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ORIGINAL ARTICLE

Application for screening frailty: elderly care tool in Primary Health Care*

Aplicativo para rastreio de fragilidade: ferramenta de cuidado ao idoso na Atenção Primária à Saúde

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ABSTRACT

Objectives: To develop an application for screening frailty in the elderly in Primary Health Care and to validate it semantically with health professionals. **Methods:** Methodological study, carried out from February to March 2021, through semantic validation. With the participation of 75 nurses and 44 doctors of the Family Health Strategy from the 25 Municipalities of the Second Health Region of the State of Paraíba. In addition to the construction of a mobile application called Primary Health Care for frail elderly, for use on an Android system, with the programming language HTML, Java Script, CSS, PHP, Framework IONIC and MVC production model. **Results:** Among the 42 variables present in the semantic validation instrument, 20 variables were selected to compose the application, formed by four Dimensions: Physiological, Functional, Biopsychosocial, Cognitive. **Conclusion:** The application enables the multidimensional assessment of the elderly in primary health care. It was identified that the early diagnosis of frailty provides stabilization of the clinical condition, reducing the risk of hospitalization, death and referrals to specialized care.

Descriptors: Frailty; Aged; Primary Health Care; Health Evaluation; Technology.

RESUMO

Objetivo: Desenvolver aplicativo de rastreio de fragilidade em idosos na Atenção Primária à Saúde e validar, semanticamente, com profissionais de saúde. **Método:** Estudo metodológico, realizado de fevereiro a março de 2021, por meio de validação semântica, com 75 enfermeiros e 44 médicos da Estratégia Saúde da Família dos 25 municípios da 2ª Região de Saúde do Estado da Paraíba e construção de aplicativo móvel denominado *APS para Idosos Frágeis*, para uso em sistema Android, com linguagem de programação HTML, Java Script, CSS, PHP, Framework IONIC e modelo de produção MVC. **Resultado:** Entre as 42 variáveis presentes no instrumento de validação semântica foram selecionadas 20 variáveis para compor o aplicativo, formado por quatro Dimensões: Fisiológica, Funcional, Biopsicossocial, Cognitiva. **Conclusão:** O aplicativo possibilita a avaliação multidimensional do idoso na Atenção Primária à Saúde. Entende-se que o diagnóstico precoce da fragilidade proporciona estabilização do quadro clínico, diminuindo risco de hospitalização, morte e encaminhamentos para atenção especializada.

Descritores: Fragilidade; Idoso; Atenção Primária à Saúde; Avaliação em Saúde; Tecnologia.

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INTRODUCTION

Frailty is a clinical syndrome characterized by a state of vulnerability to internal and external stressors that result in negative health outcomes. Its etiology includes physical, social and psychological factors that interact and cause a decrease in the functional reserve[1]. The prevalence of frailty among the elderly living in the community is around 10% and those hospitalized can vary from 18 to 40% of patients[2,3].

Furthermore, recent studies indicate that frailty is related to a higher risk of cardiovascular disease, depression and reduced quality of life, representing an important economic impact[4-7]. In addition, the difficulty in the early identification of frail elderly people compromises care, as some health professionals consider frailty an inherent condition of aging, which can lead to late interventions.

In view of this complex health state, it is noted that frailty in the elderly represents a challenge for the management of health care in the area of gerontogeriatrics. Thus, requiring effective responses throughout the Health Care Network (HCN) for the elderly. In this sense, the National Health Policy for the Elderly (Portuguese acronym: PNSPI) establishes Primary Health Care (PHC) as the coordinating level of health care for the elderly, being the gateway to meeting their health needs[8].

The coordination of care is the gateway to the HCN, being considered an attribute of PHC, as evidenced in a cross-sectional study carried out in the state of Rio Grande do Sul. The study had a sample of 555 elderly people registered in the Family Health Strategy (FHS) and used Fried's Frailty Phenotype as an assessment tool. Its results made it possible to detect, at an early stage, the pre-frail and frail elderly who lived in the community and the factors related to frailty. This information guided the planning of actions carried out by the professionals of the FHS, providing a qualified health care[9].

In this scenario, the use of digital health technologies is an important response in the early identification of frail elderly people. This is because these tools allow access to health information, creation of health indicators and formatting of databases, favoring decision-making by health professionals[10]. The creation of a frailty identification application in PHC is a method that ensures an accurate diagnosis, facilitating decision-making and monitoring of the health of the elderly by the professional[11].

In this sense, this study aims to develop an application for screening frailty in the elderly in PHC and to validate it semantically with health professionals.

METHODS

This is a methodological study[12] to build an application for screening frailty in the elderly in PHC. The study steps included the identification of indicators to compose the application, semantic validation, which sought to validate the variables to compose the application, and presentation of the application's characteristics. For the preparation of this article, the assumptions of the Revised Standards for Quality Improvement Reporting Excellence (SQUIRE 2.0) guide, available on the Equator web page, were followed.

The first stage of the study corresponded to the performance of the integrative literature review[13], carried out in September 2020. The objective of this stage was to identify adequate instruments for screening frailty in the elderly in PHC. Which resulted in the indication of 12 instruments that assess frailty in the physiological, functional, cognitive and biopsychosocial dimensions, this helped in the identification of indicators to compose the application. The preliminary version of the application was built based on the indicators found in the frailty screening instruments of this study population, validated in Brazil, referenced in the integrative review (IR).

Thus, of the 12 instruments for assessing frailty in the elderly found in the IR, eight are validated in Brazil: Fried's Frailty Phenotype (2015), Edmonton Frailty Scale (2007), Groningen Frailty Indicator (2019), Teste Timed Up and Go (2016), Prisma-7 (2016), Tilburg Frailty Index (2012), Gait Speed Test (2011) and Clinical-Functional Vulnerability Index (2016). From the evaluation of these instruments, four dimensions of frailty were chosen to compose the application: physiological, functional, biopsychosocial and cognitive dimensions.

The second stage of the study, the semantic validation, was carried out from February to March 2021. It had the participation of 75 nurses and 44 doctors of the FHS from the 25 Municipalities of the Second Health Region of the State of Paraíba, totaling 119 professionals. Sampling took place for convenience, including those who were working in a Family Health Unit with at least one year of employment. During the validation process, each professional was presented with the Free and Informed Consent Form (FICF), through Google Forms, with clarifications about the research objectives. After accepting participation, the professional characterization questionnaire was completed. Then, the professionals evaluated the instrument, verifying the importance of each item for assessing frailty in the elderly, the difficulty of answering or understanding, and the coherence and clarity of the response options for each item. To assess the participants' responses, a Likert-type scale[14] was used with five response options: 1 – Strongly disagree; 2 – Disagree; 3 – Neither agree nor disagree; 4 – Agree; 5 – Strongly agree.

After organizing the data, the Content Validity Index (CVI) was used to analyze the suggestions made by the professionals. The calculation of the CVI score considered the sum of agreement between the answers "agree" and "strongly agree"[12]. As recommended in the literature, a CVI score equal to or greater than 0.78 was considered acceptable.

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The third stage of the study consisted in the development of the application for Screening Frailty in the Elderly in PHC, called *APS para Idosos Frágeis (PHC for Frail Elderly)*. Designed for use in Android system, being considered suitable for the target audience. The programming language applied was HTML, Java Script, CSS, PHP, Framework IONIC and the MVC production model (Model, View e Controller).

The assessment of the frailty of the elderly will be carried out from the answer of 20 questions, divided into four dimensions, chosen from the validation carried out with PHC professionals. The physiological dimension (E_F) is composed of seven questions and its score is calculated by adding the score of the evaluated answers divided by seven. The functional dimension (E_{Fun}) is composed of six questions; the biopsychosocial (E_B) has four questions, the cognitive (E_{cog}) has three questions. Thus, following the same line of reasoning in which the final score for each dimension will be given by the sum of the points obtained, divided by the number of existing questions. E_{Fis}, E_{Fun}, E_{Bio} and E_{Cog} are the scores related to the Physiological, Functional, Biopsychosocial and Cognitive dimensions, respectively. Using the number of questions that make up each dimension and considering that each one of them has a dichotomous answer (zero or one), its final calculation is performed from the sum of the scores obtained by each dimension divided by four.

The total score E_{Total} varies on the closed interval [0.1], and is given by

$$E_{Total} = \frac{E_{Fis} + E_{Fun} + E_{Bio} + E_{Cog}}{4}.$$

To categorize the elderly as frail or non-frail, it was defined that when $E_{Total} > 0.5$, the elderly person is considered frail, and being $E_{Total} \leq 0.5$, the elderly person is classified as non-frail. It should be noted that the calculation of the total score was performed using mathematical calculations. From which the midpoint 0.5 of the interval between zero and one was considered, taking into account that the final variable is dichotomous and there are two similar probabilities of the elderly being classified as frail and not frail. The application is organized according to Figure 1.

The study is an excerpt from the master's dissertation entitled Application for Screening Frailty in the Elderly in PHC, presented to the Professional Master's Program in Gerontology at Universidade Federal da Paraíba (UFPB). The Research Ethics Committee, following the rules of Resolution nº 466/2012, of the National Health Council, approved it. All research participants signed the FICF.

RESULTS

One hundred and nineteen health professionals participated in the evaluation of the proposed instrument, 75

PHC for Frail Elderly
Professional/elderly identification data
1. Primary Health Care professional registration
2. Registration of the elderly
Frailty assessment
1. Physiological dimension
2. Functional dimension
3. Biopsychosocial dimension
4. Cognitive dimension
Outcome
Non-frail elderly Frail elderly

Figure 1. Representation of the sections of the application for screening frailty in the elderly in Primary Health Care. João Pessoa, PB, Brazil, 2021.

(63%) nurses and 44 (37%) doctors, with a predominance of females, 3 (2.5%) with a maximum degree of Master. Regarding working time, 65 (54.5%) said they provided care for more than five years.

Based on the findings of the IR, a questionnaire was created. Which made it possible for professionals to analyze the proposed problem, covering four dimensions: physiological, functional, biopsychosocial and cognitive. Based on the judgment of the variables present in the assessment instrument, the application named *PHC for Frail Elderly* was created.

Regarding the personal information of the elderly, five variables were selected to compose the application: age (CVI 0.93), gender (CVI 0.83), education (CVI 0.85), marital status (CVI 0.75) and presence of a caregiver (CVI 0.82).

Table 1 represents the CVI of the application with mean, median, standard deviation, minimum and maximum calculations. The CVI mean showed an agreement of 80% in the evaluation of empirical indicators validated by FHS health professionals to assess the frailty of the elderly in PHC. In addition, the minimum CVI value found was 0.67 and the maximum was 0.93.

Table 2 shows the variables with the degree of agreement of the research participants in the evaluation of the instrument, in which this sample population validated the items present in the application through the CVI. Among the 42 variables of the semantic validation instrument, 20 were selected to compose the application for screening frailty in the elderly in PHC, following what was recommended in the method as a selection criterion.

The items selected after semantic validation were divided into four dimensions: Physiological Dimension (seven questions), Functional Dimension (six questions), Biopsychosocial Dimension (four questions), and Cognitive Dimension (three questions). This technological product

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will be available for free download on the Google Play store. After downloading and accessing the application, the registration of the health professional is requested, who will provide a login and password. Then, the professional will have the option to register the elderly person with his/her personal data and then start the frailty assessment. Remembering that the data of these elderly people in PHC will be stored on the mobile device with restricted access with login and password.

In addition, the PHC health professional will have the possibility to issue reports of the elderly evaluated individually, having access to the entire completed questionnaire, with no possibility of alteration. In addition, the program will provide a nominal list of the evaluated elderly and their final assessment of frail or non-frail. The reports can be filtered by municipality of residence. It is worth noting that the proposed instrument has not yet been applied to the elderly to screen frailty in PHC. Thus, for better understanding, Figures 2 and 3 depict the screens of the application for screening frailty in the elderly in PHC.

Table 1. Demonstration of the application Content Validity Index in the evaluation of the target audience instrument. João Pessoa, PB, Brazil, 2021.

Distribution measures	Content Validity Index
Mean	0.80
Median	0.81
Standard deviation	0.04
Minimum	0.67
Maximum	0.93

Source: Survey data, 2021.

Table 2. Variables according to the degree of agreement of the research participants in the evaluation of the instrument of the target audience. João Pessoa, PB, Brazil, 2021.

Physiological Dimension	CVI
1.1 In general, how would you describe your health?	0.80
1.2 In the last few months, have you had any recent hospitalizations?	0.83
1.3 In the last year, did you lost weight without dieting?	0.78
1.4 Do you have problems in your daily life due to loss of strength in your hands?	0.80
1.5 Do you have difficulties carrying out your daily activities because you cannot see well?	0.79
1.6 Do you have difficulties carrying out your daily activities because you cannot hear well?	0.81
1.7 Do you have a problem of losing urine unintentionally?	0.81
Functional Dimension	**CVI**
2.1 In how many of the following activities did you need help? Preparing Meals ( ) Shopping ( ) Transportation ( ) Calling ( ) Housekeeping ( ) Washing clothes ( ) Handling money ( ) Take medicine ( )	0.82
2.2 Do you think you are walking slower today than you were a year ago?	0.79
2.3 In general, do health problems limit your activities?	0.82
2.4 Have you had two or more falls during the year?	0.83
2.5 Do you regularly use crutches, walkers or wheelchairs?	0.80
2.6 Are you unable to handle or hold small object?	0.80
Biopsychosocial Dimension	**CVI**
3.1 Do you need someone to help you regularly?	0.82
3.2 Do you feel sad or depressed often?	0.84
3.3 In the last month, have you lost interest or pleasure in doing previously pleasurable activities?	0.83
3.4 Have you been feeling nervous or anxious lately?	0.83
Cognitive Dimension	**CVI**
4.1 Is this forgetfulness getting worse in recent months?	0.85
4.2 Is this forgetfulness preventing the performance of some daily activity?	0.85
4.3 Do you sometimes forget to take your prescribed medications?	0.86

CVI: Content Validity Index.
Source: Survey data, 2021.

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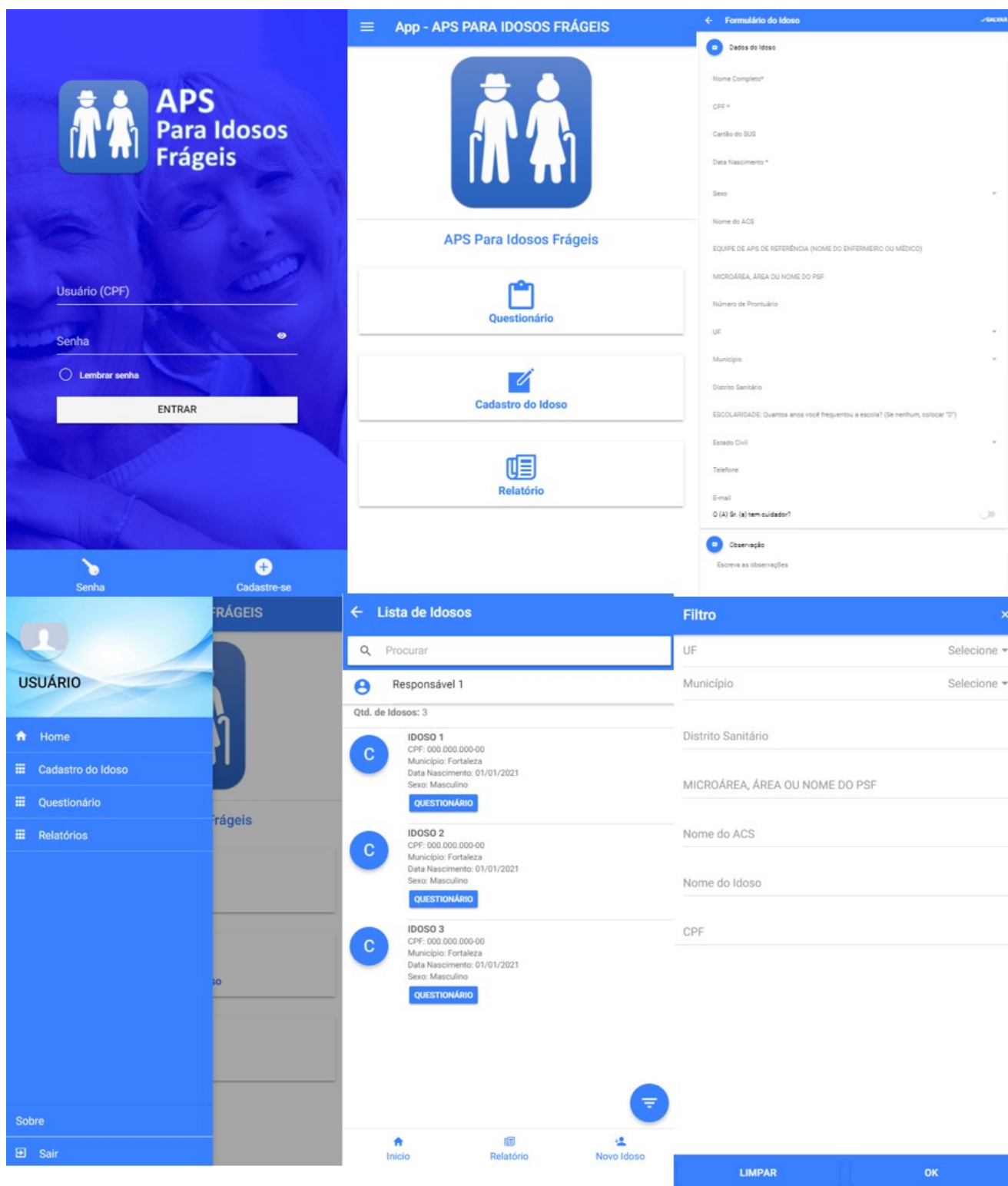Rev. Eletr. Enferm., 2022; 24:70526, 1-9

Figure 2. Screen prints of the application for screening frailty in the elderly in Primary Health Care.

DISCUSSION

The creation of this application proposes an innovative model in the assistance provided to the elderly population in PHC. The objective is to screen frail elderly people, allowing the professional to quickly assess the multidimensionality of this population, identifying frailty and planning interventions that reduce or prevent disabilities. From this perspective, the application *PHC for Frail Elderly* makes it possible to assist in the care of the elderly and in the decision-making of the health professional.

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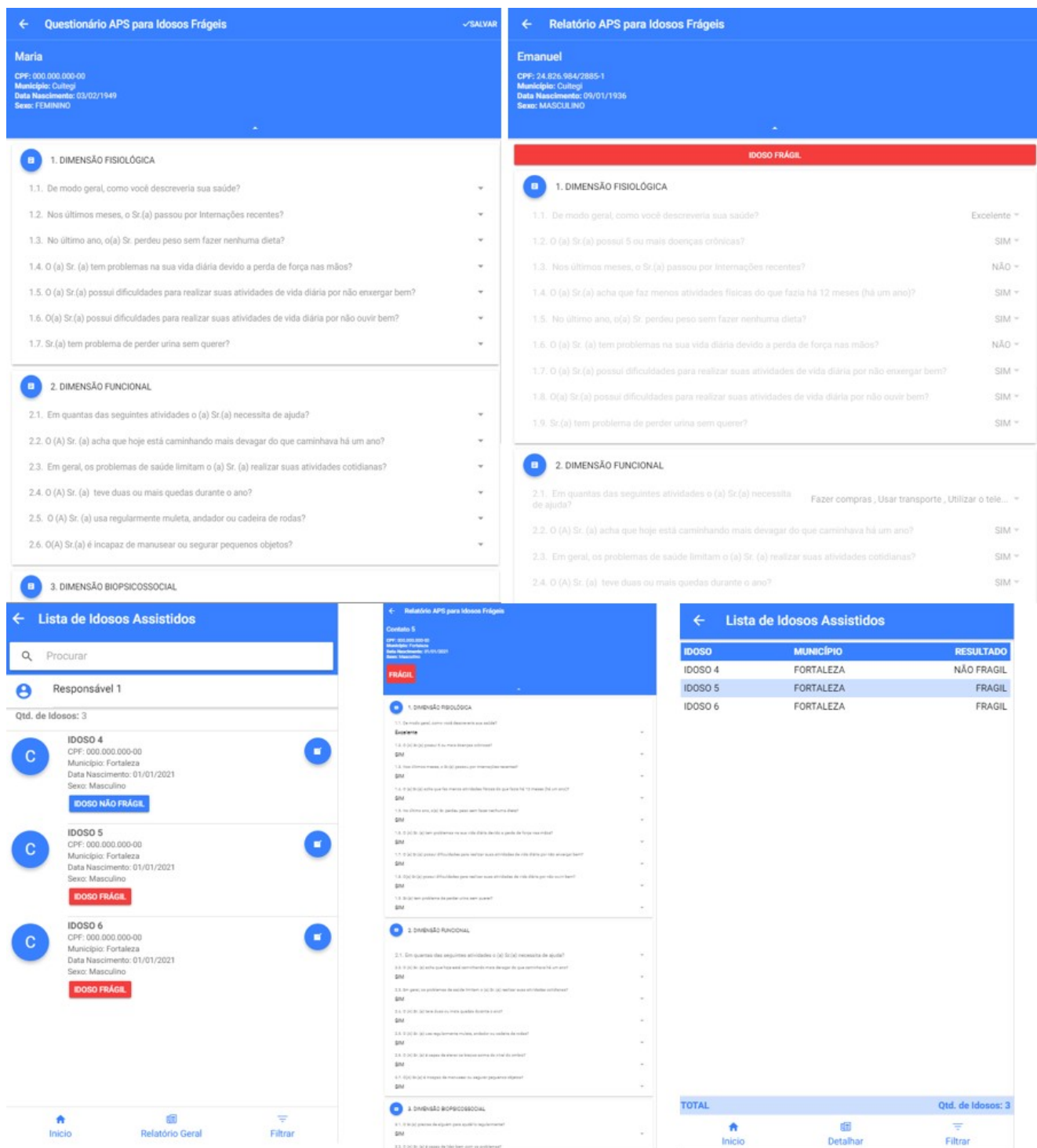
Source: Own authorship.

Figure 3. Screen prints of the application for screening frailty in the elderly in Primary Health Care.

A cross-sectional study, developed with the participation of 157 primary care services in the state of São Paulo/Brazil, demonstrated the need to improve care for the elderly in PHC with the implementation of effective care actions for aging. This need for improvement is necessary because it was verified the deficiency in the performance of comprehensive care for this public in PHC[15]. Thus, care must be thought of in a preventive way, adapting to the increase in life expectancy of the elderly population.

The application, in relation to health care, is considered a tool for preventive care, facilitating the recognition of variables that contribute to the early identification of the frail elderly, which makes it possible to reach a common definition to promote the reduction of determinants of

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fragility. In addition, the software promotes quick access to information with a brief and summarized presentation of the final classification of frailty in the elderly[11].

Application variables were selected from calculated CVI scores equal to or greater than 0.78. Thus, semantic validation was determined by the CVI, which is extremely important in the process of creating instruments that contribute to teaching and health, with the development of validated and standardized products[16].

The presence of the sociodemographic profile in several field surveys is determined by the relevance of this topic and the need to know the sample to be studied. According to researchers[17], a cross-sectional study with institutionalized elderly demonstrates that knowing the profile of the population under study enables individualized and humanized care. In addition to promoting an aging with dignity.

Regarding the personal information of the elderly, there is a strand of scholars who point to an increase, pointing to an increase of 0.8% each year. In addition to marital status also being a determining indicator in the presence of frailty, in contrast to this study. Likewise, the absence of a partner determines the score of 10.4% more when compared to those elderly who are married or in a stable union. With regard to schooling, there was a reduction of 1.2% for each additional year of study[18].

In the physiological dimension, the findings of the study demonstrate that in the perception of the elderly in relation to their health, several factors are decisive in the appearance of frailty. These factors are the presence of chronic diseases, recent hospitalizations, performing physical activities, loss of weight and strength in the hands, hearing and vision problems, and the presence of urinary incontinence. Scholars[19] point out that self-assessment of health is relevant to compose a frailty assessment instrument. A study with 214 elderly people residing in Long Stay Institutions for the Elderly (LSIEs) pointed out that this is one of the variables that most contributes to the emergence of frailty. In addition to this item, other variables were present in this cross-sectional descriptive research, such as weight loss and presence of urinary incontinence.

In the functional dimension, the findings of the study demonstrate that the number of activities performed by the elderly are determinant variables in the emergence of frailty. They are walking time, limitation of daily activities due to health problems, occurrence of falls, use of assistive technologies, and ability to raise the arm above the shoulder level and hold objects.

According to the results presented, the fall was considered one of the variants present in several frailty assessment studies. Researchers from a cross-sectional study with elderly people enrolled in FHS teams, in the southeast of the country, revealed a significant increase in frailty due to the following factors: occurrence of falls in the last 12 months, multiple pathologies, history of hospital admissions in the last six months, urinary incontinence and cognitive impairment[20].

Other strands of researchers confirm the relationship between the use of assistive technologies (crutches, walkers, canes and lenses) associated with increased detection of frail elderly. In this cross-sectional study with 390 elderly people, it was found that the use of assistive technology was decisive for the emergence of frailty, and the cane was the main variable that promotes an increase in the score of this syndrome. Thus, during the assessment of this vulnerable population and considering that the worsening of frailty can arise from the impairment and functional loss of the elderly, it is essential that health professionals take a different view of those who use support tools for locomotion[21].

In the biopsychosocial dimension, some determining factors in the emergence of frailty were identified. These factors are the need for help, ability to deal with problems, feeling sad or depressed, loss of interest or pleasure in doing previously pleasurable activities, feelings of anxiety or nervousness. Confirmation of these findings was obtained from a study carried out with 197 elderly people from the FIBRA Network database. This research revealed that elderly people identified as non-frail have social support. In addition, a direct relationship was identified between the variable depression, lack of social support and the emergence of frailty in the elderly. Thus, during the multidimensional assessment of the elderly, it is necessary to consider their psychosocial aspects[22].

In the cognitive dimension, the presence of forgetfulness and its interference in the performance of daily activities determine the emergence of frailty. In a cross-sectional Brazilian study carried out in the State of São Paulo, it was found that cognition was one of the main domains associated with the emergence of the frailty syndrome[23].

Data collection was done online in this study, due to the COVID-19 pandemic, and it was considered limited, given that it made it difficult for respondents to understand the questionnaire proposed at a distance. In addition, obtaining the e-mails and telephone contacts of all the professionals of the minimum primary care team of the Second Health Region was a difficulty for this study. An audio was also prepared explaining how the online collection form should be completed, with the researcher being available to answer any questions that might arise during this process.

CONCLUSION

The construction of the application for screening frailty in the elderly in PHC, in this study, was based on an integrative literature review to obtain the variables that provide the identification of frailty in the elderly. Then, the content

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validation was carried out by health professionals, doctors and nurses who work in PHC and, finally, the construction of the application with the validated variables.

In the semantic validation of the application by the 119 professionals of the minimum primary care team, an average agreement of 80% was reached. After the validation process, consolidated from the professional experience of the evaluators and scientific knowledge, the product was considered appropriate to be used in professional practice.

This application is a tool for assessing frailty in the elderly by professionals and managers, qualifying the health care of the elderly at the primary level, contributing to the quality of life of the elderly. As next steps, we intend to apply this application in professional practice and, through case studies, develop future research for clinical validation of the application at the primary level.

Thus, it is concluded that the construction and validation of an application for screening frailty in the elderly in a community constitutes a technological innovation. Which is able to help the work process of health professionals from the perspective of the multidimensional assessment of the elderly. Therefore, it is understood that the use of this application can bring benefits to professionals, the elderly and the health system. This is because the early diagnosis of frailty provides the possibility of stabilizing or reversing the clinical condition, reducing the risk of hospitalizations, deaths and unnecessary referrals to specialized care.

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