ORIGINAL ARTICLE

REVISTA ENFERMAGEM ATUAL IN DERME

ASSISTIVE TECHNOLOGIES TO PROMOTE HEALTH IN BRAZIL AND PORTUGAL: INTEGRATIVE REVIEW

TECNOLOGÍAS DE ASISTENCIA PARA PROMOVER LA SALUD EN BRASIL Y PORTUGAL: REVISIÓN INTEGRATIVA

TECNOLOGIAS ASSISTIVAS PARA PROMOVER SAÚDE NO BRASIL E EM PORTUGAL: REVISÃO INTEGRATIVA

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Submission: 29-01-2023
Approval: 06-10-2023

ABSTRACT

Objective: to analyze assistive technologies developed in the field of nursing in Brazil and Portugal, assessing differences and contributions to the health promotion of people with disabilities. **Methods:** An integrative literature review was conducted from November 2020 to June 2021, using databases such as Lilacs, SciELO, Medline®, Cinahl, Scopus, and RCAAP. **Results:** A total of 6,125 articles were initially identified, resulting in 13 articles included in the final sample, all from the field of Nursing. Two of the studies were conducted in Brazil and Portugal. **Conclusion:** In Brazil and Portugal, a variety of approaches were identified as tools capable of promoting health and inclusion, as well as disseminating knowledge on relevant topics. This underscores the need for studies that highlight assistive technologies in the healthcare field for the audience with disabilities.

Keywords: Self-Help Devices; Disabled Persons; Health Promotion; Nursing.

RESUMEN

Objetivo: Analizar las tecnologías asistivas desarrolladas en el campo de la enfermería en brasil y portugal, evaluando diferencias y contribuciones para la promoción de la salud de personas con discapacidad. **Métodos:** Revisión integrativa de la literatura realizada de noviembre de 2020 a junio de 2021, con base en las bases de datos lilacs, scielo, medline®, cinahl, scopus y rcaap. **Resultados:** Se encontraron 6.125 artículos, resultando en 13 artículos incluidos en la muestra final, todos en el campo de la enfermería. dos de las obras fueron producidas en brasil y portugal. **Consideraciones Finales:** En brasil y portugal, diferentes enfoques pueden ser vistos como herramientas capaces de promover la salud y la inclusión, además de difundir conocimientos sobre temas relevantes. existe la necesidad de estudios que destaquen las tecnologías de asistencia en el área de la salud para personas con discapacidad.

Palabras clave: Dispositivos de Autoayuda; Personas con Discapacidad; Promoción de la Salud; Enfermaría.

RESUMO

Objetivo: Analisar tecnologias assistivas desenvolvidas na área de enfermagem no Brasil e em Portugal, avaliando diferenças e contribuições para a promoção da saúde de pessoas com deficiência. **Métodos:** Revisão integrativa da literatura realizada durante os meses de novembro de 2020 a junho 2021, a partir das bases Lilacs, SciELO, Medline®, Cinahl, Scopus e RCAAP. **Resultados:** Foram encontrados 6.125 artigos, resultando em 13 artigos incluídos na amostra final, todos da área da Enfermagem. Dois dos trabalhos foram elaborados no Brasil e em Portugal. **Considerações finais:** Podem-se verificar, no Brasil e em Portugal, as diversas abordagens como ferramentas capazes de promover a saúde e a inclusão, além de disseminar conhecimentos sobre temáticas relevantes. Evidencia-se a necessidade de estudos que destaquem as tecnologias assistivas na área da saúde ao público com deficiência.

Palavras-chave: Tecnologia Assistiva; Pessoas com Deficiência; Promoção da Saúde; Enfermagem.

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INTRODUCTION

In Brazil, the population reporting some form of disability is 17.3 million people. This figure is further broken down by type of disability, with 13.3% having a motor disability, 3.4% having a visual disability, 1.4% having an intellectual/mental disability and 1.1% having a hearing disability[1].

According to the World Health Organization (WHO), estimates for the year 2020 suggest that disability rates could double or that disability related incidents could increase. One of these estimates was based on road traffic accidents being classified as the third leading cause of injury and becoming a significant factor in physical disability statistics[2].

The most recent data from Portugal show that approximately 25.1% of the population report having sensory disabilities or impairments, while 15.2% have motor disabilities. When analyzing the age group of people aged 65 and older, a more significant prevalence is observed, with 41.2% of people with disabilities (PwD) compared to 28.4% with sensory disabilities. Consequently, the country faces a challenge with this demographic, as the majority of this population is elderly, making them more vulnerable[3].

It is evident that the population of persons with disabilities is becoming increasingly dominant. As the world modernizes and technological advances continue, significant opportunities to promote inclusion are emerging. Among these advances, assistive technologies (ATs) stand out as devices that are adapted, modified, and designed to either maintain or restore the functional abilities of persons with disabilities and the elderly[4]. Furthermore, they contribute to the reduction of social barriers, characterized as attitudinal, communicative, architectural and financial, in addition to the strengthening of autonomy, with a direct impact on the improvement of quality of life[5].

ATs cover different thematic areas and can be developed in different ways. They are not limited to adaptation to the social environment, but also play a crucial role in promoting the health of PwD. They have the potential to empower this population and improve their quality of life by supporting preventive measures and filling potential gaps in the health care system. Health promotion should be accessible to all, and the International Convention on the Rights of Persons with Disabilities guarantees the right of access to health services for this clientele as a matter of priority[6].

The development of health promotion competencies is an integral part of nursing education. The process of acquiring these competencies during training assigns a crucial role to nursing, especially in the task of promoting and applying them to various important health-related issues. Prior studies show that nursing actions promote user autonomy and facilitate access to information. However, it is essential to ask how their actions can affect the health of the population. In addition, they should act in accordance with the

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national health promotion policy, focusing on health promotion interventions that address the needs of the population and the social determinants of health[5,7].

Thus, the construction of nursing care should be based on evidence-based practices. Therefore, the need for a literature review on ATs for people with disabilities that promote health promotion initiatives in the field of nursing is justified, with the aim of assisting nurses in direct care and researchers in the development of future scientific evidence, especially considering the increasing number of this population.

The decision to compare with the reality in Portugal arises from the collaboration between Brazil and Portugal in research, especially in the field of nursing. Recently, one of the authors of this research had the opportunity to participate in a project on the development of ATs through academic mobility, immersing in the Portuguese academic and practical reality. This context inspired the comparison between the two countries.

Furthermore, it is worth mentioning that Portugal has the specialization of Nursing Rehabilitation, which aroused the curiosity to explore the research conducted in this context and to understand the contributions to the health promotion of PwD in the Portuguese population. It is emphasized that in Portugal, indicators reveal significant challenges related to prejudice and discrimination faced by PwD. This aspect reinforces the need for changes to promote inclusion in the context of fundamental rights, especially in the field of health care[3].

The study aimed to analyze assistive technologies developed in the field of nursing in Brazil and Portugal, assessing differences and contributions to the health promotion of PwD.

METHODS

An integrative literature review was conducted in six stages: (1) identification of the topic and formulation of the guiding question; (2) literature search or sampling; (3) data collection; (4) critical analysis of the included evidence; (5) discussion of the results; and (6) presentation of the integrative review with scientific evidence[8].

The PICO strategy, which stands for population, intervention, comparison, and outcome, was used to formulate the guiding question. The components were as follows: P: people with disabilities; I: development of assistive technologies in the field of nursing; C: comparison between Brazil and Portugal; and O: contributions to health promotion in different clinical nursing settings. Therefore, the formulated question was “What are the assistive technologies developed in the field of nursing in Brazil and Portugal, and how do they contribute to the health promotion of people with disabilities”?

Inclusion criteria for the study were original articles, theses, dissertations or bachelor's theses in the field of nursing, carried out in Brazil and/or Portugal, fully available in

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Portuguese, English or Spanish, and published since 2004. The choice of 2004 as the baseline year was based on the creation of the Social Technologies Network (STN). We excluded integrative or systematic reviews, experience reports, case reports, editorials, and studies not related to the development or use of ATs.

Article searches and analyses were conducted between November 2020 and June 2021, using six electronic data platforms to obtain evidence. These platforms included the Latin American and Caribbean Literature on Health Sciences (Lilacs), the Scientific Electronic Library Online (SciELO), the specialized databases Medical Literature Analysis and Retrieval System Online (Medline®) and the Cumulative Index to Nursing and Allied Health Literature (Cinahl), the Scopus database, and the Open Access Scientific Repositories of Portugal (RCAAP). The last-mentioned database was used specifically for the purpose of comparing Brazil and Portugal.

Articles were located through indexing using Health Sciences Descriptors (DeCS) in Portuguese, including "*pessoas com deficiência*" (people with disabilities), "equipamentos de autoajuda" (self-help devices), "*tecnologia*" (technology), "*promoção da saúde*" (health promotion), "*Brasil*" (Brazil), and "Portugal". The corresponding terms in Spanish were also employed, including "*personas con discapacidad*", "*dispositivos de autoayuda*", "*tecnología*", and "*promoción de la salud*". Additionally, synonymous terms extracted from Medical Subject Headings (MeSH) were used, including "disabled persons", "self-help devices", "technology", and "health promotion".

The search strategy involved the intersection of descriptors from each component of the PICO acronym, combining them with the Boolean OR connector, and then combining each component with the AND connector, as required for logical additive and restrictive associations, respectively. The search was performed both collectively and individually to identify and correct potential discrepancies (Chart 1).

Chart 1 - Operationalization of database searches. Redenção, CE, Brazil, 2022.

Databases	Search query	Outcomes
Lilacs	*("Pessoas com Deficiência" OR "Disabled Persons" OR "Personas con Discapacidad") AND ("Equipamentos de Autoajuda" OR "Self-Help Devices" OR "Dispositivos de Autoayuda") AND (Tecnologia OR Technology OR Tecnología) AND ((Brasil OR Brazil OR Portugal) AND ("Promoção da*	273

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	Saúde" OR "Health Promotion" OR "Promoción de la Salud")	
SciELO	*("Pessoas com Deficiência" OR "Disabled Persons" OR "Personas con Discapacidad") AND ("Equipamentos de Autoajuda" OR "Self-Help Devices" OR "Dispositivos de Autoayuda") AND (Tecnologia OR Technology OR Tecnología) AND ((Brasil OR Brazil OR Portugal) AND ("Promoção da Saúde" OR "Health Promotion" OR "Promoción de la Salud")*	83
Medline®/ PubMed	*("Disabled Persons") AND ("Self-Help Devices") AND (Technology) AND (Brazil OR Portugal) AND ("Health Promotion")*	2379
Cinahl	*("Disabled Persons") AND ("Self-Help Devices") AND (Technology) AND (Brazil OR Portugal) AND ("Health Promotion")*	799
Scopus	*("Disabled Persons") AND ("Self-Help Devices") AND (Technology) AND (Brazil OR Portugal) AND ("Health Promotion")*	2589
Total		6.125

Source: The authors.

The strategy was similar for all databases, except for the Portuguese database, which required a differentiated intersection due to limitations in the number of descriptors allowed in the search box. In addition, it was necessary to use the "full text" and "subject" filters.

For the exclusion of titles and abstracts, two reviewers used the Rayyan platform (https://www.rayyan.ai/), which ensured a blinded peer selection process. This approach ensured impartiality in the evaluation between reviewers, with article elimination performed independently and simultaneously. After selection based on titles and abstracts, studies were imported into the freely available Mendeley software (https://www.mendeley.com/), which facilitated organization and duplicate checking.

After data extraction, using the Ursi instrument for comprehensive reading of the results, a synthesized table was created to present the essential variables. In order to assess the methodological quality, bias control tools were used based on the research approach. It is important to note that there was no disagreement among the reviewers.

The screening and confirmation process for the integrative review was based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, as shown in Figure 1.

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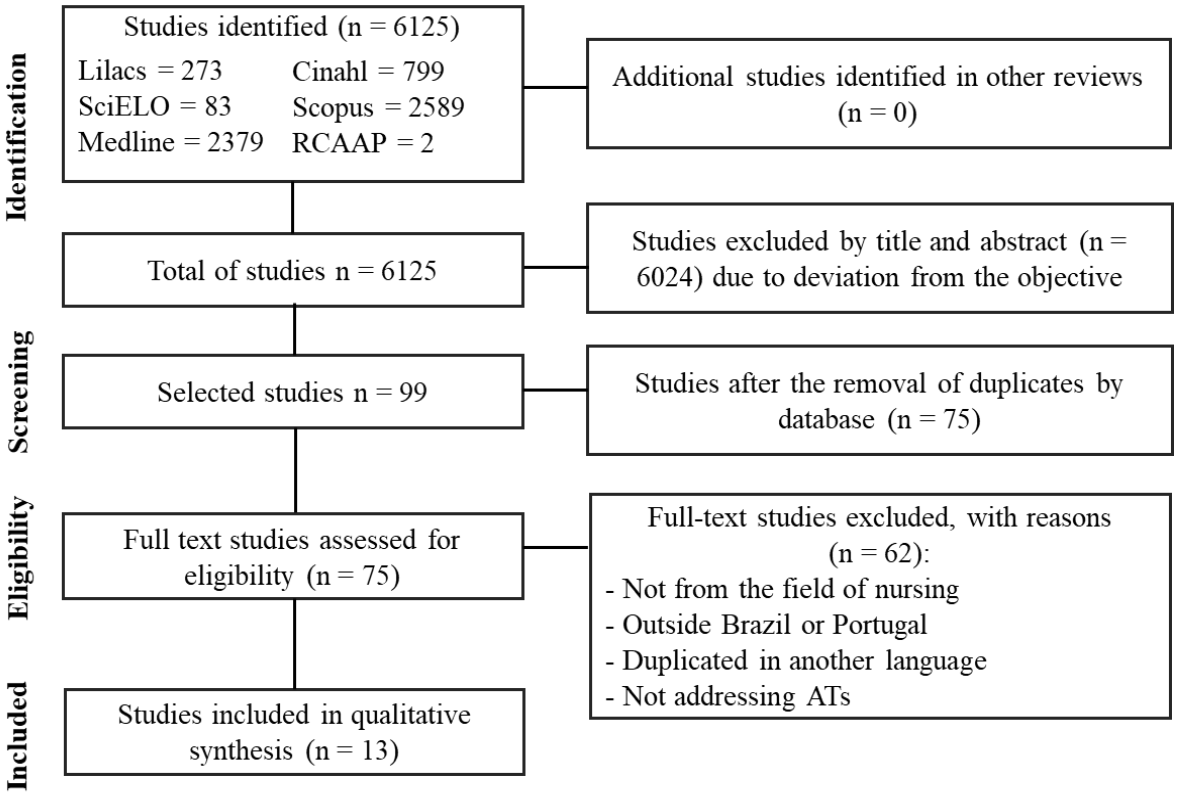
Figure 1 - Flowchart of the search process based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Redenção, CE, Brazil, 2022.



Source: The Authors.

A total of 6,125 references were found. After removing duplicates within and across databases, 75 articles remained for full-text reading. After applying the inclusion and exclusion criteria, we arrived at a final sample of 13 articles.

RESULTS

Of the 13 articles included in this review, eight were retrieved from Lilacs, three from SciELO, and two from Scopus. In terms of technologies, educational assistive technologies related to health were identified. Among them, five were developed in the form of audio and speech synthesizers, three used tactile prosthetics, two were online courses, one was an educational video, one was a tactile game, and another was an educational manual in Braille.

Chart 2 presents the information extracted from the studies regarding the country in which they were conducted, the language of publication, the technology developed, the objective of the work, and its impact on the promotion of health for PwD.

Chart 2 - Synthesis of studies. Redenção, CE, Brazil, 2022.

Reference	Country	Technology	Objective	Impact on health

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	and language			promotion
Barbosa et al.[9]	Brazil, English	Workshop with tactile prosthesis of male genitalia	To develop/evaluate a workshop with male genitalia for the use of male condoms by blind men	Promoted health education impacting knowledge about STIs, male anatomy and proper use of the male condom
Cavalcante et al.[10]	Brazil, English	Workshop with tactile prosthesis of female genitalia	To develop a workshop with tactile female genitalia for blind women to learn how to use female condoms, as a way of preventing STIs	Promoted health education on knowledge about STIs, female anatomy and proper use of the female condom
Cavalcante et al.[11]	Brazil, English	Tactile prosthesis	To validate a prosthesis developed for use in health education on the female condom's usage	Encouraged the use of female condoms and promoted knowledge and autonomy about sexual and reproductive health
Oliveira et al.[12]	Brazil, Portuguese	Digital audio in cordel literature	To validate online-accessible audio content in cordel literature about breastfeeding for blind individuals	Encouraged changes in behavior and attitude, acquiring information about breastfeeding
Oliveira[13]	Brazil, Portuguese	Digital audio in cordel literature	To assess cordel literature on breastfeeding for blind individuals	Enhanced awareness of the significance of breastfeeding for infant nutrition and overall health promotion
Oliveira et al.[14]	Portugal, English	Online voice synthesizer	To present the outcomes of the apparent and content validation of audio cordel literature among blind individuals from two distinct contexts, Brazil and Portugal	Enhanced autonomy and knowledge about breastfeeding in both cultural realities
Cezario et	Portugal,	Texts	To describe and assess the	Encouraged

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al.[15]	Portuguese	transformed using online speech synthesis	cross-cultural adaptation of technology for baby feeding care among blind parents in Portugal	independence, autonomy and changes in attitude related to baby feeding care
Cezario e Pagliuca[16]	Brazil, Portuguese	Voice synthesizer	To create and assess an educational text using the Dosvox voice synthesizer, providing information on the dangers of drug use	Improved contemplation and prevention regarding substance abuse and fostered self-reliance on the topic for individuals with visual impairments
Carvalho[17]	Brazil, Portuguese	Online course	To develop and validate an online educational course for visually impaired women on early detection of breast cancer	Enhanced breast health for visually impaired women through the provision of information on the subject
Carvalho et al.[18]	Brazil, English	Online course	To develop an accessible educational course for the blind on HIV prevention and hypertension awareness	Improved knowledge of blind people about arterial hypertension and encouraged adoption of preventive behaviors
Galindo-Neto et al.[19]	Brazil, English	Educational video	To create and validate an instructional video to teach CPR to deaf students	Enhanced understanding of breast health among blind women, providing them with crucial information on the subject
Oliveira et al.[20]	Brazil, English	Educational manual in braille and print	To evaluate the use of an educational manual to teach blind women about the anatomy and physiology of the female reproductive system	Improved knowledge about female anatomy and the physiology of fertilization, adding previous knowledge to that acquired during reading
Mariano et al.[21]	Brazil, English	Tactile educational	To develop and evaluate a blind accessible educational	Encouraged decision making and stimulated

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		game	game about psychoactive drugs	reasoning on the topic, aiming to facilitate learning about psychoactive drug use

STIs: Sexually Transmitted Infections.
Source: The authors.

All the scientific evidence was developed according to the standards of different methodological designs, except for one study that used an exploratory descriptive method. However, no instruments were used to assess the methodological quality of the studies with either methodological or exploratory descriptive designs.

Regarding the types of disability addressed, visual impairment was predominant, with 12 studies focusing on this type, while only one study addressed hearing impairment.

DISCUSSION

In Portugal, one might expect studies focusing on PwD, especially due to the specialization in rehabilitation nursing. However, the scientific evidence was mainly related to the elderly population and respiratory rehabilitation issues. In addition, many of these studies were not directly related to the field of nursing, with most belonging to the field of special education. This resulted in numerous exclusions.

A significant number of studies from other practice areas were identified during the database search. However, the studies included in this review were those published in the field of nursing, both nationally and internationally in the field of health care.

Based on the selected references, notable examples include those that focused on teaching the use of male and female condoms to visually impaired individuals. These studies conducted workshops for the development of tactile prostheses by the users themselves. The materials used for these workshops were tailored to the sensory perception of visually impaired individuals, with timely guidance provided throughout the learning process[9-11].

Many participants acquired knowledge about condom use, although the project was applied to a limited target group. This suggests a need to apply the work in the health care setting to achieve the purpose of health education on the topic, given the positive behavioral outcomes observed.

Speech synthesizers have also been shown to facilitate access to information. For example, one study validated a previously developed Cordel literature suitable for this audience that addressed maternal breastfeeding and its benefits for maternal-infant health[12-13].

The continuity of the project was observed in a study by Oliveira et al.[14], which identified applicability and validity. During this

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research, a cross-cultural adaptation of the instrument was carried out, as challenges were encountered when trying to apply it to visually impaired people in Portugal, due to grammatical and semantic differences between Brazilian and Portuguese Portuguese. This required a revision of the words to make them more suitable for the Portuguese linguistic context. A similar situation was found in prior studies about assistive technologies for blind parents in Portugal in the context of complementary infant feeding[14-15].

Both concluded that technologies developed in different cultural contexts are essential, allowing for evaluation of improvements and expansion of knowledge that can make significant contributions. This underlines the importance of nursing education based on transcultural theory, with the aim of overcoming barriers and providing care in a humane, inclusive and welcoming manner[22].

From the perspective of interculturality, the studies identified involved collaborations between Brazil and Portugal with the aim of adapting previously validated interventions for PwD to the Brazilian context. They aimed to evaluate the effectiveness of these adaptations, identify major discrepancies, and compare the feasibility of their application.

The commitment of nursing to create, disseminate and involve people in health prevention and promotion initiatives was evident, as reflected in other technologies identified, such as online courses on hypertension prevention and resources such as games and educational manuals in Braille/ink for the blind. These technological approaches aim to facilitate the delivery of information, make learning more engaging, and provide quick and efficient access to knowledge[23].

Studies with online access illustrate digital inclusion through the use of accessible programs that ensure rapid access. These tools enable distance learning, user interaction with technology products, and user exploration. As a result, people with disabilities who have digital access can expand their knowledge in various areas of information[18,23].

The use of tactile senses, such as the educational manual on the anatomy and physiology of the female reproductive system and the educational game on drugs, has had a significant impact on the health promotion of blind people by promoting not only information but also their active participation[21]. Because of their playful nature, these activities have motivational potential and are adapted with resources such as Braille, ink, and textures that contribute to empowerment. The literature suggests that such playful resources facilitate learning and encourage interaction between people with visual impairments and those who can see, thereby promoting inclusion[20,24].

Only one study focused on hearing impairment. Galindo Neto and colleagues emphasized the need to educate this population on important topics, such as CPR, in prehospital settings involving laypersons. The validation showed the satisfaction of deaf people in

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accessing the educational content adapted in Brazilian Sign Language (Libras) through videos[19].

The search for the inclusion of PwD in health care processes was identified, reflecting the critical view, interest and commitment of nurses in the scientific development of ATs, with the aim of providing inclusive care to this population. This approach suggests that nurses play a crucial role as educators, operating in different settings and providing opportunities for effective educational strategies.

Regarding the methodological approach of the studies, there was a predominance of methodological studies, many of which involved the development, evaluation, and validation of tools. However, there is a need to apply the validated technology in the health care context through planned interventions based on experimental or quasi-experimental scientific evidence. These research modalities are essential in nursing because they generate evidence that is closer to the reality of clinical practice[25].

Consequently, the levels of evidence could not be assessed due to their methodological nature. In fact, technological research should progress towards interventions that reach a wider audience, which would be beneficial for health promotion in both public and private health services.

This integrative review highlighted the existence of numerous nursing studies focusing on visually impaired people with disabilities. However, it also highlighted the need to address gaps, as there were few findings related to hearing and intellectual impairments. This suggests the importance of conducting studies targeting these populations.

FINAL CONSIDERATIONS

When analyzing the assistive technologies developed in both Brazil and Portugal, one can observe the different approaches that these tools offer, such as health promotion, inclusion, and dissemination of knowledge on relevant topics. From this perspective, the development of assistive technologies reflects principles of inclusion and accessibility in health care, highlighting the role of nurses in creating inclusive care and promoting universal design. Thus, the need for studies that emphasize assistive technologies in health care for the disabled population is evident, as access to services should be equal and equitable, regardless of the type of disability.

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Foment: there is no funding institution

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