Natalia Caroline Favoretto[1]
Natalia Gutierrez Carleto[1]
Aline Megumi Arakawa[1]
Murilo Priori Alcalde[1]
José Roberto Magalhães Bastos[1]
Magali de Lourdes Caldana[1]

Portal of the elderly: development and evaluation of the website with information about the aging process and the main speech, language and hearing disorders that affect the elderly

Portal dos idosos: desenvolvimento e avaliação de um website com informações sobre o processo de envelhecimento e as principais alterações fonoaudiológicas que acometem os idosos

ABSTRACT

Purpose: This research aimed to develop and evaluate a website with information on Speech-language therapy area with focus on the aging process. A website containing information with simple language, clear purpose and concise content was designed based on scientific evidence. **Methods**: The Flesch Index was used to check the material readability, with 50% of the content corresponding to "easy" and 50% of the content corresponding to "difficult". The website development followed the steps: analysis and planning, modeling, implementation and evaluation. Evaluators invited to participate were part of the following categories: elderly people, caregivers and speech-language therapists. The sample consisted of 10 elderly, 8 caregivers and 10 speech-language therapists. Most individuals (89.28%) were females, who often accessed the Internet (78.57%) and had different educational levels. **Results**: Statistical analyses were performed using the Kruskal-Wallis test and Spearman correlation coefficient. The website's content was classified as "adequate" and the website's technical quality as "excellent". There was no statistically significant difference between the categories and subscales or the overall score. **Conclusion**: The website can be considered an accessible material, and a source of consultation and complementation of information about the theme, as well as an important tool for effecting the information transmission process.

RESUMO

Objetivo: o estudo teve como objetivo desenvolver e avaliar um *website* com informações na área de Fonoaudiologia com enfoque no processo de envelhecimento. **Método**: foi elaborado um *website* contendo informações com linguagem simples, objetivo claro e conteúdo conciso, baseado em evidências científicas. Utilizou-se o índice de Flesch para verificar a legibilidade do material, encontrando-se, em 50% do conteúdo, o correspondente a "fácil" e, em 50% do conteúdo, o correspondente a "difícil". A elaboração do *website* seguiu as etapas: análise e planejamento, modelagem, implementação e avaliação. Foram convidados avaliadores que fizeram parte das categorias: idoso, cuidador de idoso e fonoaudiólogo. A amostra foi composta por 10 idosos, 8 cuidadores de idosos e 10 fonoaudiólogos. A análise estatística foi realizada por meio do teste Kruskal-Wallis e Coeficiente de Correlação de Spearman. **Resultados**: o conteúdo do *website* foi avaliado como "adequado" e a qualidade técnica do *website* apresentou-se como "excelente". **Conclusão**: conclui-se que o *website* pode ser considerado um material acessível, que compõe uma fonte de consulta e de complementação de informações sobre a temática, além de uma importante ferramenta para efetivar o processo de transmissão de informação.

INTRODUCTION

Aging is considered a progressive phenomenon that, besides organic wearing, causes to cultural, emotional and social changes. This process begins at birth and persists throughout life, with each individual aging in a unique way, due to intrinsic and environmental conditions. Thus, aging is a variable process followed by changes in the composition, structure and physiology of the human body[1].

Aging is often associated with illnesses, decrepitude, disorientation and regression. Although biological, economic, social and psychological losses take place in fact, such associations may not always be true; if the elderly remain physically active and have interesting social and family life, aging can be healthy. For this reason, it is necessary to distinguish senescence from senility. Senescence is the natural process of aging and senility is the pathological state of this process. Both cases require interventions from health professionals focusing specifically on this segment of the population[1]. In this cases, speech-language therapists must make use of their knowledge of communication, mainly in terms of voice, hearing, dysphagia, orofacial motricity and language.

The process of aging voice is called presbyphonia, and its characteristics are hoarse, shimmering, weak, breathy voice, with reduced maximum phonation time and phonation range, among others, which may lead to a change in the intelligibility of speech and a negative impact on quality of life[2]. Another aspect that affects the majority of the elderly is presbycusis, defined as hearing loss due to the aging process and characterized by reduced auditory sensitivity, speech intelligibility, and ability to recall long sentences, compromising the process of verbal communication, due to the symmetrical bilateral neurosensorial high-frequency audiometric profile that progresses with age[3]. As for the orofacial motricity, some changes involving the stomatognathic system take place, particularly speech, chewing, deglutition and breathing aspects. Changes related to deglutition are among the most critical. It is important to differentiate between adaptation and alteration when it comes to deglutition; the first one consists in presbifagia, inherent to the aging process, and the second corresponds to dysphagia, which is associated with pathologies[4]. As for cognitive abilities, changes related to selective attention functions, sensory and motor functions, memory, reasoning, problem solving and oral language may occur. Because of these changes, the elderly commonly develop communication disorders[5].

The current scenario indicates that attention is needed to issues related to the promotion, education and health of the elderly. It is important to consider the possibility that many individuals do not have easy access to health care professionals as well as to the reliable information about the health in this life stage. In this sense, Telehealth can be considered a support tool, since it helps overcoming the distance and supporting the health care process by means of communication and technologies for information transfer[6].

Considering the above, a survey was carried out based on scientific material on the aging process and speech and language changes in the elderly for the development and subsequent evaluation of the contents and the *website* on the subject.

Objective

To develop and evaluate a *website* in the field of Speech-Language therapy and Audiology, focusing on the Aging Process and the main speech-language disorders that affect the elderly.

METHODS

The project was approved by the Ethics Committee on Research involving Human Beings of the Institution of Origin under CAAE number 20836813.0.0000.5417. We emphasize that all individuals agreed to participate and signed the Informed Consent Form.

The production of the material followed the development stages of instructional design proposed in 2004 by Filatro and Piconez: analysis and planning, modeling, implementation and evaluation[7].

In the stage of analysis and planning, information was collected from scientific articles indexed in the Lilacs, Medline, PubMed, Cochrane and Scielo databases, using the following descriptors: Aging, Population Aging, Presbycusis, Presbyphonia, Presbyphagia, Cognitive Abilities, Language, Memory, Stomatognathic System and Speech. Information collected in books, theses, dissertations and official websites related to the topic was also used. The search for data was directed to feed the submenus of the website, namely: natural aging process; presbycusis; presbyophonia; presbifagia; stomatognathic system in aging; and cognitive abilities in aging.

The themes of the submenus were defined based on the clinical experiences of the research group "Aging and quality of life: from promotion to rehabilitation" (GREPEN), registered in the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq); on the care provided to the adult and elderly population in the Speech-Language therapy and Audiology Clinic service, Adult Language stage; and on the discussions that took place in the outreach course (process nº 12.1.06450.25.7) offered by the Faculdade de Odontologia de Bauru, Universidade de São Paulo (FOB-USP).

In the stage of modeling, the technique for construction was defined to facilitate the usability and comprehension of the website, based on aspects that facilitate the use by the target public, and included the use of three criteria: conceptual, in which the form of presentation of the content was established; navigation, in which the mode of access to the content was defined; and interface, regarding the choice of the *layout* of the screens.

In the stage of implementation, the website domain was registered in an electronic environment. In this phase, eight ethical aspects defined in the HONcode code of conduct established by the Swiss organization *Health on the Net Foundation* (HON), committed to maintaining self-regulation of health websites for Internet providers (Chart 1)[8], were considered.

After the organization of the material, the information was selected, adjusting the intelligibility of the text and illustrating the contents with static images. This textual analysis was performed using the Microsoft Word® tool with the *Flesch Reading Ease* formula, which has an intelligibility metric adapted to Portuguese[9]. All content was reviewed with the writing style in the colloquial option.

Ten elderly, speech-language therapists and eight caregivers of elderly participated in the evaluation of the website contents. Three instruments were used: protocol of characterization of the sample (Chart 2), prepared by the authors to collect information on identification and frequency of use of Internet; an instrument based on a questionnaire to evaluate a Speech-Language therapy and Pediatrics blog (Chart 3)[10] for content evaluation; the adapted questionnaire *Health-Related Web Site Evaluation Form Emory*[11,12] for evaluation of the technical quality of the *website* which addresses topics related to content, accuracy, authors, updates, public, navigation, *links* and structure.

Chart 1. Principles followed by HONcode

Authorship	All medical or health guidance provided and hosted on the website shall be given only by trained and qualified professionals.
Complementarity	The information available on the website is designed to support, not replace, the relationship between patient and health care provider.
Confidentiality	The confidentiality of data of patients and visitors must be respected.
Assignments	If necessary, the information contained in the website shall be backed by clear references to the sources and, whenever possible, will have HTML links to these sources. The date of modification of the information should be clearly displayed.
Justification	Any statements made about the benefits and performance of a specific treatment, commercial product or service should be supported by scientific evidence.
Transparency	Website designers shall strive to provide the information as clearly as possible and provide contact addresses for visitors seeking more information or support.
Financing	Commercial and non-commercial organizations that have contributed to the financing of the website shall be disclosed.
Advertising Policy	A brief description of the advertising policy adopted by the owners will be displayed on the website. Advertising and other promotional materials will differ from editorial content.

Chart 2. Sample characterization protocol

1. How old are you?
2. Gender: ( ) female ( ) male
3. Name of the city where you live:
4. Name of the city where you work:
5. What is your educational level:

Old nomenclature	Current Nomenclature	Specify
Illiterate/Incomplete primary school	Illiterate/Up to 3rd grade of fundamental school/Up to 3rd grade of basic school	
Complete primary school/ Incomplete secondary school	Up to 4th grade of fundamental school/Up to 4th grade of basic school	
Complete secondary school /Incomplete high school	Complete fundamental school/Complete basic school	
Complete high School/Incomplete Superior education	Complete high school	
Superior education	Superior education	

6. Only for speech language therapists, if you are not a professional in this area, skip to question 7. 6.a What is your field of activity? ( ) Voice ( )Language ( ) Orofacial motricity ( ) Audiology ( ) Disphagia ( ) Educational phonoaudiology ( ) Collective health 6.b What is your target audience? ( ) neonates ( ) children ( ) adolescents ( ) adults ( ) elderly 6.c How long have you been working in this area? ( ) less than one year ( ) from 1 year and one month to 5 years ( ) from 5 years and one month to 10 years ( ) more than 10 years
7. How often do you access the Internet? ( ) rarely ( ) sometimes ( ) often
8. Where do you go to the Internet most often? ( ) home ( ) work ( ) cyber cafes ( ) other

Chart 3. Content evaluation protocol

	Very bad	Bad	Regular	Good	Very good	I did not access it
a. Aging process						
b. Presbycusis						
c. Presbyphonia						
d. Presbyphagia						
e. Stomatognathic System in aging						
f. Cognitive aspects in aging						

Data were treated using descriptive and inferential statistics. Statistical analyses were performed using the Statistica 7.0 *software*, adopting a significance level of 5% ($p<0.05$). The Kruskal-Wallis test was used to compare the categories with the overall score of the questionnaires evaluating the content and the technical quality of the *website*, as well as the scores of the submenus, followed by the Dunn test to determine which categories significantly differed from each other. The Spearman's correlation coefficient was used to test the correlation between the frequency of use of the Internet and age, schooling and frequency of Internet use, and schooling with the overall score of the questionnaire .

RESULTS

The website named Portal of the Elderly was designed with a responsive layout allowing access through tablets, cell phones with access to the Internet and/or desktop or notebook computers, regardless of the operating system, using the main browsers available in the market (Internet Explorer, Mozilla Firefox, Google Chrome, and Apple Safari) without losing functionality. There are nine items that make up its main menu, one of which is the item "Aging", which has six submenus: natural aging process, presbycusis, presbyphonia, presbyphagia, stomatognathic system in aging, and cognitive aspects of the elderly. Other items on the website also have aspects related to aging, such as "News", "Videos", "Interesting Links" and "Downloads". In addition, in order to establish a link with the community that visits the website, an email was created in the "Contact" menu. The material inserted in the category "Aging" was analyzed by the author regarding the level of textual intelligibility, with a score ranging from easy to difficult (Table 1).

The material contains scroll bars on the sides of the navigation pages that help users to explore the content according to their needs and also has flags that highlight the selected tab. The structure of the website has a reading wizard that allows users to increase the font size of the text.

In the Speech-Language therapist category, 60% of the professionals worked in the language area, 20% in dysphagia, and 20% in collective health, 60% of whom worked with elderly, 10% with adults and 30% with children. As for time of professional practice, this varied from less than one year (30%), one year and one month to five years (40%), five years and one month to 10 years (20%) and more than 10 years (10%). There was a prevalence of the female gender in all categories studied. As for the instructional level of the Elderly category, 60% of this population had incomplete High School/Superior education, or 11 to 14 years of schooling.

Table 1. Flesch index values for each topic

Submenus	Flesch index (%)	Classification
Aging process	27	Difficult
Presbycusis	51	Easy
Presbyphonia	54	Easy
Presbyphagia	50	Easy
Stomatognathic system in aging	33	Difficult
Cognitive aspects in aging	26	Difficult

As for the Internet access profile, 70% of the elderly and caregivers and 100% of the speech-language therapists frequently access it, with 100% of the elderly and 87.5% of caregivers using the Internet at home, while Speech-language therapists used to access it preferentially at work.

When correlating the frequency of access to the Internet with age and schooling through the Spearman Correlation Test, a statistically significant difference was obtained with $p<0.05$, where $p = -0.58$. However, there was no statistically significant difference when we analyzed the frequency of use of the Internet by the participants according to schooling.

Regarding the classification of the content of the submenus on Aging according to each category, "adequate" was the predominant classification among the elderly evaluators, "adequate" and "excellent" among caregivers and "excellent" among speech-language therapists.

When comparing the overall score of the evaluation of the content of the questionnaire, a statistically significant difference was found only between caregivers and speech-language therapists according to the Kruskal-Wallis and Dunn post-hoc test, with $p = 0.017$. As for the submenus, there was a statistical difference in the submenus 1 and 5, and also among caregivers and speech-language therapists, with $p = 0.001$ and $p = 0.019$, respectively.

"Excellent" quality of the website prevailed among all categories according to the subscales of the Emory questionnaire. Statistical analyses of subscales of the Emory questionnaire and categories did not present statistically significant differences.

DISCUSSION

The development of the website sought to adapt the presentation of the material mainly to the elderly public. Designs particularly targeting the elderly represent a research area poorly investigated, under-explored and neglected. There is therefore a need for social inclusion of this population through the creation of devices to help the elderly to live in society and interact with their environment[13]. The way in which the information is made available, the typography, the colors and the composition of the visual elements in the Portal of the Elderly were carefully structured to facilitate the intelligibility of the content.

The Flesch index has been used by some authors in order to adapt the readability of content of websites, blogs, cyber tutors, among others[14,15]. Thus, this index was used to this end in the present study; 50% of the texts were considered "easy" and 50% "difficult". The "difficult" classification was related to the contents "Natural Process of Aging", "Stomatognathic System" and "Cognitive Aspects". This must have happened due to the presence of scientific terms that were explained in sequence, as well as the structuring of the content in topics in the submenu "Stomatognathic System", which possibly influenced the calculation based on sentences and words. As for the classification of Aging data according to each category, "adequate" was the classification attributed by the elderly evaluators, "adequate" and "excellent" by the caregivers and "excellent" by the speech-language therapists, reinforcing that the readability of the material was adequate to the public.

The scientific literature does not report studies with websites related to the theme addressed by the Portal of the Elderly, making it difficult to compare and discuss these results, and suggesting the need for further research on the theme.

Considering the decline in ocular function, commonly altered with aging, adjustments were made, according to the criteria of visual ergonomics, in order to provide the reader with a graphic efficient representation, organized by ergonomic principles and aimed at solving acuity and readability problems. Some impacts of visual aging must be highlighted: a) reduction of visual acuity; b) decreased peripheral vision and presbyopia (tired sight); c) difficulty with lighting (need of environments with greater illumination); d) difficulty to distinguish colors (soft colors with similar intensities are very difficult to distinguish); e) difficulty to read (need to use larger fonts, with more contrasting background color)[16]. Thus, there is a need to compose visual elements to illustrate these actions, associated with short texts organized in blocks for better learning and storage of content[17].

A study on visual communication of medicine instructions with elderlies revealed that 100% of the interviewees opted for the Arial font instead of *Times New Roman*, which has serifs. The most readable source was Arial, body 8 (1.8 mm height), line length 50 mm, word spacing 1.6 mm, line spacing 3 mm, and text alignment on the left. This research indicates that the use of non-serif fonts and the correct spacing between lines and words makes reading easier[18]. In addition, the colors in which the material is presented can influence the receptivity of the public by triggering feelings and sensations, focusing on the productivity and quality of the activities developed, because they may call attention depending on visibility, contrast and purity[19]. Notably, the written material was prepared following the formatting indicated as the most readable, with a reading wizard to increase the font size, absence of abbreviations and paying attention to the colors used in the website, which are combinations between green and white, black and white, white and green, corresponding to the letters and the background, respectively.

Researchers have proposed a checklist to evaluate web accessibility for the elderly through topics such as: presence of textual descriptions of images and videos, absence of intermittent images and auxiliary windows, presentation of search functions, plain and clear language texts, concise content, identification of titles and headings, figure captions, definition of a standard layout, bibliographic references, absence of advertisements (advertising and marketing), presence of authorship and possibility of making contact with authors on all pages[20]. It should be noted that the Portal for the Elderly presents characteristics that are in line with this proposal.

With regard to access to the Internet, this has been intensified in Brazil. The proportion of people who use the Internet in daily basis grew from 53% in 2008 to 71% in 2013[21]. These data corroborate the statistical results found, as the majority of the sample reported to make frequent use of the Internet. Authors have pointed to age and educational level as the two main barriers to use of Internet, which is in agreement with the present findings on the statistically significant results found when correlating age, schooling and Internet access[22].

The evaluation of the website was carried out by three categories: Caregivers, the Elderly and Speech-Language therapists. It is recommendable to check the opinion of other evaluators, so as to verify the quality of the tool made available online[23]. It was for this reason that caregivers of the elderly and elderly participants were included as evaluators. Ten speech-language therapists, 10 elderly and eight elderly caregivers participated in this study, totaling 28 evaluators. This sample is ideal for evaluation of the website, considering that at least three experts in each group are recommended, with a scale of up to 10[24].

Regarding the access to Internet, we observed that the category Caregivers presented a higher frequency of access, followed by the Elderly and Speech-language therapists. However, the categories presented similar values, pointing to frequent use of the Internet by the population in general and calling attention to the growing interest of the elderly population on the use of the Internet[25].

Home access to the Internet was prevalent among the Elderly and Caregiver categories, while Speech-language therapists prefer to access it in the work environment. This is justified by the characteristics of the populations: the workplace of caregivers do not allow them to access to the Internet, and the elderly usually spend much of their time in their homes, while speech-language therapists continuously use the Internet in their work environment. Consistent with such indications, it is noteworthy that in Brazil, the number of computers connected to the Internet in homes and workplaces, as well as access to through cell phones, is significant[21].

In this study, women prevailed among participants. Among the elderly, this predominance is a result of the geographic aging pattern where women normally live more than the men[26]. The prevalence of women in the Caregiver category can be justified by the characteristics of caregivers of Brazilian elderly, who are usually family members of the female gender living in the same household who become the caregivers of their husbands, parents and even children, as in our society, caregiving is considered a feminine role[27]. In the Speech-language therapist category, the higher number of women is explained by the prevalence of the female gender in the profession. This prevalence is also found in Europe, where speech-language therapists are approximately 95% women. In the United States, only 4.2% of males make up the speech-language therapy profession and 18.6% to audiology profession, with 26.7% working in both areas[28].

CONCLUSION

The website was developed through the stages of analysis and planning, modeling and implementation. The content was evaluated as "adequate" and its technical quality as "excellent", and can be considered an accessible material about the Aging Process that makes up a source or supplementation of information for the population. People have increasingly sought for health information on the Internet, and therefore the website can be an important tool to transmit information, meeting the objectives of Telehealth.

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Author contributions

The author NCF participated in all stages of the research in an active way, aiming at the development and conclusion of her master's thesis. Authors AMA and NGC contributed to the elaboration of the methodology, as well as to the complementarity of the website approached during the research; MPA and JRMB assisted in the analysis of the results and the statistical treatment. Finally, MLC guided all stages of the work.