daily living, which can be aggravated by the presence of chronic and disabling diseases. This causes health problems, including those that affect the structures of the locomotor apparatus such as bones, muscles, joints, nerves and tendons, which worsen in the presence of pain.

Studies have revealed a high prevalence of problems related to the health of the feet, associated with trauma that impairs the integrity of the nails, skin, nerves, vessels, and bone structures.[4,5] Another important aspect is callosities and processes of pain, which can have psychological manifestations[3].

Chronic diseases, such as diabetes and chronic obstructive arterial disease, can result in lower limb injuries, especially in the elderly. Problems with the feet lead to the deterioration of functional ability and interfere with mobility, increasing the risk of falls[2,3].

Considering the rapid growth of the elderly population and the increased demand for long-term care,[1] there is a trend to seek alternative services, including Long Term Care Facilities for the Elderly (LTCF), although policies continue to prioritize the family as the providers of care for the elderly. As the current paradigm in health focuses on the maintenance of functional capacity and the promotion of quality of life, and given the importance of feet problems among the elderly, research aimed at this population group is required.

The present study therefore aimed to identify the most frequent changes to the feet of institutionalized elderly persons, in order to support improved care for the overall health of the elderly population.

METHOD

A descriptive study was performed with elderly people living in a LTCF in the town of Passo Fundo, Rio Grande do Sul, Brazil. A total of 174 people aged 60 and over of both genders, regardless of health conditions, participated from six institutions. The exclusion criteria of the study were: elderly persons hospitalized during the data collection period, with amputated limbs and/or a history of burns and/or recent surgical interventions in the feet. This research is part of a larger project entitled *Patterns of Aging and Longevity: Biological, Educational and Psychosocial Aspects*, which is part of the National Program for Academic Cooperation (PROCARD/CAPES, Applicationnº.71/2013).

Data collection was performed between October 2016 to May 2017by a previously trained team and through the application of a structured questionnaire. The evaluation of the feet was performed by two nursing students under the supervision of the researcher. They were given specific training to identify the changes to the feet. The Manchester Scale was applied to check the degree of hallux valgus. This test was developed by Garrow et al.[6], and uses a sheet with a photographic representation of four degrees of deformities (no deformity- 0 point, slight deformity-1 point, moderate deformity- 2 points, severe deformity- 3 points). The sheet is placed next to the right foot for comparison. This scale was translated and validated for Brazil by Esótico[5].

Descriptive analysis of the data was carried out, considering the sociodemographic variables (age, gender, ethnicity, marital status, schooling, main

occupation) and variables related to alterations to the feet (nail, dermatological and bone deformities).

The ethical precepts that guide research involving human beings were respected, as set out in Resolution Mº 466/12 of the National Health Council. The participants and/or their caregivers signed a Free and Informed Consent Form. The project was approved by the Research Ethics Committee of the Universidade de Passo Fundo, under approval nº. 2.097.278.

RESULTS

A total of 174 elderly people participated in the study, most of whom were women (62.6%) and white/Caucasian (83.3%). Age ranged from 60 to 101 years, with a mean of 80.5 (± 9.4) years. In terms of marital status, 55.2% were widowers and 21.3% were single; 67.8% had one to eight years of schooling, and the most frequently described previous occupation was homemaker (23.0%), followed by agriculture (20.1%) (Table 1).

Table 1. Sociodemographic characteristics of the institutionalized elderly persons(N=174). Passo Fundo, RS, 2017.

Variables	n (%)
Gender	
Female	109 (62.6)
Male	65 (37.4)
Age range (years)	
60–69	25 (14.4)
70–79	52 (30.1)
≥80	96 (55.5)
Skin color/ethnicity	
White/Caucasian	145 (85.8)
Black/Afro-Brazilian	9(5.3)
Brown/Mixed-Race	13 (7.7)
Yellow/Asian-Brazilian	2 (1.2)
Marital status	
Married	13 (7.4)
Single	37 (21.3)
Divorced/Separated	28 (16.1)
Widowed	96 (55.2)
Schooling (years of study)	
Illiterate	32 (18.7)
1 to 8	118 (69.0)
≥9	21 (12.3)
Previous occupation	
Homemaker	40 (23.0)
Agricultural worker	35 (20.1)
Teacher	15 (8.6)
Domestic worker/Cleaner	10 (5.7)
Seamstress	6 (3.4)
Builder	5 (2.9)
Driver	4 (2.3)
Others*	59 (34.0)

*Occupations with frequency<4

Onychomycosis (70.7%), onychogryphosis (43.1%), onycholysis (39.0%) and onychosclerosis (36.2%) were the most frequent changes to the feet of the elderly (Table 2). Regarding dermatological alterations, there was a prevalence of interdigital callosity (23.6%), and bromhidrosis/fetid odor (21.3%). The most frequent bone deformities were pes cavus (56.3%) and in the transverse arches (54.6%). Foot hygiene was evaluated as satisfactory in most cases (64.9%).

Table 2. Distribution of foot disorders in institutionalized elderly persons (N= 174). Passo Fundo, Rio Grande do Sul, 2017.

Alterations	n (%)
Ungual alterations	
Onychomycosis	123 (70.7)
Onychogryphosis	75 (43.1)
Onycholysis	68 (39.0)
Onychosclerosis	63 (36.2)
Onychatrophia	34 (19.5)
Nail psoriasis	34 (19.5)
Onychodystrophy	30 (17.2)
Leukonychia	30 (17.2)
Dermatological alterations	
Interdigital callosity	41 (23.6)
Bromhidrosis/Fetid odor	37 (21.3)
Anhidrosis	34 (19.5)
Callosity in the toes	30 (17.2)
Dyshidrosis	26 (14.9)
Tinea pedis	21 (12.1)
Plantar callus	18 (10.3)
Milliare callus	11 (6.3)
Cleft	10 (5.7)
Bone deformities	
Pes cavus	98 (56.3)
Transverse arch	95 (54.6)
Medial arch	76 (43.7)
Lateral arch	45 (25.9)
Pes valgus/Pronatus	50 (28.7)
Pes varus/Supinated	49 (28.2)
Flat foot	48 (27.6)
Hallux valgus/bunion	109(62.6)
Claw toe	98 (56.3)
Satisfactory hygiene	113 (64.9)

In terms of foot problems (Table 3), when evaluated by the Manchester Scale, 38.5% of the elderly persons had foot pain, while mild was the most frequent type of deformity of the hallux valgus, followed by no deformity and moderate deformity. A notable percentage (17.2%)had severe deformities.

Table 3. Distribution of foot problems in institutionalized elderly people based on the Manchester Scale. Passo Fundo, Rio Grande do Sul, 2017.

Disorders	n (%)
Foot pain	
Yes	67 (38.5)
Hallux valgus	
No deformity	44 (25.3)
Light deformity	62 (35.6)
Moderate deformity	38 (21.9)
Severe deformity	30 (17.2)

DISCUSSION

The sociodemographic profile of the institutionalized elderly, where women with a mean age of 80.5 years predominated, and the nail disorders found corroborate the results of a study carried out in São Bernardo do Campo in the state of São Paulo[7], which identified a mean age of institutionalized elderly persons of 86 years among both genders. Onychomycosis was the most frequent disorder, a significant finding in terms of nail disorders, identifying a high rate of fungal alterations in the feet of the institutionalized elderly, exceeding the results found in other studies carried out in Brazil[8,9].

Among factors that contribute to the increase of onychomycosis in the feet, the use of closed shoes and socks for prolonged periods of time, irrespective of the season, can cause disease of the nail bed and subsequent invasion to the nail plate. This suggests a need for care and guidance for caregivers and the elderly themselves regarding foot care for this and the other pathologies identified, even if not prevalent[3,10,11].

Problems such as onychogryphosis and onycholysis were recorded in almost half the population of the present study. For onychogryphosis, or ram's horn nails, studies show a prevalence of 43.1% in the elderly. In the aging process, the nails become curved and generally grow faster[10], causing the nail plate of the elderly persons to modify its chemical composition, raising the calcium content and reducing the iron content. As a consequence, the lamina becomes fragile, brittle and with deep grooves (longitudinal striae), leading to onychogryphosis[11].

About one-third of the elderly studied had onycholysis, that is, nail detachment, corroborating the study of this condition performed with non-institutionalized elderly residents in the city of Porto Alegre (Rio Grande do Sul)[12]. This alteration may be related to trauma, dehydration of the skin, the presence of moisture in the feet and vascular disorders[13].It is a frequent nail disorder in the elderly, resulting from microtraumas and the improper use of footwear[3,7,14].

However, this nail disorder may be related to conditions of frequent morbidities among the elderly, such as low immunity, hypertension, diabetes mellitus or even inadequate hygiene, where bromhidrosis is a contributing factor and onycholysis a secondary factor[4,7], making therapeutic management difficult and consequently compromising quality of life.

Regarding the dermatological disorders observed in this study, interdigital callosity was present in a quarter of the elderly. In a study that aimed to assess the characteristics of the feet problems of 50

elderly persons belonging to a Family Health Unit, the majority of whom were female, a prevalence of 76.0% was identified. These were callosities that occur in bony prominence areas after a long period of pressure and friction, which can cause pain and difficulty with gait[15].

The study by Mello and Haddad[16], on the foot conditions of a population of 784 elderly persons, found 58.2% with problems of corns and calluses. Calluses in the elderly cause difficulty in functional capacity and interfere with the basic activities of daily living, such as walking, and also hinder hygiene. A survey carried out in a university hospital located in the state of Rio de Janeiro[11] found the presence of callosities in 67.5% of the elderly population. It is worth noting that as well as the physiological and anatomical causes, other factors also contribute to the development of callosities on the feet.

Among the bone deformities, the prevalence of pes cavus was higher than in the results of a survey carried out in the state of São Paulo[5], in which the frequency was 20.0%. The findings of the present study also contradicted those of the study by Peral et al.[12] in which 9.41% had pes cavus.

Toe deformities are common among the elderly, with assessment by the Manchester scale revealing that one-third of the elderly assessed had pain in the feet and mild deformities. These results are corroborated by a study that evaluated the elderly using the same scale[18]. Foot pain in the elderly is often associated with functional incapacityl[2,11,13]. Foot deformities may be perceived by elderly persons as a common deformity in aging. However, they can cause health impairment, such as decreased strength, coordination, increased postural instability, risk of falls, functional disability and a consequent reduction in quality of life[11,13,17,18].

The presence of onychopathies and deformities in the feet can cause behavioral changes and impair the emotional state of the elderly person. Manifestations such as anxiety and fear are psychological factors that diminish confidence in one's ability to walk and are a potential risk of falls, which therefore affects the functional mobility of the institutionalized person, justifying investment in the care of foot disorders.

Difficulties were reported by team members at the long-term care facilities[19], such as a need for knowledge about caring for the elderly, particularly in podiatry, suggesting the need for improvement in treatment and continuous education programs, as care for food disorders is not always included in the overall training of professionals in the area of health.

Caring for an elderly person, regardless of the context, demands a combination of knowledge, skills and attitudes that support the activity of caring, which functions throughout the education and training process of the caregivers present in the services, especially in the establishment of care protocols. This requires the implementation of programs focused on caregivers, involving both health services and social facilities, such as LTCFs. It also highlights the importance of the participation of a multi-professional team in educational actions and the need for the inclusion of podiatrists in health services, something that is rare in the context of elderly care, but which is justified by the benefits of interconnected knowledge.

The present study has some limitations, namely in terms of its delineation, which generally aims to describe populations according to the attributes of the individual, time and space, without the objective of establishing associations or causal inferences, which limits the possibility of extrapolation to the wider institutionalized elderly population.

CONCLUSION

The present study allowed the identification of feet disorders in institutionalized elderly persons. The findings showed that the most frequent were those related to the nails, such as onychomycosis, onychogryphosis and onycholysis. The main dermatological problems were callosities and bromhidrosis while the most common bone deformities were pes cavus and those of the transverse arcs.

The most prevalent degrees of hallux valgus deformity indicated by the Manchester Scale were mild and no deformity. Most of the elderly persons reported pain in their feet.

Based on the results of this study, greater attention to the health of the feet of the institutionalized elderly is required among health professionals and caregivers. This in turn requires specific training, aimed at the prevention of these disorders and improvement in the quality of life of this population.

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Received: October 31, 2017
Reviewed: March 24, 2018
Accepted: May 14, 2018

http://dx.doi.org/10.1590/1981-22562018021.180100

Caring Senior: A Brazilian health model with emphasis at light care levels

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Abstract

The present article discusses the creation of an elderly care model entitled *Caring Senior*. Population aging caused by demographic and epidemiological changes in Brazil, a relatively recent phenomenon, requires an efficient response. Based on a critical analysis of healthcare models for the elderly, the text presents a proposal for the healthcare of this age group, with emphasis on low intensity levels of care, focusing on health promotion and prevention, in order to avoid overload in the system. Integrated care models aim to solve the problem of fragmented and poorly coordinated care in current health systems. The more health professionals know about the history of their patients, the better the results. This is how the contemporary and resolutive models of care recommended by most major national and international health agencies should function. A higher quality, more resolutive and cost-effective care model is the focus of the present study.

Keywords: National Health Policy for the Aged. Aging. Elderly. Disease Prevention. HealthCare.

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INTRODUCTION

One of mankind's greatest achievements has been the extension of life expectancy, accompanied by a substantial improvement in the health parameters of populations, despite the fact that these achievements are far from equitably distributed across countries and socioeconomic contexts. Reaching old age, which was once the privilege of a few, has today become the norm even in the poorest countries. The greatest achievement of the twentieth century, however, has resulted in a major challenge: how to add quality to the additional years of life.

While the growth in longevity initially occurred in developed countries, it is in the developing world that it has manifested itself in a more pronounced manner. In Brazil, the number of elderly persons (60 years of age and over) has increased from three million (in 1960) to seven million (in 1975), then 14 million (in 2000). This is an increase of 500% in 40 years, and the total should reach 32 million by 2020. In countries such as Belgium, however, it took a hundred years for the elderly population to double in size[1].

One of the effects of this dynamic is the growing demand for health services, which can often result in a scarcity of and/or constraints on resources. The elderly use more health services and experience more frequent hospitalizations and longer bed occupancy times than other age groups. This is due to the pattern of diseases among this group, which are chronic and multiple, require constant monitoring, permanent care, continuous medication and periodic examinations[2].

In health structures outside Brazil, general practitioners or family doctors are completely responsible for the treatment of 85% to 90% of their patients, without the need of specialists. Health professionals with specific training (in Nutrition, Physical Therapy or Psychology)[3] are also used. In this way, the elderly have access to a much larger range of qualified professionals, who are recommended to them through their attending doctor.

In Brazil, however, there is an excess of consultations carried out by specialists, with the current model of care prioritizing the fragmentation of care. This can be clearly seen by comparisons with the model in the UK, the National Health Service (NHS), the central figure of which is the general practitioners (GP), who has a high resolutive capacity and can establish a strong bond with the patient. The NHS is offered to all citizens regardless of income or social status, in a similar manner to Brazil's SUS[4]. To be eligible for free public health care, a citizen must register with a General Practitioner (GP). The main health service units are local health care clinics composed of general practitioners and nurses. Any necessary medical care, provided it is not an extreme emergency or caused by an accident, will be performed by the doctor of that health center.

The American model, on the other hand, is based around referral to numerous medical specialists, in a model of care that is the opposite to the English. These two rich countries, with great medical traditions, therefore use different models and provide quite different results[5].

FINANCIAL PRESSURES

The demographic transition and the improvement of Brazil's social and economic indicators, compared to previous decades, have led not only to the growth of the elderly population, but also to greater financial pressure on public and private health systems. As the number of elderly people increases, so, naturally, do the prevalence of chronic diseases and spending[6].

In recent decades it has been shown that most of the public health problems that affect the population – both communicable and noncommunicable diseases – can be prevented. This is shown by the significant decrease in mortality due to coronary and cerebrovascular diseases, a reduction in the incidence of and mortality from cervical cancer, as well as a decline in the prevalence of smoking and the incidence of lung cancer in men. In summary: a major social and economic burden can be avoided through the reduction of disease[7].

Many still see the preventive action as a burden of procedures and additional costs. In fact it is the inverse of such thinking which, in the medium and long term, can reduce hospitalizations and other procedures of much greater cost. All the evidence indicates that biomedical health systems are likely to suffer problems of sustainability in the future.

We live in the information age. In the field of Collective Health, epidemiological information can be translated into the capacity to predict events, enabling early diagnosis, especially in relation to chronic diseases, delaying the onset of such illnesses, improving quality of life and the effectiveness of the therapeutic approach[5].

The role of the health professional in these cases is not to avoid disease (since it is already installed) or seek a cure, but to stabilize and reduce harm, aiming at maintaining quality of life[8]. In general terms, these are the foundations and discussion of health proposed by Caring Senior.

WHAT WE KNOW BUT CHOOSE TO IGNORE

Elderly care should be structured in a unique manner. The current provision of health services fragments care for this age group, with multiple specialist consultations, a failure to share information, widespread use of drugs, clinical and imaging exams, among other procedures that overwhelm the system, have a strong financial impact at all levels and do not generate significant benefits for health or quality of life[1]. One of the problems stems from the exclusive focus on disease. Even when a program based on the anticipation of illness is provided, the proposals are geared primarily towards the reduction of a certain disease, forgetting that when a chronic illness is already established in an individual the objective should not be the cure, but the stabilization of the clinical profile and constant monitoring in order to prevent or mitigate functional decline[8].

Studies have shown that care must be organized in an integrated manner and must be coordinated throughout the treatment pathway, following a network-based logic from entry into the system to care at the end of life[9], focusing on strategies of education, health promotion, the prevention of preventable diseases, postponement of illness, early care and rehabilitation[10]. The best strategy for the proper care of the elderly is the permanent monitoring of their health, varying only the levels, intensity and scenario of the intervention[11].

Programs aimed at this group should be constructed based on integrated care, with the leading health professional and their team managing not the disease, but the health profile of the patient, as often the treatment of a health problem can only be conducted with the reduction or suspension of other actions[12].

It is necessary to structure models that work in an integrated manner and cover the complexity of the care demanded.

A FAMILIAR INNOVATION

A health unit with broader characteristics allows the anticipation of problems through the early identification of possible symptoms, changes in mood or possible functional losses. In this way, the elderly person can be referred promptly to the attending doctor[13]. Ideally, health care services should focus on providing qualified care and well-being to the elderly, ensuring their clients have a referral doctor, and that all doctors have a portfolio of clients for whom they care. This care unit should be a space with the characteristics of a social center with varied activities including medical consultations and actions aimed at integration and participation, facilitating the establishing of trust and client loyalty within the model. This "innovation" is at least 70 years old, as it has functioned in England since 1948.

Prevention is essential. The earlier the intervention is performed, the better the chances of a more positive prognosis[3]. The model we propose here, which we will call Caring Senior, embraces the successful British experience and offers permanent monitoring.

A phrase has been repeated for decades in medicine is that the more the healthcare professional knows about the history of their patient, the more positive the results will be. This belief is supported by the World Health Organization and all managers and professionals in the area. As logical as it is old, it still represents a modern idea of a health care model[7]. It is surprising, then, that we do not see it in practice on a daily basis. There should therefore be an emphasis on the integrated care of the elderly, adding conventional medical care to the development of supervised educational and leisure activities. The purpose is to maintain, for as long as possible, a good quality of life.

To say that monitoring health and anticipating predictable illnesses is a "different and innovative" way of caring calls into question the efficiency of healthcare managers, as such an idea was established at the beginning of the last century, and it is absurd to consider it new.

The main risk factor of most of the chronic diseases that affect the elderly individual is age itself. Aging without chronic illnesses is the exception rather than the rule. Thus, the focus of any contemporary policy should be to promote healthy aging, by maintaining and improving – where possible –the functional capacity of the elderly, the prevention of diseases, recovery of the health of those who have become sick (or stabilization of illnesses) and the rehabilitation of those who have had their functional capacity restricted. Actions such as these, however, remain uncommon. The greatest investment continues to be in traditional care, with emphasis on the hospital structure[14].

We must understand this dichotomy better, and ask why it is so difficult to implement prevention programs, even when they are widely accepted in theory.

OUR PROPOSAL

To put into practice what we advocate, the model of care for the elderly in Brazil must be urgently redesigned[15]. The Caring Senior care model was designed with these basic assumptions in mind, and is characterized by a focus on low intensity instances of care, through the constant monitoring of the elderly and light, but intensive care, as it is known that more than 85% of such clients do not require more complex care, provided that they are properly monitored.

Other actions of health will be the responsibility of another structure which is responsible for dealing with segments such as the emergency unit, the hospital, clinical and imaging exams and medical specialists. Caring Senior will involve some specialist doctors and will also accompany its clients in high-intensity instances of care – but as a support, not as a central element of care, as we will see below.

Caring Senior is based on certain principles. The first is the role of the doctor, who will be responsible for a portfolio of clients. A nurse will also be available, performing an effective role in providing care to this clientele and ensuring better quality of care. The clinical unit will have several such pairs of general practitioners and nurses, while a 40-hour workweek will allow for portfolios that can cover from 800 to a maximum of 1,000 clients. This will guarantee that professionals have the time to attend each client properly, ensuring appointments at least four times a year, and accompanying them in other instances of care, if necessary.

A full Caring Senior unit, for example, will have five pairs of doctors and nurses who are responsible for around 4,000 to 5,000 patients. The site must also include health professionals trained to provide care within the philosophy of the program, prioritizing promotion and prevention. These will include psychologists, nutritionists, physiotherapists and physical educators, who will attend cases selected by doctors. These professionals will lead group activities and lectures and provide guidance on relevant topics.

In addition to a full Caring Senior unit, each region (depending of course on demand) will have two or three minimum capacity units, featuring only a doctor/nurse pairing, with all support service provided in the full unit.

To those concerned about the possible high costs of maintaining this structure, it is worth noting that health professionals cost much less than a day's stay in an Intensive Care Unit or a hospital. To provide good care, to avoid the exaggerated use of specialist doctors and unnecessary hospitalizations, it is essential to maintain a good quality reception structure.

CENTRAL POINTS OF THE MODEL

An adult client over 49 years of age with one or more chronic diseases will not be cured. The physician's duty is to stabilize, monitor, and ease the pain caused by the disease, which will remain with the patient for the rest of their lives. The role of the Caring Senior general practitioner will be to maintain the functional capacity of clients so that they can a full and healthy life.

The benefit of Caring Senior will be the reduction of specialist doctors and subsequent lower numbers of exams and drugs, as client loyalty will prevent them from resorting to emergency units and greatly reduce hospitalization periods.

It should be remembered that Caring Senior involves low-intensity instances of care, and is largely composed of care provided by well-trained health professionals concerned with preserving the quality of life and social participation of the elderly client. Instances considered high-intensity are those which are expensive and which involve the hospital and other long stay units. All effort must be taken to rehabilitate the elderly and return them to low-intensity instances of care.

TECHNOLOGY AS A DIFFERENCE MAKER

A high quality, lightweight technology information system will provide fundamental support for the doctor/nurse pairing and facilitate client loyalty. Without the use of technology, the Caring Senior project is not feasible, and so participants must be able to use the system to its maximum potential.

The faces of clients for example, could be recognized when they go through the door of the clinic, instantly opening their medical records on the receptionist's desk. The receptionist can then address the client by name, ask about their family, and check the list of medications they are taking. These actions are extremely simple, but they add enormous trust to the relationship, making the client feel protected and welcomed from the first moment.

Registering the care pathways of the patient is a unique feature of this model. A high-quality information system that is broad in scope can document not only the clinical evolution of the elderly person, but also their participation in individual or collective prevention actions, as well as the support of the nurse and the telephone calls made, all of which must be resolutive, with trained and qualified personnel.

The telephone contact between patients and professionals should involve the sharing of all information with the team, to enable a comprehensive assessment of the individual. The information system, which begins with the registration of the client, is one of the pillars of the program. Through it, the entire care pathway can be monitored at each level, verifying the effectiveness of the actions and contributing to decision-making and follow-up. It is a unique electronic record, both longitudinal and involving a range of professionals, which accompanies clients from reception onwards. This medical record differs from existing registries as it includes a record of their life history and health events.

The creation of a mobile app with individualized information and reminders of consultations and prescribed actions is also envisaged. This can, among other actions, ask the client to take a photo of their breakfast and send it to the nutritionist, who will observe if the meal is balanced and if there are adequate amounts of fiber, for example.

Caring Senior will focus on maintaining the clientele within its units, avoiding the use of specialists. Five areas of medical specialties related to our model, who can assist the general practitioner, will be required. The choice of such specialties is based on demand and high prevalence, as well as featuring areas where annual preventive control examinations can be carried out and registered. They are: cardiology, gynecology, urology-proctology, dermatology and ophthalmology.

Consultation with the specialties listed will only be possible at the request of the client's general practitioner. If the client requires the care of one specialist, Caring Senior will not therefore include the other specialties. The same reasoning applies to hospitalization. Doctors and nurses will be responsible for contacting the hospital doctor, armed with knowledge of the case and, preferably, acting to ensure the best care and the shortest hospitalization time, as well as being able, if necessary, to suggest a medical specialist.

REMUNERATION

Another key element of Caring Senior is the form of payment of physicians, the Accountable Care Organizations (ACO) system, which encourages healthcare professionals to organize themselves as

a group, managing the quality of services provided, being responsible for cost management and the distribution of bonuses[16].

There are two key points: the provision of services of excellence at a lower cost and a model of remuneration based on added value. The segmented and non-integrated health that is offered to patients today is largely due to the service remuneration model, in which the incentive is production, rather than quality[17]. In other words, there is no benefit in seeking new forms of care or new payment models if the transfer of part of the responsibilities, risks and benefits of providers is not associated with the results achieved through the care offered.

The challenge is to make this new care model acceptable to the client, since trust (which will lead to loyalty) is an indispensable factor if the process is to function as planned. One cannot, after all, ask a person to trust something they do not know.

It benefits no one to declare that Caring Senior is the best model if it is not applied by Brazilian supplementary health services. Society needs to be made fully aware of the proposal if it is to convince itself of its benefits[2]. Otherwise, healthcare will continue to opt for the "siren song" of excess and consumption, which burden the system, generate higher costs, and render long-term care unfeasible.

CONCLUSION

The socioeconomic transformations of recent decades and the consequent changes in the lifestyles of individuals in contemporary societies – with changes in eating habits, increased sedentarism and stress, plus the increasing life expectancy of the population – have contributed to a higher incidence of chronic diseases, which today constitutes a serious public health problem.

The current provision of health services fragments care for the elderly. It overloads the system, causes a strong financial impact at all levels and does not generate significant benefits for quality of life. It is therefore imperative that a new model is adopted. If we know the population is older, that diseases are chronic and multiple, that the costs of care increase, that the models of care are from a time of acute diseases and that a knowledge of epidemiology can inform us about risk factors, why do we continue to offer an outdated and ineffective product? Especially if we have all the information required to implement an assistance-based care model in which everyone benefits?

It is necessary to rethink and redesign the care to the elderly, turning the focus to the individual and their particularities. This will bring benefits not only to this part of the population, but also quality and sustainability to the entire Brazilian health system.

It is possible to reorient the healthcare of the elderly population and to build an organization within this sector that provides better welfare and economic-financial results. To achieve this, everyone involved must realize they are responsible for the changes required and allow themselves to innovate - which, in many situations, means recovering the simpler care and values that have been lost within our health system.

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Received: May 24, 2018
Reviewed: May 31, 2018
Accepted: June 08, 2018

http://dx.doi.org/10.1590/1981-22562018021.180058

Accuracy of waist circumference for predicting other components of metabolic syndrome: evidence from the Bambuí cohort study of the elderly

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Abstract

Objectives: To examine the accuracy of waist circumference to predict two or more metabolic syndrome (MS) components among the elderly and to compare it with the recommendations of the Joint Interim Statement (JIS) for adults. *Method:* The study was conducted among participants of the baseline of the Bambuí (Minas Gerais) Cohort Study. The best waist circumference cut-off point for the outcome was determined by the Younden Index. The accuracy of such cut-off points was assessed by the area under the ROC curve (AUROC) and the sensitivity, specificity and positive and negative predictive values. *Results:* The prevalence of MS was 63.8% among women and 43.4% among men. Of these, the waist circumference cut-off that best predicted two or more components of MS (≥88 cm) was similar to that recommended by JIS (≥90 cm) (AUROC=0.673 and 0.672, respectively). Among women, the corresponding value was higher (≥92 cm) than recommended by the JIS (≥80 cm) (AUROC=0.605 and 0.560, respectively). *Conclusion:* The overall accuracy of waist circumference (AUROC) for the outcome was low for both genders, indicating that this measure is not an effective predictor of other components of MS in the study population.

Keywords: Waist Circumference. Health of the Elderly. Metabolic Syndrome. Accuracy.

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INTRODUCTION

Metabolic Syndrome (MS) is a complex disorder represented by a set of factors related to central fat deposition and insulin resistance. The progressive increase in the occurrence of diabetes and cardiovascular events with advancing age makes MS particularly relevant among older age groups[1,2].

There are different diagnostic criteria for MS. More recently, a Joint Interim Statement (JIS)[3] was issued, which adopted cutoff points for the circumference of more sensitive waists, which is not essential for the diagnosis of the syndrome. While these criteria are recommended for the adult population, there is no specific recommendation for the elderly population.

As it is an easily obtainable measure, waist circumference can be used for tracking other factors that make up MS, the assessment of which depends on biochemical and blood pressure measurements. However, to our knowledge, few studies have examined the accuracy of waist circumference in the prediction of other factors that comprise MS among the elderly[4-7]. Considering the different values found in these studies, new investigations among different populations are required to determine cutoff points that may be useful in predicting the other components of MS among elderly individuals.

The present study aimed to determine the waist circumference cut-off points for the prediction of two or more components of MS in a large population base of elderly men and women, and to compare them with the corresponding values of the JIS[3] recommendations for adults.

METHOD

The present analysis used baseline data from the Bambuí elderly cohort study, conducted in the city of the same name, which has around 15,000 inhabitants and is located in the state of Minas Gerais, Brazil. Among the 1,742 residents aged 60 and over, 1,606 participated in the baseline survey procedures. More details can be found in a previous publication[8]. The Bambuí elderly cohort study was approved by the Fiocruz Ethics Committee, Rio de Janeiro, in 1996. Participants signed an Informed Consent Term for all the study procedures.

The JIS[3] defines MS by the presence of at least three of the following five components: (1) waist circumference ≥90 cm for men and ≥80 cm for women; (2) triglycerides > 150 mg/dL for both genders; (3) HDL-cholesterol <40 mg/dL for men and <50 mg/dL for women; (4) glycemia >100 mg/dL or history of medical diagnosis of diabetes and/or use of hypoglycemic agents; and (5) systolic pressure >130 mmHg and/or diastolic pressure >85 mmHg and/or use of antihypertensives. The outcome was defined by the presence of two or more of the components mentioned, excluding waist circumference.

Waist circumference measurement was performed in triplicate at the midpoint between the lower edge of the last rib and the iliac crest. The average of three measures was considered. The evaluators were trained by a nutritionist, and reliability analysis was performed for a sample of 10% of those evaluated. No significant differences were found among the evaluators[9]. Pressure levels were measured after 30 minutes or more of the last intake of caffeine or cigarette smoked. Three measurements were performed after five minutes of initial rest and then at two-minute intervals, and the mean of the second and third measurements were considered. Blood collection was performed after a recommended 12 hours of fasting. The dosages of glycemia, HDL cholesterol and triglycerides were determined by traditional enzymatic methods[8]. The use of medications was evaluated through a face-to-face interview, and the prescriptions and/or packaging of drugs consumed were requested.

Initially, the best cut-off point for waist circumference for the prediction of two or more other components of MS in the study population was based on the cut-off points proposed by Wang et al.[6]. Each waist circumference value between 75 cm and 95 cm was evaluated in a stratified analysis by gender. The best cut point was determined by the highest Youden Index (YI), 88 cm for men (YI=0.346) and 92 cm for women (YI=0.209). Next, the accuracy of the waist circumference cut-off point obtained in the analysis described was determined,

as well as the cut-off points recommended by the JIS[2]. Accuracy was assessed using the area under the Receiver Operating Characteristic (AUROC) curve, sensitivity, specificity, and positive and negative predictive values.

RESULTS

Among the cohort baseline participants, there was complete information for all the study variables for 1,383 individuals included in this analysis. The mean age of participants was 68.9 (+7.0) years, with a predominance of women (60.9%). The overall prevalence of MS based on the JIS definition was 55.8%. This prevalence was higher among women (63.8%) than men (43.4%). The cut-off points that best predicted two or more MS components in the study population were 88 cm and 92 cm for men and women, respectively.

Table 1 shows the results of the waist circumference accuracy analysis, using the cut-off point that presented the best prediction for MS in the present analysis and that recommended by the JIS. Among men, the AUROC was similar for the two cut-off points. The sensitivity and specificity of the first measurement of waist circumference were the same, as were the corresponding values for the cut-off point recommended by JIS. The positive and negative predictive values using each of these measures were similar. In contrast, the use of the two cut-off points among women produced different results, with the AUROC found to be higher using the first measurement. The sensitivity for the prediction of two or more components of MS, meanwhile, was higher using the second measurement. The corresponding values for specificity of the first measurement were higher than those of the second. The positive and negative predictive values were similar for each of the two cut-off points.

Table 1. Accuracy of waist circumference for the prediction of two or more of four components of metabolic syndrome (Baseline of the Bambuí Elderly Cohort Study).

Waist circumference	Prevalence of two or more components*	AUROC (CI 95%)	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
Men	0.577					
≥88 cm**		0.673 (0.633-0.713)	0.721	0.624	0.723	0.622
≥90 cm***		0.672 (0.632-0.712)	0.641	0.703	0.746	0.589
P value		0.948				
Women	0.680					
≥92 cm**		0.605 (0.569-0.639)	0.565	0.645	0.720	0.485
≥80 cm***		0.560 (0.533-0.588)	0.906	0.215	0.709	0.518
P value		0.014				

*Two or more of the following components: Triglycerides ≥150 mg/dL; HDL-cholesterol ≤40 mg/dL among men and ≤50 mg/dL among women; systolic blood pressure ≥135 mm/Hg and/or diastolic blood pressure ≥85 mm/Hg; fasting blood sugar level ≥100 mg/dL; ** Cut-off point that best discriminates two or more components in the study population; *** Cut-off point recommended by the Joint Interim Statement - JIS; AUC = area under the ROC curve (receiver operating characteristic); AUROC = area under the ROC curve; *p* value = Z test for comparison between areas under the curve; sensitivity: proportion of increased waist circumference (positive) among those with two or more components (true positives); specificity: proportion of negatives among those who did not have two or more components (true negatives); positive predictive value: proportion of people with two or more components among individuals with increased waist circumference; negative predictive value: proportion of people who did not have two or more components among individuals with adequate waist circumference.

DISCUSSION

The main results of this study were as follows: (1) the waist circumference cut-off point which best predicted two or more components of MS among the men in the study population was similar to that recommended by the JIS for the adult population (2) the best waist circumference cut-off point for women was higher than that recommended by the JIS.

Among men, the adoption of the cut-off point that best predicted the other components of MS in the study population and that recommended by the JIS resulted in similar sensitivity and specificity. The results differed among women, however, with higher sensitivity for the cut-off point recommended by the JIS than the measured cut-off point. In contrast, as expected, the specificities for the cut-off points were lower for the former measure than the latter.

Positive and negative predictive values were also used in this analysis. These are important measures from a public health perspective, since, in addition to sensitivity and specificity, they also consider the prevalence of the disease in the population. Our results found similar predictive values for both genders for both the cut-off point which best predicted the other components of MS in the study population and that recommended by the JIS.

The main measure used in this analysis to examine the accuracy of different waist circumference cut-off points for the prediction of two or more components of MS was the area under the ROC curve. This area represents the overall performance of the test, combining the sensitivity and specificity of the measure for the outcome. The better the test, the more the area under the curve approaches the value of 1, while values equal to 0.50 represent an accuracy due to chance. Values of 0.90 can be interpreted as high, those from 0.7 to 0.89 as moderate and those from 0.51 to 0.69 as low[10]. Although the AUROC was higher than the cut-off point defined in this study among women, our results show low overall accuracy for all the waist circumference cut-off points analyzed.

The main advantage of this study is its large population base. Although all precautions were taken to ensure the standardization and quality of the measurements performed, there is always the possibility of regression to the mean, which may have attenuated the validity measures used in this analysis. In any case, however, this factor could not explain the low accuracy found. As the study was conducted in a single population, it is not known whether the results can be generalized to other elderly populations.

CONCLUSION

The overall validity of the use of waist circumference for the prediction of two or more components of Metabolic Syndrome was low for both genders, indicating that this measure does not adequately predict other components of this syndrome in the study population.

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Recebido: 29/03/2018
Revisado: 15/04/2018
Aprovado: 20/04/2018

http://dx.doi.org/10.1590/1981-22562018021.170179

Pharmacological treatment of chronic non-malignant pain among elderly persons: an integrative review

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Abstract

Objective: The objective of the present study was to perform an integrative review of proposed pharmacological treatments for chronic non-malignant pain in elderly patients. *Method:* An integrative review was carried out. The search of literature included papers about the treatment of chronic pain among the elderly, published from 2007 to 2017 and available in Portuguese or English. Searches were conducted on the LILACS and MEDLINE electronic databases using the key words "chronic pain", "treatment" and "elderly" combined with the Boolean operator "AND". To analyse methodological quality, the adapted Critical Appraisal Skill Program (CASP) was used. *Results*: Of a total of 303 studies found, 32 were included. The articles selected included 20 reviews, five observational studies, five clinical trials, one case series and one retrospective study. A total of 75% of the articles were published in the last five years, of which one was in Portuguese and 31 in English. *Conclusion:* The results demonstrate a variety of treatments for chronic pain among the elderly population, highlighting the role of opioids which, according to more recent evidence, can be carefully used in treatment. Several drugs, however, have not been specifically tested for the elderly population. A number of factors are relevant in pain management of elderly patients, including comorbidities, polypharmacy and patient functionality. An individualized approach should be applied to elderly patients to improve outcomes and reduce side effects.

Keywords: Chronic Pain. Drug Terapy. Drug Utilization. Health of the Elderly.

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INTRODUCTION

Population aging is accompanied by an increase in the incidence of chronic and degenerative diseases, which contribute to the onset of functional pains and limitations[1]. Chronic pain is a prevalent condition in the elderly and has major repercussions on health status, quality of life and biopsychosocial care for this population[2-4]. Studies have shown that pain is one of the most common complaints of the elderly in outpatient medical consultations and that 25% to 50% of such individuals in general suffer from chronic pain, with these numbers reaching 80% in institutionalized elderly persons[5,6].

According to the International Association for the Study of Pain (IASP), pain is an unpleasant sensation or emotional experience associated with actual or potential tissue damage, and may be acute (lasting less than 12 weeks) or chronic (lasting longer than 12 weeks), as well as presenting several pathophysiological mechanisms[7]. Its consequences are multidimensional, altering the physiological, psychological, functional and social variables of the individual[8].

The treatment of chronic pain is based on the World Health Organization (WHO) Analgesic Ladder, originally proposed for the treatment of cancer pain. Treatment of low-intensity pain typically involves administration of a non-opioid analgesic and a non-steroidal anti-inflammatory (first step). For pain of moderate intensity, an analgesic associated with a weak opioid (second step) is recommended. For patients with severe pain (third step), strong opioids such as morphine and oxycodone are indicated. In parallel with the drug classes mentioned above, the WHO also recommends adjuvant drugs such as antidepressants and anticonvulsants, which can be associated with any step or used alone to better manage pain[9,10].

Physiological and pharmacodynamic changes in senility, comorbidities, cognitive aspects and degree of independence may interfere with the behavior of pain and its management. Elderly people tend to be more susceptible to the effects of medication and also to their adverse effects. Thus, one should be aware of possible unexpected responses to certain medications when beginning pain management in the elderly, which sometimes involves strong drugs such as opioids[11]. The Brazilian and American consensuses of potentially inappropriate drugs for the elderly report that adverse effects in the elderly are at least twice as frequent as in young patients[12,13]. Associated with these factors is polypharmacy, one of the most worrisome aspects of drug therapies in the elderly[9].

The objective of this study was to perform an integrative review addressing the drug treatment of chronic non-oncologic pain in the elderly. The study aimed to explore the use of different classes of drugs used in the treatment of pain, as well as their recommendations and specific advantages and disadvantagesfor this population.

METHODS

An integrative literature review was adopted as a research methodology, since it allowed the use and critical evaluation of scientific evidence of several methodological designs. The preparation of this review was based on six stages, in order to guarantee greater methodological rigor[14].

First stage: Establishing of the research question, based on the theme, which in this case was, *what are the options for the drug treatment of non-oncologic pain in the elderly*?

Second stage: a literature search was conducted between October 2016 and June 2017. The databases used were: Latin American and Caribbean Health Sciences Literature (LILACS) and the Medical Literature Analysis and Retrieval System Online (MEDLINE). The descriptors used were: "dor crônica", "tratamento" and "idoso" in Portuguese and *"chronic pain", "treatment"* and *"elderly"* in English, all included in the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH). The Boolean operator AND was employed.

The criteria for selecting the articles were: a) articles on the proposed theme, namely chronic non-oncologic pain treatment in the elderly, with individuals older than 60 years considered elderly; b) articles published between 2007 and 2017; c) articles in English or Portuguese; (d) articles available in full; e) articles that met the criteria proposed by the Critical Appraisal Skills Program (CASP) Checklist for Qualitative Research. The

exclusion criteria were: a) articles that addressed the non-pharmacological treatment of pain; b) articles repeated among the databases.

Third Stage: Categorization of the studies, including the gathering of information such as: identification of the original article and authors, periodical, year of publication, database, methodological characteristics, level of evidence, interventions measured and results found.

Fourth Stage: evaluation of the studies included in the integrative review. The critical analysis of the data was performed following the organization of the selected articles. The CASP instrument was applied with the purpose of guaranteeing the methodological rigor, relevance and credibility necessary for an integrative review of studies with different approaches.

Fifth Stage: Interpretation of results. The discussion of the main results found in literature on the drug treatment of chronic pain in the elderly, the drug classes and their effects on this population was carried out.

Sixth Stage: Writing of review. The results and discussion were presented in a descriptive manner.

RESULTS

The search identified 303 articles, of which 204 were published between 2007 and 2017. The initial evaluation was performed by reading the title, excluding articles outside the theme of "pain in the elderly". The abstracts of the included articles were evaluated in accordance with the eligibility criteria. The abstracts were evaluated by three independent reviewers and the publications that met the inclusion criteria were evaluated in their entirety.

The final sample for inclusion in the integrative review was 32 articles, of which 75% were published in the last five years (Figure 1).

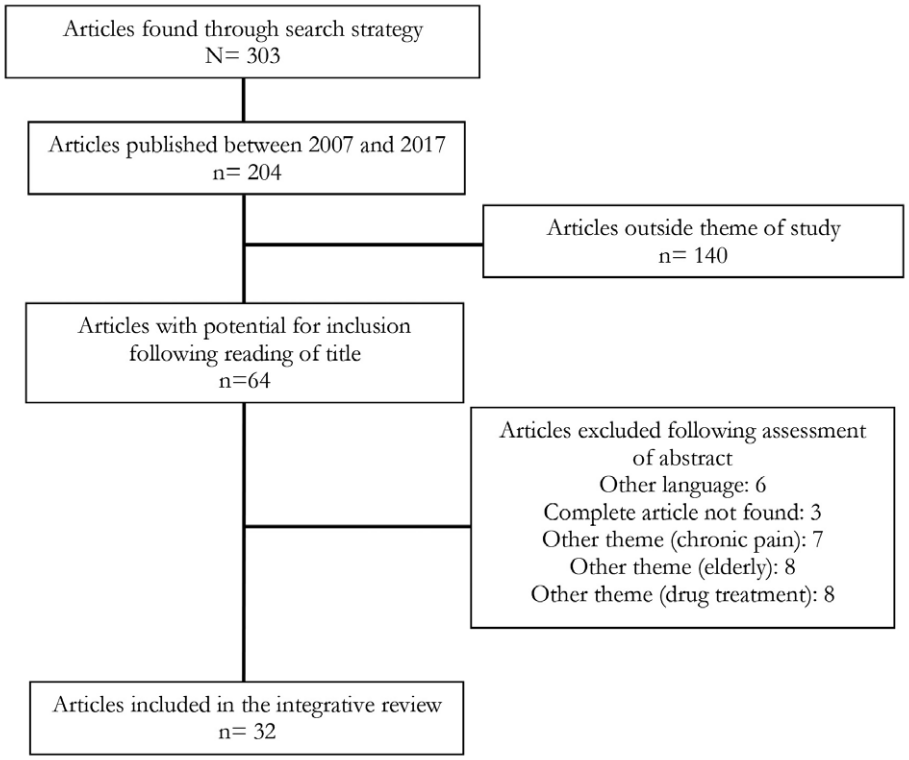

Figure 1. Flowchart of study selection.

DISCUSSION

Non-opioid analgesics

This group of various drugs reduces or interrupts the nerve transmission pathways, reducing nociception, with the main examples being acetaminophen and dipyrone[11]. No studies on the use of dipyrone in chronic pain were found, however, and so this drug was not addressed in the present study.

Acetaminophen

Popularly known as paracetamol, this drug has analgesic and antipyretic properties. It acts by inhibiting the arachidonic acid cascade. It is the most widely used analgesic, and is the drug of choice for the treatment of mild to moderate pain[15]. Its use in combination with tramadol produces a good response in patients who show no improvement with nonsteroidal anti-inflammatory drugs (NSAIDs)[16].

It rarely presents side effects and results in few drug interactions. The greatest concern regarding its use is due to its high hepatotoxic potential. In many countries, the drug is considered the leading cause of acute liver failure and it may cause subclinical toxicity even at normal dosages. In alcoholics, there is an increased risk of toxicity, since the hepatic metabolism becomes synergistic[17,18].

Despite being considered a safe drug for the elderly, there are no studies that specifically address the safety of acetaminophen in this group. According to the Food and Drug Administration (FDA), there is no evidence that doses above 325 mg produce better results, with dosages of up to 2 grams/day recommended for the treatment of chronic pain[18,19]. The use of paracetamol in the elderly should be recommended on an individual basis. Because it is a low-cost and easily accessible drug, it is important to advise the patient about the risks of the indiscriminate use of the drug[19,20].

Anti-inflammatory drugs

NSAIDs, along with analgesics, are indicated for the treatment of acute and chronic mild pain, and represent the first step of the WHO analgesic ladder[10]. NSAIDs possess an antipyretic, analgesic and anti-inflammatory action by inhibiting the synthesis of prostaglandins and thromboxanes[19].Despite the role of NSAIDs as drugs of choice in the treatment of mild to moderate chronic pain, they are potentially inappropriate for the elderly and their indiscriminate and long term use is related to various morbidities and delirium[11,12,21-23]. It is recommended that they are used only when essential and with monitoring[21-23].

Although diclofenac sodium is a high-potency drug and the most prescribed medication worldwide, it has a high incidence of side effects. The drug is available in oral, topical and adhesive forms, with the last the safest in terms of systemic adverse effects, although it is not as efficient as the oral form[24]. When comparing ibuprofen, diclofenac and celecoxib, the Celecoxib Long-term Arthritis Safety Study (CLASS) found similar results for the risk of cardiovascular disease associated with the use of NSAIDs[19].

Studies have suggested that selective NSAIDs have greater gastrointestinal effects than non-selective drugs[20]. While celecoxib has a better gastric tolerance profile than ibuprofen and diclofenac, its use for more than six months results in a similar incidence of gastrointestinal effects[19].It is important to remember that the coadministration of acetylsalicylic acid, which is quite common in the elderly, also reduces the advantage of selective NSAIDs over non-selective NSAIDs, and both cases involve a predisposition to gastric ulcers and reduced safety. Since none of the NSAIDs is completely safe in terms of gastrointestinal effects, the concomitant use of proton pump inhibitors is recommended[22].

The continuous use of anti-inflammatories can cause renal damage. Cardiorenal effects are usually attributed to traditional drugs such as diclofenac, nimesulide and naproxen. However, a clinical trial by Schwartz et al. (apud Kean et al.)[19] found that after 28 days of use of selective COX-2 inhibitors (rofecoxib and celecoxib), the changes in renal function were similar to naproxen, resulting in creatinine clearance, weight change, urinary excretion and systolic and diastolic blood pressure[19].

The choice of NSAID for the treatment of chronic pain states is largely empirical[21]. Some authors suggest a therapeutic trial of one to two weeks, with the treatment maintained if there is a

satisfactory response. It should be initiated at low doses to determine patient tolerance, with subsequent dose adjustment to maximize efficacy or minimize adverse effects[25,26].

Opioids

Opioids are a group of compounds that act by binding themselves to the opioid receptors distributed in the nervous system and peripheral tissues, and can act as agonists or antagonists. Fentanyl, hydromorphone, methadone, morphine and oxycodone are agonist opioids, while buprenorphine is partially agonist/antagonist[27].

They are potent for the control of moderate to severe chronic pain which is refractory to treatment with non-opioid analgesics and anti-inflammatory drugs.[18,28] Due to the high index of dependence, side effects and lack of knowledge on the part of clinicians, however, there is a fear of prescribing opioids[23]. However, studies have suggested that, when properly recommended for carefully selected elderly, they may offer less risk than NSAIDs[27,29,30].

Opioid tolerability is an extremely important factor in the treatment of the elderly with chronic pain, since adverse events such as dizziness and sedation are related to an increase in the incidence of falls and, consequently, risk of fractures[22,31]. The main side effects of opioids, however, are gastrointestinal, including constipation, nausea and vomiting[9]. These effects may be amplified by normal physiological changes in the elderly, such as increased gastric pH and reduced gastric and intestinal motility[17,32].

Tramadol

This is a weak opioid and an agonist of the μ-opioid receptor, acting to inhibit the reuptake of monoamines at the central level. Its most common side effects are nausea and vomiting, the reduction of the convulsive threshold withdoses greater than 300 mg/day, and an increased risk of suicide and serotonergic syndrome. Tramadol should therefore be avoided in patients with suicidal ideation or the use of serotonin reuptake inhibitors[28,33,34]. There are few studies for the elderly population and some authors recommend beginning with a dose of 25 to 50 mg day, with a progressive increase of up to 100 mg/day[24,28].

An observational study by Imamura[21] evaluated the effects of the combination of tramadol and acetaminophen in patients with chronic low back pain which had not improved with the use of NSAIDs. While the results showed significant improvement of pain after one month of treatment, more interventional studies are necessary to evaluate the long-term results.According to Hirst et al.[16], tramadol increases the risk of falls and fractures when compared to buprenorphine. Based on data from the British National Health Service, the authors concluded that, even though the drug itself is cheaper, the indirect final costs of falls and fractures are greater than with the use of buprenorphine.

Codine

This is a weak opioid widely used in the treatment of moderate pain (second step). Twelve times less potent than morphine, it is widely used in combination with other analgesics such as paracetamol. Even though it is a weak opioid, it can cause side effects similar to other such drugs, mainly nausea, vomiting and constipation. No studies were found that evaluated the use of codeine in the elderly population. Evidence in the general population suggests that the drug is related to neurotoxicity in patients with renal impairment, so the American Society of Interventional Pain Physicians (ASIPP) contraindicates its use in patients with creatinine clearance less than 30 mL/min/1.73m^2[2,18,24].

Hydrocodone

Hydrocodone, also known as dihydrocodone, is a semisynthetic opioid synthesized from codeine. It is one of the principal and most used opioids in the treatment of chronic pain in the USA. Even though it is a widely used drug, the ASIPP[18]states that the evidence of its effects and safety is variable and insufficient. In the search for data in this review only one study on hydrocodone was selected, confirming the need for further studies[19].

The study by Broglio et al.[35] evaluated the efficacy and safety of long-release hydrocodone in the elderly with chronic pain. Patients older than 75 years, with moderate to severe pain, were admitted to treatment for a period of 52 weeks. The results showed that 94% of patients were satisfied with treatment and reduced pain based on the evaluation index "pain in the last 24 hours". The median dose of the drug in the study ranged from 37.7to 49.7 mg, consistent with ASIPP recommendations, which are 30 to 40 mg per day. Like other opioids, the main side effects were constipation and nausea, with no incidence of falls[18,35].

A particular feature of the study was the use of long-release hydrocodone, considered a positive factor by the study subjects. It presents limitations however, such as its post-hoc nature, small population, and the absence of a cognition test in sample selection[35]. In addition, the drug is expensive in Brazil.

Methadone

Methadone is a popular synthetic opioid with a potent analgesic effect and also several adverse effects. Its pharmacological and pharmacokinetic properties differ from other opioids, producing significant interindividual differences and greater chances of interactions[28]. In addition, it may be related to a prolonged QT interval and the increased risk of Torsades de Pointes when used in high doses[36].

Case reports by Vu Bach et al.[36]found a satisfactory response in the improvement of pain with the use of methadone in low doses, ranging from 2.5 to 20 mg, as an adjuvant drug. In this study, the authors concluded that methadone was safe, well-tolerated and effective in controlling pain when offered as a complement to hydromorphone.

According to the ASIPP[18]consensus for the treatment of pain, methadone is recommended only in the case of the failure of other opioid drugs, with treatment beginning with a dose of two to five mg/day and a maintenance dose of between 10 and 30 mg/day. Electrocardiograms prior to and during treatment have been recommended, although there is a limited level of evidence for such recommendations, as most studies involving the drug are case reports, requiring new evidence of greater significance[18].

Oxycodone

Oxycodone is a semisynthetic opioid of morphine, derived from thebaine. It is a pure agonist that has a high affinity for μ-opioid receptors and a potency twice as great as morphine[30]. Its use is usually only indicated in cases of severe pain, corresponding to the third step of the analgesic ladder[18]. New studies have shown promising results regarding the use of oxycodone as the first option in the treatment of chronic pain in the elderly[37,38]. The British consensus for the treatment of chronic pain recognizes the prescription of strong opioids in low doses without the previous use of weak opioids when pain is not adequately controlled with analgesics or NSAIDs[22].

In order to reduce gastrointestinal effects, a prolonged release formulation combining oxycodone and naloxone has been developed and has produced good results for efficacy and safety. Naloxone is an opioid antagonist drug with low systemic bioavailability that predominantly antagonizes opioid receptors in the gastrointestinal tract, preventing the gastric side effects of oxycodone[38,39].

The oxycodone-naloxone prolonged-release combination has shown analgesic efficacy in studies, with a significant reduction in the incidence of opioid-induced constipation and improvement in patient quality of life[37,39,40]. A study conducted by Guerriero et al.[37]demonstrated statistically significant clinical improvements during oxycodone-naloxone treatment. A total of 60 patients, with a mean age of 81.7 years, received an average dose of 17.4/7.7 mg daily for four weeks. There was significant improvement in the pain index as well as Barthel's functional scale at the end of four weeks, and the results were maintained after 52 weeks.

According to Malec and Shega[24], oxycodone has a better safety profile in patients with cardiovascular diseases and reduced renal function than codeine and morphine. It should still be used carefully and with monitoring for possible toxicity, however, since the drug has several metabolites that can accumulate in renal failure.

Buprenorphine

Buprenorphine has been used in medicine as a treatment for opioid dependence for decades, and studies have demonstrated the analgesic effect of the transdermal presentation of the drug in recent years[41,42]. It is a derivative of thebaine and 25 to 40 times more potent than morphine. It is suggested that its mechanism of action operates through partial agonist effects on the μ and Kappa opioid receptors, as well as via antagonistic action on the delta receptors[15,41,43]. Initially, it was believed that the partial agonist effect of buprenorphine limited its analgesic effect, but studies have shown that the ceiling effect only exists with respect to respiratory depression, and not analgesia[44].

Buprenorphine comes in intravenous, sublingual and transdermal forms, with the last the only type available in Brazil and the most currently studied. Adhesives are available in five, 10 and 20 mcg/h forms, with seven day release. Unlike other drugs, buprenorphine has no systemic accumulation, with mainly intestinal elimination, and is considered safe for patients with renal insufficiency. Its transdermal route of administration prevents first-pass metabolism, contributing to lower rates of drug interactions and adverse effects such as respiratory depression and immunosuppression[29,42,45].

A study by Überall and Müller-Schwefe[45] evaluated the efficacy of buprenorphine in the treatment of chronic pain in the elderly. A total of 891 individuals, with a mean age of 72.8 years, received doses between 5 and 30 mg/h during the study. On average, complaints of pain decreased by approximately 82%. Results were also positive for intensity of pain, which was reduced by 50% in the first four weeks and by 76% at the end of the study. There was also an improvement in depression scores of 56%.

According to a study by Likar et al.[41], there was no difference in the tolerance and safety profiles between patients older and younger than 65 years. Transdermal buprenorphine therefore seems to be a viable option for pain management, but like other opioids, its benefits and risks should be evaluated individually. In addition, it is a high cost drug, hindering its access to the general population[41].

Morphine

Morphine is a high potency opioid drug which has been used in medicine for more than a century. Again, the present survey did not find studies that evaluated its use specifically among the elderly population. Morphine is widely used in severe pain, surgical and palliative sedation. In recent years there has been a tendency to substitute it with new opioids, and to use it as a parameter of equivalence for such drugs[28]. As with codeine, morphine should be used with caution in patients with renal impairment, requiring adjustment of dosage or replacement with another opioid[24].

Adjuvant medications

These are drugs developed for other therapeutic purposes, but which have their analgesic effects verified during use. They are mainly used for the treatment of neuropathic pain.

Antidepressives

The literature search did not identify studies describing the use of antidepressants in the treatment of chronic pain in the elderly. Tricyclic antidepressants, which act at the presynaptic level by blocking recapture of monoamines, are commonly used in the management of chronic pain related to polyneuropathy and peripheral diabetic neuropathy[28]. However, attention is required when prescribing these drugs, since they can have a large number of side effects including urinary retention, constipation, postural hypotension, sedation, glaucoma and cardiac arrhythmias[31]. They are also related to an increase in the number of falls and the precipitation of delirium, and should therefore be used with care in the elderly[28]. Antidepressant drugs are considered potentially inappropriate for the elderly by the BEERS criteria[12].

Although the tolerability of selective serotonin reuptake inhibitors is better than that of tricyclics, there are controversies in their use for pain control[25]. The British National Health Institutesuggests duloxetine as an option for pain related to diabetic neuropathy, but does not discuss its use in the elderly[28].

Anticonvulsants

Antiepileptic drugs such as carbamazepine and sodium valproate have already been used in the management of neuropathic pain, and a high incidence of adverse effects, drug interactions and the need for monitoring by laboratory tests have been described. New antiepileptic drugs such as gabapentin and pregabalin have become common in the treatment of pain, as studies have shown their efficacy and safety[28,33]. However, there are no studies evaluating the use of these drugs in the elderly population. In general, it is recommended that use begins at the lowest dose possible, considering renal function, and is then increased according to response and adverse effects[25,33].

One factor to be considered in the treatment of pain in the elderly relates to the psychosocial aspects of this population. When caring for the elderly, mental health is an essential factor to be evaluated. The rate of depression, which is high in this age group, contributes to the precipitation and perpetuation of chronic pain[8,46]. Degrees of independence and cognitive function should also be considered as they can affect how complaints of pain are manifested, as well as the therapeutic approach to be established and adherence to treatment[47].

The social condition of the patient is also of fundamental importance. Social determinants impact the prevalence of chronic diseases and their management. Social inequality, low schooling and inequality in access to health services and information are related to a higher prevalence of chronic diseases, their aggravations and poor adherence to treatment[47,48]. Most of the drugs mentioned above, for example, are expensive by Brazilian standards, representing an obstacle to the establishment of adequate treatment.

As it is an integrative review, the study has methodological limitations. The design allows the analysis of different drugs, but more controlled studies are needed for the establishment of better treatment options. The present review found a lack of this type of study, which may be related to the low number of studies among the elderly population. More studies in this population are therefore necessary to contribute to existing evidence and the definition of protocols in the treatment of chronic pain among the elderly.

CONCLUSION

The management of chronic pain in the elderly is complex due to the comorbidities, polypharmacy, functional status and physiological alterations of this population. Therapeutic planning requires a broad understanding of these variables, as well as the social condition of the patient. Common undesirable effects of various drug classes can be avoided or mitigated with an individualized approach to the patient, especially when several drugs have not been specifically tested for the elderly population. The consequences of inadequately treated chronic pain can worsen comorbidities, decrease the individual's degree of independence, and lead to depression. In general, the geriatric maxim "start low and go slow" should be applied. This involves starting at lower doses which are increased according to tolerability and efficacy, as well as constant patient monitoring. Studies have described the demystification of strong opioids, which are now established as a safe and effective choice when prescribed correctly. In treating chronic pain in elderly patients, the risk-benefit ratio of any drug should be evaluated, based on the recommendations of the current consensus and scientific evidence.

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Recieved: November 15, 2017
Reviewed: March 20, 2018
Accepted: April 23, 2018

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