

Mapping of assistive technology resources used by the aged

Mapeamento de recursos de tecnologia assistiva utilizados por idosos

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ABSTRACT: The increase in life expectancy of the Brazilian population shows the number of people that age with functional capacity loss and increased dependency to perform daily activities. Assistive technology (AT) is a support for the aged to maintain their independence and functionality. The objectives of this study were: (i) to list assistive technology resources used by the aged assisted in a Centralized Health Unit (CHU) in the city of Uberaba, Minas Gerais, Brazil; (ii) to describe the socioeconomic characteristics and chronic diseases reported by them, and (iii) to study the area of occupation – daily life activities and the category of resources used. One hundred and forty-four adults aged 60 years or more participated in the study. For the data collection, two structured instruments devised by the authors were applied. The results showed that the use of assistive technology was beneath the expected for maintenance of the functional performance of the aged, except for the use of glasses. The average age of participants was 72.4 years (± 7.8) and there was a predominance of women. Reported diagnoses were, in most cases, hypertension. Of the participants, 140 (97.2%) reported using a type of AT resource as an aid in some daily activity.

KEYWORDS: Self-help devices; Primary health care; Occupational therapy; Aged; Daily living activities.

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RESUMO: O aumento da expectativa de vida populacional no Brasil evidencia também o número de pessoas que envelhecem apresentando perda da capacidade funcional e aumento da dependência nas atividades do dia a dia. A tecnologia assistiva (TA) se constitui como suporte para que os idosos mantenham a independência e funcionalidade. Os objetivos deste estudo foram: (i) elencar os recursos de tecnologia assistiva utilizados por idosos assistidos em uma unidade matricial de saúde (UMS) no município de Uberaba/MG; (ii) descrever as características sócio-econômicas e as doenças crônicas por eles relatadas e (iii) estudar a área de ocupação – atividades de vida diária e a categoria dos recursos da tecnologia assistiva usados. Participaram do estudo 144 idosos com 60 anos ou mais. Para a coleta dos dados foram aplicados dois instrumentos estruturados idealizados pelos autores. Os resultados evidenciaram utilização de tecnologia assistiva aquém das necessidades para manutenção do desempenho funcional dos idosos, com exceção do uso de óculos. A idade média dos participantes foi de 72,4 anos ($\pm 7,8$) e houve predomínio de idosos do gênero feminino. Os diagnósticos clínicos relatados foram na maioria casos de hipertensão arterial. Dos participantes, 140 (97,2%) relataram utilizar um tipo de recurso de TA como auxílio em alguma atividade de vida diária.

DESCRIPTORIOS: Equipamentos de autoajuda; Atenção primária à saúde; Terapia ocupacional; Idoso; Atividades cotidianas.

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INTRODUCTION

Population aging causes demographic change and has implications for public health policies. The increase of this population represents increased demand for services, as a result of possible chronic diseases. In Brazil, the number of adults in 2000, aged 60 years or more, was 14,536,029 (8.6%), and 19,321,986 (10.13%) in 2010¹.

Aging may involve the loss of occupational roles, change in functionality, changes in the organization of daily life and of personal habits and, generally, is associated with the prolonged use of health services². Still, aged adults tend to depend on others to perform their daily tasks, which can increase by approximately 5% after 60 years and 50% after 90 years³.

Most of the time, the functional capacity is related to skills and independence to perform daily activities⁴. While the functional incapacity can be verified by the difficulty in performing the task or desired activity or by the need for help to perform them. In Brazil, according to Giacomini et al.⁵, functional incapacity may achieve approximately from 2% to 47% of aged adults. To this growth is added the low socioeconomic and educational level, and the high prevalence of chronic illnesses that cause functional limitations and disabilities.

To subsidize actions that support the condition, the Ministry of Health provides assistive technology products (AT) to facilitate daily activities and promote functional independence^{6,7}. These products are mentioned in the list provided by the Brazilian Unified Health System (SUS), composed of items such as: wheelchair, wheelchair posture support, orthopedic orthosis and prosthesis, besides the service of Health Technology Assessment (HTA) used during the product's useful life. This service must supervise from the development and management stage of health services to the replacement or obsolescence of assistive technology⁸.

Assistive technology is defined as an area of knowledge of different health professionals and of other areas such as engineering, and gathers "products, resources, methodologies, strategies, practices and services that aim to promote functionality, related to activity and participation of people with disabilities, inabilities or reduced mobility [...]" (p. 10)⁷.

According to Garcia and Galvão Filho⁹, in the last national assistive technology research with institutions (higher education, companies and entities of the third sector) referring to the years from 2005 to 2008, aged adults and people with visual impairment were singled

out as the populations that most had assistive technology projects dismissed (35.8%); losing only to people with physical disabilities (43.1%).

The aim of the research is to broaden the understanding of the situation that involves the use of assistive technology devices by aged adults and to provide for this population practical analysis of the resources dispensed by health services. We also expect to bring information on the topic for people who work (health care professionals) and for those who seek the services of the Brazilian Unified Health System (SUS), concerning the assistive technology devices (AT).

Thus, the objectives of this study were: (i) to list assistive technology resources used by aged adults who attend a Centralized Health Unit (CHU) in the city of Uberaba, Minas Gerais, Brazil; (ii) to describe the socioeconomic characteristics and chronic diseases reported by them; and (iii) to study the area of occupation – daily life activities and the category of resources used.

METHODOLOGICAL PROCEDURES

This is a cross-sectional, observational and descriptive study of quantitative approach. The project was approved by the Human Research Ethics Committee from the Federal University of Triângulo Mineiro (CEP/UFTM), under opinion No. 2315 of 2012. All participants signed the Informed Consent Form at the time of the data collection.

Research was conducted in a Centralized Health Unit (CHU), located in a Health District in the city of Uberaba/MG. The territorial map of CHU is divided into nine micro areas to attend the population employed in basic specialties; also serving as support to Family Health Units (FHUs) and to the Family Health Support Center (FHSC).

The staff is composed of a general practitioner from the unit and two others from the Family Health Program, besides two gynecologists, two pediatricians, one dentist, two nurses, three nursing assistants, one psychologist, one social worker, one physical therapist and three community agents. It also has an agreement with an Institution of Higher Education for an internship in nutrition and physiotherapy.

Adults aged 60 years or more, of both sexes, participated in this study, all of them able to understand and answer the questions of the forms, regardless of their health condition, and registered in CHU. The aged adults who were not found after three visits by the interviewer,

the ones who changed their address, that died or refused to participate in the study, were excluded.

Analysis of all of the families registered in CHU was made for the sample calculation. People aged 60 years or more were selected, totaling 573 people. After this selection, those who were not identified in the electronic system of SUS, i.e., those who did not have the data necessary to locate the domicile were excluded, remaining 513 people.

For the probabilistic sample, the sample size (n) was established so that everyone would have the same probability to be selected using the formula below as a sample calculation.

$$n = \frac{(P \times 1 - p)}{e_a}$$

In which: n = sample size; P = estimated proportion in the population; p = total proportion; e_a = sampling error.

To estimate the sample size, we used the estimated proportion of 0.5, since there are no national studies that report the use prevalence of assistive technology devices by aged adults in a community, considering a sampling error of 10% and a 5% significance level. Thus, we defined a sample of 144 aged adults.

To ensure the coverage of the sample in a representative manner throughout the nine micro areas, 144 people were distributed among them, totaling 16 individuals in each area.

To identify those people to be interviewed, 513 aged adults were numbered in ascending order and 144 individuals were drawn randomly, according to the sample calculation. In the cases listed in the exclusion criteria, the sample was recomposed by a new random drawing. When all the aged adults had already been drawn in a micro area, another one was used to keep the size of the sample.

For the data collection, a staff of five interviewers, four students and one teacher was constituted, members of the Assistive Technology Integrated Laboratory of the Federal University of Triângulo Mineiro (LITA/UFTM), were trained to apply the instruments, on how to approach the aged adults, and for ethical issues of the research. Data collection occurred at home between August 2014 and January 2015.

The survey questionnaire had two sections: the first related to social and demographic issues following the "Brazilian Criteria of Economic Classification – CCEB" of the Brazilian Association of Research Companies

(ABEP)¹⁰; and the second included the application of a structured form prepared by the authors containing personal aspects (age, marital status, and clinical diagnosis) and closed-ended questions about assistive technology with binary answers (yes/no).

The questions related to economic class according to ABEP indicate the average family income by classes such as A1 (R\$ 14,250.00), A2 (R\$ 7,557.00), B1 (R\$ 3,844.00), B2 (R\$ 2,256.00), C1 (R\$ 1,318.00), C2 (R\$ 861.00), D (R\$ 573.00), E (R\$ 329.00).

The closed-ended questions were related to the presence or absence of assistive technology in the participant's area of occupation involving daily activities, which according to the American Occupational Therapy Association⁴ cover daily activities such as shower; feeding; clothing; mobility; use of the toilet; personal equipment; self-care and personal hygiene equipment.

In "shower", we identified the use of shower seat or chair; rubber mat with suction cups; soap attached to brush, connected to a string or toweling glove; sponge or long-handled brush; grab bars. In "clothing", we inquired about the use of cuff links, sneakers, and clothes with velcro, shoehorn, zip puller ring, front opening bra, tie with elastic, orthosis and prosthesis. In "feeding", plate with high edges, plate with suction cups and non-slip surface, plate with raised edge, thickener of feeding cables, cutlery with adapted cable (thickened or angled), cup with beak lid or with lid and straw, cup with unilateral or bilateral strap, cup with clipping, cup with weight at the bottom, tray for plate and cup, universal belt to attach objects. In "care with personal equipment", we questioned about the use of orthosis, prosthesis, hearing aids, and glasses; while in the item "personal hygiene and self-care": thickener of cable for products of personal hygiene and self-care, universal belt to attach objects, dental orthosis and prosthesis. In the item "use of the toilet" we investigated the use of raised toilet seat, the toilet's height elevation (plinth), hygienic wheelchair, and grab bars. In "mobility", we asked about the use of cane, wheelchair, crutch, and/or walker.

DATA ANALYSIS

The results were submitted to descriptive analysis through absolute and relative frequency for the qualitative variables (economic status, marital status, gender, clinical diagnosis, assistive technology) and mean and standard deviation for the quantitative variable (age). All analyses were performed in the software Statistical Package for Social Sciences (SPSS, Chicago, IL, USA) version 20.

RESULTS

Socio-demographic characteristics can be observed in Table 1. The average age of participants was 72.4 years (± 7.8), the oldest being 92 and the youngest being 60, and predominance of aged women (68%). Regarding the marital status, most were married (57.6%) and 34.7% belonged to the C2 economic group, which is equivalent to an average family income of R\$ 861.00 (Table 1).

Table 1 – Socio-demographic characteristics of participants ($n = 144$)

| Variable | n | % |
|------------------------|----|------|
| <i>Age Group</i> | | |
| 60-69 | 64 | 44.4 |
| 70-79 | 52 | 36.1 |
| 80-89 | 24 | 16.7 |
| 90-99 | 04 | 02.8 |
| <i>Marital status</i> | | |
| Married | 83 | 57.6 |
| Widower | 42 | 29.2 |
| Divorced | 09 | 06.3 |
| Single | 10 | 06.9 |
| <i>Sex</i> | | |
| Female | 98 | 68.1 |
| Male | 46 | 31.9 |
| <i>Economic Status</i> | | |
| A1 | 00 | 00.0 |
| A2 | 01 | 00.7 |
| B1 | 00 | 00.0 |
| B2 | 24 | 16.6 |
| C1 | 37 | 25.7 |
| C2 | 51 | 35.4 |
| D | 26 | 18.1 |
| E | 05 | 03.5 |

Most clinical diagnostics reported were cases of hypertension (42.3%), followed by diabetes mellitus (14.6%) and associated comorbidities such as diabetes mellitus and hypertension (10.3%) (Table 2).

Regarding the presence of assistive technology resources (AT) on any daily living activity, we found that 140 (97.2%) participants reported using some type of AT resource as an aid in their tasks. In Table 3, the categories investigated in the area of occupation can be observed. Specifically, in the item “shower”, all five resources studied were reported by at least 4% of the participants.

In the locker room, eight resources were identified, but only two participants (1.4%) reported using AT, in particular, the front opening bra due to the difficulty of moving the upper

limbs and orthosis. However, during collection, 16 (11.1%) participants reported the need for a third person to put on their socks and shoes, as well as to close buttons and zippers.

Table 2 – Clinical diagnosis reported by participants ($n = 144$)

| Diagnosis | n | % |
|-------------------------------|----|------|
| Cerebrovascular Accident | 06 | 04.2 |
| Arrhythmia | 01 | 00.7 |
| Orthopedic Condition - column | 03 | 02.1 |
| Depression | 01 | 00.7 |
| Alzheimer’s disease | 02 | 01.4 |
| Chagas disease | 04 | 02.8 |
| Visual impairment | 01 | 00.7 |
| Diabetes | 21 | 14.6 |
| Pulmonary emphysema | 02 | 01.4 |
| Gout | 01 | 00.7 |
| Arterial Hypertension | 61 | 42.3 |
| Hypertension and Diabetes | 15 | 10.3 |
| Labyrinthitis | 04 | 02.8 |
| Parkinson’s disease | 01 | 00.7 |
| No diagnosis | 21 | 14.6 |

In feeding, twelve resources were investigated. Of these, only two were used in daily living activities. And, regarding the personal equipment care, we observed that 112 aged adults use one of the two resources investigated (Table 3).

Table 3 – Assistive technology resource by categories in the area of occupation – daily activities ($n = 144$)

| Shower | n | % |
|---|----|------|
| Shower seat or chair | 12 | 08.3 |
| Rubber bath mat with suction cups | 62 | 43.1 |
| Soap attached to brush, connected to a string or toweling glove | 06 | 04.2 |
| Sponge or long-handle brush | 47 | 32.6 |
| Grab bar | 17 | 11.8 |
| Clothing | n | % |
| Cuff links | 00 | 00.0 |
| Sneakers and clothes with velcro | 00 | 00.0 |
| Shoehorn | 00 | 00.0 |
| Zip puller ring | 00 | 00.0 |
| Front opening bra | 01 | 00.7 |
| Tie with elastic | 00 | 00.0 |
| Orthosis | 01 | 00.7 |
| Prosthesis | 00 | 00.0 |
| Feeding | n | % |
| Plate with high edges | 00 | 00.0 |
| Plate with suction cups and non-slip surface | 01 | 00.7 |

Continues...

Table 3 – Continuation

| Feeding | n | % |
|---|----------|----------|
| Plate with raised edge | 00 | 00.0 |
| Cutlery with adapted cable (thickened or angled) | 00 | 00.0 |
| Cup with beak lid | 00 | 00.0 |
| Cup with lid and straw | 00 | 00.0 |
| Cup with unilateral strap | 06 | 04.2 |
| Cup with bilateral strap | 00 | 00.0 |
| Cup with clipping | 00 | 00.0 |
| Cup with weight at the bottom | 00 | 00.0 |
| Tray for plate and cup | 00 | 00.0 |
| Universal belt to attach objects | 00 | 00.0 |
| Personal equipment care | n | % |
| Hearing Aid | 08 | 05.5 |
| Glasses | 104 | 72.2 |
| Personal hygiene and self-care | n | % |
| Cable thickener for personal hygiene products and self-care | 00 | 00.0 |
| Universal belt to attach personal objects | 00 | 00.0 |
| Dental orthosis | 73 | 50.7 |
| Dental prosthesis | 58 | 40.3 |
| Use of the toilet | n | % |
| Elevation of the toilet seat | 04 | 02.8 |
| Increase in the height of the toilet | 03 | 02.1 |
| Grab bar | 09 | 06.3 |
| Mobility | n | % |
| Cane | 18 | 12.5 |
| Walker | 06 | 04.2 |
| Crutch | 00 | 00.0 |
| Wheelchair | 05 | 03.5 |

In the activity “personal hygiene and self-care”, we observed that aged adults reported using dental orthosis and prosthesis. In “use of the toilet”, all three AT resources studied were reported by a minority of participants. In the item “mobility”, there was a preference for cane.

DISCUSSION

The results show that 42.3% of the aged adults interviewed reported hypertension. This event can be explained by physiological changes resulting from the aging process, such as the increase of arterial stiffness, causing the reduction in vascular compliance and, consequently, increased arterial pressure¹¹. It is noteworthy that the prevalence found is lower than the one indicated by population studies conducted in other states with people of the same age group^{12,13}. For Alves et al.¹⁴, hypertension is

a chronic disease that can increase by 39% the dependence in performing instrumental activities of daily living.

Most participants had average family income of R\$ 861.00, value slightly superior to the minimum monthly wage¹⁵. Regardless of the prevalence found, it is noteworthy that, according to Pinto and Neri¹⁶, health and functional capacity are integrated to family income, education, age and sex. In Brazil, these factors are the difficulties to access health services and the scarcity of information and opportunities for the maintenance of functional and physical conditions in old age” (p. 3455)¹⁶.

Cruz and Emmel², Nunes et al.¹¹, and Giacomini et al.⁵ report that the loss of functional capacity is a relevant factor in the cycle of life, since there is a gradual decrease of skills and, consequently, of the capacity to perform daily activities. A preventive measure, available as an aid to maintain the capability, is the use of assistive technology¹⁷. That contrasts to the results obtained in this study, because although it has been indicated that 97.2% of participants use assistive equipment described in the occupation studied, the amount and the type of assistive technology in each activity performed by aged adults are restricted and limited. This would imply functional limitations even if the individual uses assistive technology, because the equipment used are restricted to a certain group that does not cover the whole area of occupation. These data represent a paradigmatic situation in which the use of assistive technology is high (97.2%), but even so the functional potential of individuals is not exploited. Considering this, an assessment of aged adults’ needs, followed by resource selection and training for its use, i.e., the adequacy in the variety of equipment prescribed and distributed to them, could diminish the functional deficit that may exist. The contradiction presented above, in which the high use of assistive technology may not increase or maintain the functionality, shows a mismatch between the aged adults’ functional needs and the offer of assistive technology by the Brazilian Unified Health System (SUS).

About the use of assistive technology according to the occupation area, in the item “shower”, most participants did not have AT devices to assist their performance in this activity. Some equipment such as rubber mat and grab bar are very important for the safety of aged adults and can prevent falls. According to Chianca et al.¹⁹, people of any age can fall, but in aged adults this risk is higher and the consequences are significant for their health condition, as it may lead to disability, injury, and death. For Cross et al.²⁰, advanced age is associated with the increased risk of falling. The information of low-frequency use of assistive

technology in that context is important, because the preventive use of the equipment could reduce the falls and avoid the need to use health services for this cause, sparing the health system, besides the functional maintenance of the individual. Therefore, adjustments related to the use of equipment in the shower could be stimulated in the area studied, through actions by professionals in primary health care, focused on evaluation, prescription, selection, preparation, and training of assistive technology resources.

The items “clothing” and “feeding” presented few reports on the use of assistive technology. Aging alters physical and cognitive abilities, and can cause diseases and dependence of daily activities²¹. According to the American Occupational Therapy Association⁴, clothing and feeding are daily activities that individuals perform in their daily lives. Since the aging changes physical functions, aged adults may have difficulties in performing these tasks. A hypothesis for the low number of AT resources in these items would be the constant assistance of a caregiver or family member or the independence of aged adults and, therefore, the absence of assistive technology.

In “personal equipment care”, we observed a higher prevalence of reading glasses. In the process of aging, complaints about eyesight and hearing arise, but those do not disturb the active aging, since there are ways to lessen the difficulties inherent to this natural process, such as orthosis (glasses and hearing aid), allowing the adjustments of these disabilities¹¹.

On the item “personal hygiene and self-care”, most of the aged adults reported owning dental prosthesis or orthosis. This corroborates the study of Simões and Carvalho²², who explain that periodontal disease tends to increase with advanced age and it has been identified as the primary cause of absence of teeth leading to a high number of people who require prosthesis.

In the item “mobility”, the frequency of the use of aid equipment by participants was not reported; however, we observed that during the data collection some aged adults needed but did not have this kind of technology. Cruz et al.²⁰ indicate that 11% of the individuals studied in a certain region demanded help to walk, either by a caregiver or by the regular use of a device. Chianca et al.¹⁹ say that the age of a person over 65 years is a predisposing factor for falls, noting that 81.3% of the participants were included in this probability. This is a functional component that deserves special attention, because the literature indicates a relation between displacement and functionality^{23,24,25}, therefore, the displacement should be encouraged so that the decrease in functionality have less impact.

Assistive technology (AT) is an option as a service dispensed by SUS, aiming to provide resources, products and strategies to address aging problems, such as reduced mobility, the change of functional capacity and increased dependency⁶. AT devices seek to involve the individual in any area of occupation, such as in the activities of daily living (bathing, feeding and clothing, for example), providing better functional performance⁴.

Among the limitations of this research we can include the restriction of the study to a geographical area of the city, causing the non-representativeness of the data. In addition, the real need of AT for aged adults was not evaluated, being collected only the information about its use. The functionality of individuals even with the use of the equipment could have been assessed, as well as the prescription, origin and proper use of the equipment. However, it is noteworthy that this study presented a detailed description of the equipment used by aged adults in a region of the city of Uberaba, Minas Gerais, Brazil. In addition, the carefully conducted sampling process ensures internal validity and quality of results.

CONCLUSIONS

We concluded that the studied population reported using assistive technology resources in some daily living activities. However, when specifying the equipment listed in every daily activity, the use was beneath the expected for the functional performance of aged adults, except for the use of glasses.

Aging is a phase that may cause motor dysfunction, decreased functional capacity and dependency, but, despite all of this, aged adults can have an active, healthy aging, which can be intensified with the use of AT. Thus, a suggestion for a new study is to research beyond the variety of equipment, i.e., the individual, environmental and cultural variables that influence the use of AT by aged adults. We also suggest that other studies continue to investigate the topic, researching the correlation of devices with the demands of these individuals; i.e., if the assistive technology is suitable or appropriate.

The availability of this information may improve the quality of public services and also the quality of life of the aged population using assistive technology. Besides, it may contribute to the field research, assisting the sedimentation of knowledge as it brings new information, expanding the AT field. To the health system, this study provides data that can subsidize decision-making through policies or programs of care and assistance to the population studied.

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