

# Development of education material for providing orientation to the elderly who are candidates for hearing-aid use

## Desenvolvimento de material educacional para orientação de idosos candidatos ao uso de próteses auditivas

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### ABSTRACT

**Purpose:** To determine the characteristics and factors to be considered in the process of developing and designing education material in the field of health care aimed for a target population comprised of elderly people; and to develop multimedia material for counseling the elderly who are candidates for hearing-aid use considering the guidelines on health literacy. **Methods:** A bibliographic survey of the design factors to be incorporated in the preparation of education material in the field of health care was conducted. In addition, its contents also encompassed orientation and counseling for the elderly who are candidates for hearing aids. The multimedia material developed was based on the literature surveyed. **Results:** The guidelines on language, design, layout and typography, organization and graphic illustration according to the literature references studied. Then, 57 content presentation screens making up the multimedia material were drawn up and divided into two main areas: “orientation on hearing aids” and “listening with the hearing aids.” **Conclusion:** When preparing education materials in the field of health care, it is important to consider text readability to ensure health information will be understood and learned. In order to access the compilation of our results, the multimedia material we developed as the final product of this study could be made available.

**Keywords:** Hearing aids; Elderly; Orientation; Counseling; Health literacy

### RESUMO

**Objetivo:** Determinar as características e fatores a serem considerados no processo de desenvolvimento e *design* de materiais educacionais escritos na área da saúde, para uma população-alvo de idosos e desenvolver um material multimídia para orientação e aconselhamento de idosos candidatos ao uso de próteses auditivas, considerando as diretrizes estabelecidas para confecção de materiais educacionais em saúde. **Métodos:** Realizou-se um estudo bibliográfico para levantamento de fatores de *design* a serem incorporados na elaboração de materiais educativos na área da saúde, bem como para elaboração do conteúdo de orientação e aconselhamento ao idoso candidato à prótese auditiva. Com base neste estudo, foi desenvolvido um material multimídia. **Resultados:** Foram compiladas as diretrizes de linguagem, *layout*/tipografia, organização e ilustração gráfica recomendadas pela literatura estudada. A seguir, foram elaboradas 57 telas, que constituíram o material multimídia, em conteúdo que se dividiu em duas grandes áreas: “orientações sobre o aparelho auditivo” e “escutando com o aparelho auditivo”. **Conclusão:** Na construção de materiais educacionais na área de saúde, é importante considerar, além do conteúdo, a legibilidade e leiturabilidade do texto, para garantir a melhor compreensão e aprendizado da informação em saúde. Para demonstrar a compilação dos resultados, é possível disponibilizar o material multimídia, elaborado como produto final deste estudo.

**Palavras-chave:** Auxiliares de audição; Idoso; Orientação; Aconselhamento; Alfabetização em saúde

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## INTRODUCTION

In professional–patient communication, there are several factors that can affect the understanding and later recall of the information provided during the clinical consultation. To facilitate the communication process and minimize retention problems, numerous studies recommend the use of written material in tandem with verbal information<sup>(1-6)</sup>.

Information materials in the field of health care are of great relevance, since adequate understanding and recall of treatment aspects are decisive factors in the success of any intervention.

Health information and instruction materials will only be effective if they are noticed, read and understood by the patient<sup>(2)</sup>. Therefore, it is important that content, design and readability of the materials with information on health care produced correspond with the reader's literacy and cognitive level<sup>(7)</sup>. However, much of the information offered to the patient in the field of health care, either orally or in writing, is, in general, too complex for the majority of the population. In the particular case of the elderly, such materials should be even more carefully designed and prepared, taking into account the possible sensory and cognitive impairments in this population<sup>(5)</sup>.

Health professionals should be concerned about using and developing materials that can maximize reader interest and facilitate their understanding and recall of information<sup>(2)</sup>.

Instruction materials can be defined as the presentation of words and figures with the aim of promoting knowledge. Information can be either printed out or made available on screens, whereas figures can be static (illustrations, pictures) or dynamic (animations and videos). Learning will always be more effective when combined with visual and verbal information<sup>(1)</sup>.

The design of any given information material should promote the relationship between the visual message and the recipient. In addition to the concern about its graphic design *per se*, the material should enable readers to enjoy independence as they are being given instructions and orientation<sup>(8)</sup>. The greater the appropriateness regarding presentation format and organization of ideas, the better use of information can be made by the recipients.

In addition, in order to promote knowledge, this type of material must be compatible with the literacy of its target readership. Health literacy is the degree of an individual's ability to obtain, process and interpret basic information on health and health care services, aiming at an adequate health decision-making process<sup>(9)</sup>.

Low literacy competence in health is one of the greatest obstacles to the efficient understanding of information received by patients<sup>(10)</sup>. In order for health education materials to become a facilitating pathway, readability and legibility factors must be carefully studied when designing and preparing them. Even though they do not solve the difficulties imposed by low literacy, such adaptations are aimed at making the reader's understanding as easy as possible.

The readability of a text, i.e. the concept of "readability", is that which allows reading intelligibility and understandable language quality. The study of readability is fundamental to simplify the texts, in order to ensure they are understood by a greater number of readers. The term readability also refers to the ease a text can be read. Nonetheless, it is more often used in the fields of layout and typography, which take into consideration

such aspects as font type, color and contrast between the lettering and its background, spacing and margins<sup>(11)</sup>.

The cognitive demand imposed by an education material can occur due to intrinsic factors (conceptual difficulty, for instance), or extrinsic factors (presented format, font type, wording). The better the readability and legibility of the proposed material, the lower the cognitive demand<sup>(1)</sup>.

With regard to adapting to hearing aids, it is widely known that, in order to achieve user satisfaction in this process, the intervention should not be solely restricted to the clinical procedure of selecting and fitting the devices. Psychosocial factors, understanding of technology, and device handling, as well as patient and family involvement are all fundamental to the success of aural rehabilitation. An individual's communication needs are not solely related to a lacking access to sounds and the consequent several difficulties that can ensue, but also encompass how successful adapting to amplification is.

The suitability of the material used as an aid in providing counseling and orientation has been shown to strongly correlate with performance when managing and using amplification devices. It also correlates with its users being required a smaller number of instruction repetitions and problem solving skills<sup>(12)</sup>. In addition, the concern about the suitability of information materials has been correlated with the satisfaction level of users of sound amplification and a better use of rehabilitation<sup>(13)</sup>.

In Brazil's national scenario, one might mention the development and evaluation of hearing aids in this context<sup>(14,15)</sup>.

Therefore, providing orientation and counseling is known to play an important role in the process of selecting, fitting and adapting to hearing aids. The means whereby information is conveyed can dictate the ease or difficulty with which it is understood and recalled. Hence, such limitation must be compensated for by using a combination of verbal and visual media.

Conducting a study such as this one is thus justified, as is the hypothesis that the use of appropriate education materials containing the needed information and suitably designed can and should significantly assist the elderly with their learning about the use and benefits of hearing aids.

Accordingly, this study was intended to determine the features and factors to be considered in the process of developing and designing printed education materials in the field of health care aimed for a target population comprised of elderly people; and to develop multimedia material for providing orientation and counseling to the elderly who are candidates for hearing-aid use considering the guidelines on health literacy.

## METHOD

Initially, a bibliographic survey was carried out in order to identify relevant studies in databases such as MEDLINE, Web of Science, Scopus, and SciELO, published between 2000 and 2017, by using the following search queries (their equivalent in Portuguese are indicated between brackets): hearing aids (*auxiliares de audição*) in isolation and in conjunction with orientation (*orientação*), counseling (*aconselhamento*) and elderly (*idosos*) and health literacy (*alfabetização em saúde*). Other studies were found from the lists of bibliographic references contained in the selected studies. Guides, manuals and textbooks related to health communication were also consulted.

According to the literature review, the characteristics that needed to be taken into consideration to ensure the health education material would be suitably designed were defined so as to enhance its legibility and readability aspects. Likewise, a survey was conducted on the subjects that should be included in the material, making up its contents and aiming at providing orientation and counseling to the hearing-impaired elderly who are candidates for hearing-aid use.

To ensure suitability when preparing the orientation material, Caposecco et al.<sup>(4)</sup> suggested the following phases: planning, design, assessment of material suitability, and pilot testing. In our study, we sought to reach the planning and design phases involved in the preparation of the material.

The first phase in the development process was planning, whose purpose was to define and characterize the target readership, which was defined as being the elderly with bilateral hearing loss, of any type and grade, candidate for hearing-aid use. Other relevant characteristics of the target readership were also determined: being literate; absence of major visual problems; without evidence of cognitive impairments that might compromise reading ability; and no required prior knowledge about aural rehabilitation.

For this study's second phase, a multimedia material was developed in order to exemplify, in practice, the suitability of design previously studied.

Multimedia interaction allows patients to move through the existing connections between the available links while each of them builds their own learning pathway according to their own needs<sup>(16)</sup>. On the other hand, printed materials can be more practical and portable, so that users who are not familiar with the digital world can access them at any time<sup>(2)</sup>. We therefore believed it was important to render the navigation screens in the multimedia material printable. The design recommendations for preparing the multimedia material were duly considered to ensure they would suit the printed material. The main difference occurs when choosing the correct type of paper to be used, in addition to its quality and format selected for printing.

The language, used in a simple and concise manner, was such that it delimited the information content of the material to be presented, i.e. It was such that the information being conveyed was not to become excessive, overwhelming or confusing to the reader.

After adjusting a material in accordance with design recommendations, better readability and legibility are expected, as well as a decrease in the cognitive load demanded of the reader<sup>(1)</sup>.

It was suggested that the modules should be divided into two large navigation areas, namely orientation on device use and counseling on sound amplification.

We opted for this type of organization according to the following definition on orientation and counseling<sup>(17;1021)</sup>:

[...] orientation aims to ensure that the user gets the desired benefits from treatment as quickly and easily as possible, whereas counseling aims to provide patients and their families with an understanding of the effects of hearing loss and the effective implementation of strategies to reduce such effects. The information to be given can be divided into those relative to care and use of the electronic device and those relative to the user. In the latter category, information should be included to assist the elderly and their family members to understand the nature of hearing loss, facilitate adaptation to amplification, help

develop realistic expectations as to the benefits and limitations of hearing aid use, and understand the importance of making use of other strategies to alleviate hearing and communication difficulties, such as assistive technology devices, communication strategies and lip and face reading.

The topics and informative content were chosen according to the difficulties commonly reported in previous studies by patients, first-time hearing aid users<sup>(6,18)</sup>.

When preparing the material design, the language, layout and typography, organization and graphic illustration used all followed the guidelines set forth in guides and in the literature reviewed<sup>(4,5,8,19-23)</sup>.

## RESULTS

The following is a compilation of the findings on the design characteristics to be taken into account when creating and preparing education material in the field of health care. The results were divided into sections: language, layout and typography, organization and graphic illustration.

Table 1 shows a compilation of recommendations on the language suitable for use in health education material intended for the elderly.

Table 2 displays the main recommendations for suitable layout and typography to be used in health education material intended for the elderly.

Table 3 describes the recommendations for suitable organization of health education material intended for the elderly.

Table 4 summarizes the main recommendations in the literature regarding graphic illustrations in a health education material.

The compilation of these results was exemplified in the preparation of the multimedia material. The material developed corresponds to an interactive file, which can be played on computers or notebooks as a facilitating tool in the orientation and counseling phase when adapting to hearing aids.

Usage guidance information generally covers the behind-the-ear and completely-in-the-canal hearing aids, which differ as to how they should be managed.

It is recommended that the professional be a facilitator in the use of the material during the clinical consultation with the patient and their family members. The navigation is interactive, so that professional and patient should choose the subheadings for which they wish to obtain the information and, in this way, are channeled to the text and explanatory images on the topic of interest. It is possible to return and choose other topics at any time.

With some interactive options, the professional can, for instance, fill in with recommendations or information that specifically pertain to the hearing aid manufacturer. These small interactions still need improving before the final product is fully developed.

A total of 57 screens have been drawn up, considering the initial presentation screen, menus and submenus intended for orientation and counseling. Each of the screens can be printed out.

Table 5 shows the content organization (themes and modules), headings and subheadings, and exemplary screens of the final product in Figures 1, 2 and 3.

**Table 1.** Language suitability recommendations for health education material

	Recommendation	Literature
Language	Use a text with high readability (ease of reading) and great cohesion among sentences.	People, irrespective of their literacy level, prefer reading simple to complex materials as they are easier to understand <sup>(4,19,20,23)</sup>
	Use familiar words, phrases, and sentences. Repeat main words, phrases and ideas.	This increases text cohesion, which makes it easier to understand. A highly cohesive text reduces the demand for cognitive processing <sup>(4,20-22)</sup>
	Make clear the benefit of the information. Highlight its good points.	Be stimulating, promote quick responses <sup>(8,19,21)</sup>
	Use the active voice. Tell the reader what to do.	Increases readability and urges the reader to take action <sup>(4,19,20,23)</sup>
	Do not use double meaning words. Use analogies familiar to the reader. Avoid the use of jargon, technical or scientific terms, acronyms or abbreviations.	Reduce the demand for cognitive processing and facilitate understanding of the text. Define technical terms, when essential <sup>(3,19,21,23)</sup>
	Limit the use of statistics or mathematical concepts, symbols and quotation marks.	This may render the text more difficult to understand or cause misinterpretation <sup>(19)</sup>

**Table 2.** Suitability recommendations for layout and typography used in health education material

	Recommendation	Justification
Typography	Use at least from 12- to 14-point types for text and 16-point types for headings.	Many elderly people have some sort of visual impairment that can not be corrected with glasses <sup>(19)</sup>
	Use sans-serif fonts.	Sans-serif fonts are easier for the brain to recognize <sup>(8,19)</sup>
	Do not use UPPERCASE letters for writing an entire word.	Words written in uppercase only are more difficult to read, as there are fewer traits differentiating one from another (e.g. differences in size) <sup>(19)</sup>
	To highlight a word, use <b>bold</b> . Avoid underlined words or in <i>italics</i> .	Underlined letters or letter in italics are harder to read <sup>(19)</sup>
Layout	Leave blanks, 10% to 35% per page, and blanks between heading, subheading and body text. Limit the amount of text and graphic illustrations per page.	This increases contrast and makes reading easier; Too much information per page can intimidate the reader <sup>(8,19,21)</sup>
	Use dark letters on light backgrounds. Use non-glossy paper for printed materials.	Elderly people have difficulty in perceiving differences when there is a low contrast between paper color and letter color <sup>(19,20,23)</sup> The reflection of light on paper makes it difficult to read <sup>(8)</sup>
	Preferential text alignment to the left, not justified.	A justified alignment results in non-uniform word spacing, making the text more difficult to read <sup>(19,22,23)</sup>

**Table 3.** Organization suitability recommendations for health education material

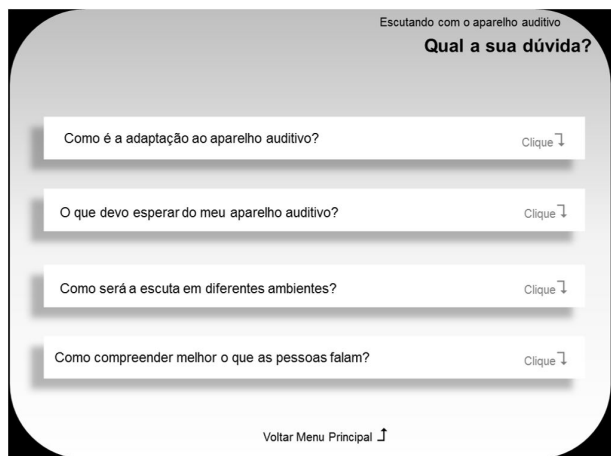
	Recommendation	Justification
Organization	The main message should always be in the first paragraph and then the details, with the explanation on the subject, should follow.	It is the most frequently read part of written documents and should motivate the reader to continue reading. Readers find information more easily <sup>(4,8,19,20)</sup>
	Organize the information into blocks with headings.	They provide context and help the reader to find the desired information by easily distinguishing headings from the rest of the text <sup>(8,20)</sup>
	Use questions in headings and subheadings.	This invites the reader to think about the answers <sup>(19,21)</sup>
	Use short paragraphs expressing only one idea or subject.	This makes reading and understanding of the text easier <sup>(19)</sup>
	Offer the reader 3 to 4 pieces of information per page.	This helps information retention <sup>(19)</sup>
	Key words or key ideas should go in text boxes. Use bullet points when possible.	This highlights relevant information. Low literacy readers have difficulty finding the most important piece of information on a given page <sup>(4,19)</sup>
	Sentences should be short, containing 8 to 12 words, on average. A line of text must be between 60 and 72 characters in length.	This reduces the demand for cognitive processing <sup>(4,5,23)</sup>
Include a summary of the key points at the end of each session or document.	This helps the reader to remember the main points addressed <sup>(20)</sup>	

**Table 4.** Graphic illustration suitability recommendations for health education material

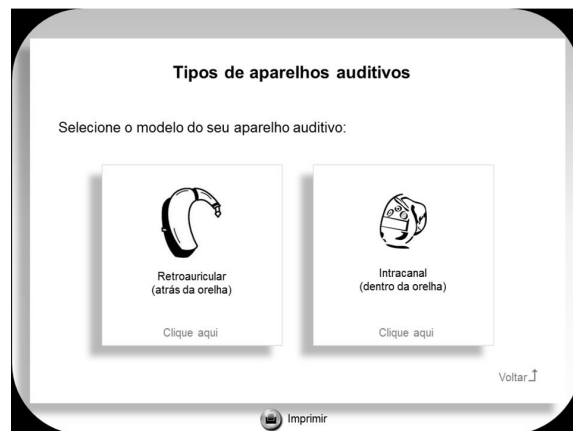
	Recommendation	Justification
Graphic Illustration	Use high quality visuals. Use illustrative resources to help communicate the message.	Figures increase attention, improve understanding and recall of written material for those with low literacy <sup>(19,20)</sup>
	Use simple (linear) drawings without unnecessary details.	Photography is an important resource for drawing attention to the message; however, simple designs have fewer distracting elements <sup>(4,8,19)</sup>
	Use familiar images and symbols that are attractive to the reader. Use cartoon characters with caution.	They should be used to support the text and assist in the retention of information. If the image lacks credibility, it might not be taken seriously <sup>(19)</sup>
	Place explanatory captions close to the images. Use arrows and labels to illustrate the figures.	This helps to explain meaning and promote correct interpretation <sup>(4,8,19)</sup>
	Should a sequence of illustrations be used, number the images.	This ensures that the reader will understand all the elements contained in graphic illustrations <sup>(19)</sup>
	Use actual photographs to illustrate body parts or small pictures.	Photographs are good for drawing attention, especially when on the cover of the document <sup>(8,19)</sup>

**Table 5.** Information content of the material for orientation and counseling of the elderly in the hearing aid adaptation process

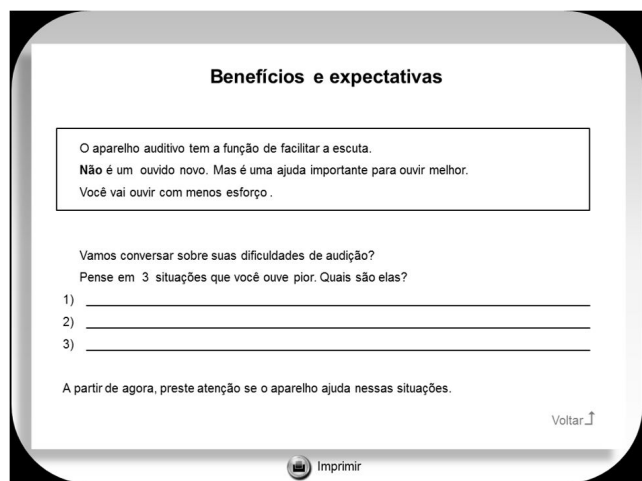
	What is a hearing aid?	<ul style="list-style-type: none"> <li>• Definition and function</li> <li>• Types of hearing aids</li> <li>• Technology</li> </ul>
Orientation on the hearing aid	How does the hearing aid work?	<ul style="list-style-type: none"> <li>• Turning it on and off</li> <li>• Volume control</li> <li>• How to replace its battery?</li> <li>• Microphone</li> </ul>
	How to put on and take off the hearing aid?	<ul style="list-style-type: none"> <li>• Right side and left side</li> <li>• How to put on the mold/device</li> <li>• How to take off the mold/device</li> </ul>
	How to talk on the phone with the hearing aid on?	<ul style="list-style-type: none"> <li>• Microphone pickup</li> <li>• Phone Coil</li> <li>• Accessories</li> </ul>
	Hearing aid care and maintenance	<ul style="list-style-type: none"> <li>• Hearing aid care</li> <li>• Cleaning of the mold</li> <li>• Types of hearing aids</li> </ul>
Listening with the hearing aid (counseling)	How is the adaptation to the hearing aid?	<ul style="list-style-type: none"> <li>• What is the purpose of the hearing aid?</li> <li>• Adaptation to amplification</li> <li>• Routines of use</li> <li>• The importance of monitoring and follow-up</li> </ul>
	What should I expect from my hearing aid?	<ul style="list-style-type: none"> <li>• Benefits and expectations</li> </ul>
	How will my listening be affected in different situations?	<ul style="list-style-type: none"> <li>• Quiet settings</li> <li>• Noisy settings</li> <li>• Radio and television</li> </ul>
	How to better understand what people are saying?	<ul style="list-style-type: none"> <li>• Lip and face reading</li> <li>• Communication strategies</li> </ul>



**Figure 1.** Counseling Menu Screen



**Figure 2.** Exemplary Content Screen: “What is a hearing aid? Types of hearing aids”



**Figure 3.** Exemplary Content Screen: “What should I expect from my hearing aid? Benefits and expectations”

## DISCUSSION

Brazil’s population pyramid has changed significantly in recent years. Currently 17.6 million individuals are over 60 years old<sup>(24)</sup>.

These data suggest how important it is for the resources currently available suit this population. The digital age has made using computers and accessing multimedia information a reality in most households. Despite the fact that Internet access is still limited in some poorer regions, the presence of a computer and/or a CD/DVD player has become increasingly common<sup>(25)</sup>.

Several studies have been discussing “elderly-computer” interaction and have shown that the elderly are interested in computers and that many attain basic mastery of handling computers, which may offer some benefits, such as improved mental stimulation and social interaction<sup>(26)</sup>. Although there is a strong belief that older people are resistant to interacting with technology, such studies have shown that not only do they accept to use computers, but also affirm that training, technical support, ease of access and available application types are determinants for their receptivity.

It is worth underscoring the recommendation that the orientation material should be used as a facilitating tool for the professional in the clinical setting and the multimedia or printed material should be handed out according to each patient’s profile, so that they can have some form of support for recalling the information at a later time<sup>(1,2,6)</sup>.

The education materials, commonly available to hearing aid users, are those distributed by the very companies that manufacture the electronic amplification devices themselves<sup>(12,13)</sup>. Nonetheless, studies have shown that not always are these materials ideally suited to facilitate the learning experience of individuals; in addition, there is enormous room for further improvement of their content and the way it is presented<sup>(3,5)</sup>.

The content in the manufacturers’ instruction guides is not appropriate for the patients’ level of language and literacy<sup>(3)</sup>. Difficulties in finding, understanding, and following the instructions provided have also been reported<sup>(13)</sup>. Deficiencies in vocabulary, layout and typography, as well as failure to stimulate

and motivate the patients to read such materials have been found in several manuals evaluated<sup>(5)</sup>. Other authors have suggested differentiating the orientation of the several hearing aid models<sup>(8)</sup>, a recommendation that we have taken into consideration when preparing the material we developed here (distinction between behind-the-ear and completely-in-the-canal hearing aids).

In addition to the information on how to use and manage hearing aids, there is a need for manuals to also include information on adapting to amplification and using communicative strategies (counseling). Furthermore, the amount of text should be reduced, whereas font size and the number of illustrations should be increased<sup>(8)</sup>.

In general, the speech-language therapist/audiologist who works with hearing aid adaptation feels the need to complement their verbal orientations; still, most of these professionals use the manufacturer’s manual without any further instructional support<sup>(12)</sup>. Thus, most first-time hearing aid users are at risk of not understanding much of the important information being conveyed and intended for their successful adaptation to sound amplification<sup>(3,13)</sup>.

The design recommendations we studied were incorporated into the material developed in such a way as to ensure a better understanding of the texts contained therein. The purpose of that is to enable the individual to make correct decisions in face of everyday situations with regard to their sound amplification device<sup>(4)</sup>. In addition, the organization of screens and visual features was designed in order to facilitate the direct reading, thus avoiding distractions or unnecessary messages, which may divert attention from the main information<sup>(19)</sup>.

Studies have shown that users have a preference for instruction materials containing a greater number of graphic illustrations over textual content. The graphic illustrations were specifically developed for this material, following the recommendations of simple, linear drawings familiar to readers<sup>(19-23)</sup>.

In our study, instruction videos were not included. Video can be a powerful feature in a multimedia application. It adds realism and allows demonstrations that could not be rendered by animations and still images. Animations are recommended when one can not properly communicate information as still images<sup>(27)</sup>. On the other hand, still and printed images tend to draw an individual’s attention to specific information, thereby allowing them to control their own pace and improve their learning<sup>(28)</sup>. We suggest future studies be conducted in order to develop videos that are suited to the same population and purpose.

The term “hearing aid” (“*aparelho auditivo*”, in Portuguese) was adopted in all contexts, because it is more popular and better known to the lay public in an attempt to avoid formal terminology<sup>(19,21,23)</sup>.

It should be noted again that, in our study, the target readership for the material we developed was the elderly. Nevertheless, we suggest it can and should be used by any individual who is adapting to hearing aids, at any age, of any gender or social class. We expect it to be a useful tool in this process, since we sought to use universal language and design illustrations that should be easy to understand, regardless of the readership’s literacy level<sup>(4)</sup>.

As for the difficulties encountered in developing a digital product, the financial factor for hiring a professional in the field may be relevant, since this process requires that the professionals have specific knowledge in the field with a training in graphic design. A partnership with professionals in this field could

enrich this type of study and permit the creation of products with all of the required and suitable resources.

The material developed in this study can be made available by the authors and has the purpose of showing, in a practical fashion, the construction of a tool that meets the requirements described in the literature.

Studies are being carried out to evaluate and validate the applicability of this material in individuals who are in the process of adapting to hearing aids, so that any adjustments and corrections to texts and illustrations, or inclusion of topics, can be implemented. It is essential that the evaluation be conducted by professionals with expertise in the field to ensure optimal structuring and tuning to the readership in question.

## CONCLUSIONS

When preparing education materials in the field of health care, it is important to consider, in addition to content, text readability and legibility. Recommendations include language register, layout and typography, organization, and graphic illustration, in order to ensure health information will be better understood and learned.

We would like to offer an incentive to improve and carry out further studies on the resources facilitating this process. We also recommend that new tools be developed, aiming for patient's well-being and greater satisfaction.

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