Literature Review

TEXTO & CONTEXTO ENFERMAGEM
TEXT & CONTEXT NURSING TEXTO & CONTEXTO ENFERMERÍA

TECHNOLOGIES FOR HEALTH EDUCATION FOR THE DEAF: INTEGRATIVE REVIEW

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ABSTRACT

Objective: investigate the scientific evidence on the technologies that are used for health education for deaf people.
Method: integrative review carried out in October 2017, with the publications of the last 15 years, in the databases MEDLINE/PubMed, CINAHL, LILACS via Biblioteca Virtual em Saúde (BVS), Web of Science and Scopus.
Results: we found 3367 articles, of which 19 were included in the study. The predominant type of technology was video, present in ten studies and computerized technologies, such as *web sites* and online courses, in four studies. The topic most approached by the technologies was cancer, in ten studies and oral health in three. Two articles were methodological, in 17 the application of the technology with deaf occurred and in 16 of these the efficacy and/or viability for health education was proven.
Conclusion: educational technologies are mostly videos that are comprehensible to deaf people and effective for use in health education.

DESCRIPTORS: Health education. Teaching materials. Educational technology. Audiovisual aids. People with hearing impairment.

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TECNOLOGIAS PARA EDUCAÇÃO EM SAÚDE DE SURDOS: REVISÃO INTEGRATIVA

RESUMO

Objetivo: investigar as evidências científicas acerca das tecnologias que são utilizadas para educação em saúde de pessoas surdas.
Método: revisão integrativa realizada em outubro de 2017, com as publicações dos últimos 15 anos, nas bases de dados MEDLINE/PubMed, CINAHL, LILACS via Biblioteca Virtual em Saúde, *Web of Science* e Scopus.
Resultados: foram encontrados 3367 artigos, dos quais 19 foram incluídos no estudo. O tipo de tecnologia predominante foi o vídeo, presente em dez estudos e as tecnologias computadorizadas, como *sites* e cursos *online*, em quatro estudos. O tema mais abordado pelas tecnologias foi o câncer, em dez estudos e a saúde bucal em três. Dois artigos eram metodológicos, em 17 ocorreu a aplicação da tecnologia com surdos e, em 16 desses foi comprovada a eficácia e/ou viabilidade para educação em saúde.
Conclusão: as tecnologias educativas são, em sua maioria, vídeos que se mostram compreensíveis pelas pessoas surdas e eficazes para serem utilizados na educação em saúde.

DESCRITORES: Educação em saúde. Materiais de ensino. Tecnologia educacional. Recursos Audiovisuais. Pessoas com deficiência auditiva.

TECNOLOGÍAS PARA UNA EDUCACIÓN EN SALUD DE SORDOS: REVISIÓN INTEGRADORA

RESUMEN

Objetivo: investigar las evidencias científicas sobre las tecnologías que se utilizan para una educación en salud de personas sordas.
Método: revisión integradora realizada en octubre de 2017, a partir de las publicaciones de los últimos 15 años en las bases de datos MEDLINE/PubMed, CINAHL, LILACS a través de la Biblioteca Virtual en Salud, *Web of Science* y Scopus.
Resultados: se encontraron 3367 artículos, de los cuales 19 han sido incluidos en el estudio. El tipo de tecnologías predominantes han sido el video, que estuvo presente en diez estudios, y las tecnologías computadorizadas, como sitios *web* y cursos *on-line*, en cuatro estudios. Las temáticas más abordadas por las tecnologías fueron el cáncer, en diez estudios, y la salud bucal, en tres estudios. Dos artículos eran metodológicos, en 17 se implementó la tecnología con sordos, y en 16 de estos se pudo comprobar la eficacia y/o viabilidad para la educación en salud.
Conclusión: Las tecnologías educativas son, en su mayoría, videos que las personas sordas pueden comprender y eficaces para utilizarse en la educación en salud.

DESCRIPTORES: Educación en salud. Materiales de enseñanza. Tecnología educacional. Recursos audiovisuales. Personas con deficiencia auditiva.

INTRODUCTION

Hearing impairment is the reduction of sensory efficiency of hearing which, depending on the impairment of perception in decibels (dB) can be classified as mild (26 to 40 dB), moderate (41 to 70 dB), severe (71 to 90 dB) or profound (greater than 91dB). In this context, according to the World Health Organization, hearing impairment is considered incapacitating when it exceeds 40dB (moderate or deep) in the ear of better functionality, so that the individuals affected by this situation are considered deaf.[1]

Data from the World Health Organization show that more than 5% of the world's population (466 million people) have moderate or profound hearing loss, with estimates that by 2050 this number corresponds to 10% of the world's population (900 million people).[1] In Brazil, according to the 2010 census, there are 9.7 million people with hearing impairment, of whom approximately 2.1 million have severe or profound hearing loss.[2]

People with disabilities (PWD), including the deaf, are considered vulnerable due to the social exclusion they are exposed to.[3] Such exclusion contemplates loss in access to health services and a shortage of trained professionals to establish effective communication with these clients.[4]

From the perspective of health care, the communication barrier between professionals and the deaf presents a challenge for the implementation of guidelines and educational interventions. The health education actions are relevant and necessary to corroborate the population's contribution to prevention, treatment, recovery and rehabilitation, since they aim to inform, capacitate and enable critical reflection on the causes and problems, as well as the actions necessary for their resolution.[5]

In this context, the use of technological resources can contribute to fostering communication with the deaf and, therefore, to the best effectiveness of educational interventions with this public. Such use is supported once the application of scientific knowledge to solve practical problems, from the creation and technological use, has been increasingly required in health communication, because it favors empowerment, insofar as it helps or replaces didactic approaches in the teaching and learning process.[6–7]

Although the technological use is pertinent to address the problem of communication in health, it is observed in the literature, a shortage of studies that scientifically disseminate technological resources for health education for the deaf and/or that support their use from scientific evidence.[8–9]

It is therefore important that the results of the existing studies on health education technologies for deaf people be synthesized to present the scientific evolution of the subject, contribute to the dissemination of the existing technological options and point out the gaps that could support the achievement of future studies.

Thus, the present study aimed to investigate the scientific evidence on existing technologies that are used for health education for deaf people.

METHOD

It is an integrative review, operationalized in the following stages: establishment of the research question; establishment of the criteria for inclusion and exclusion of studies; definition of the information to be extracted from the selected studies and characterization; evaluation of included studies; interpretation of results; presentation of knowledge review/synthesis.[10]

The search occurred in the databases MEDLINE via PubMed, CINAHL (Cumulative Index of Nursing and Allied Health Literatura*)*, LILACS (Literatura Latino-Americana e do Caribe em Ciências da Saúde) via Biblioteca Vertical em Saúde (BVS), *Web* of Science and Scopus, in October of 2017 and was operated by two researchers who standardized the steps for its accomplishment and executed them separately, with later comparison of the results found.

The research question was: what technologies exist and/or are used for health education for deaf people? This question was built from the acronym PICO and the search strategy also corroborated this acronym (Figure 1).[11]

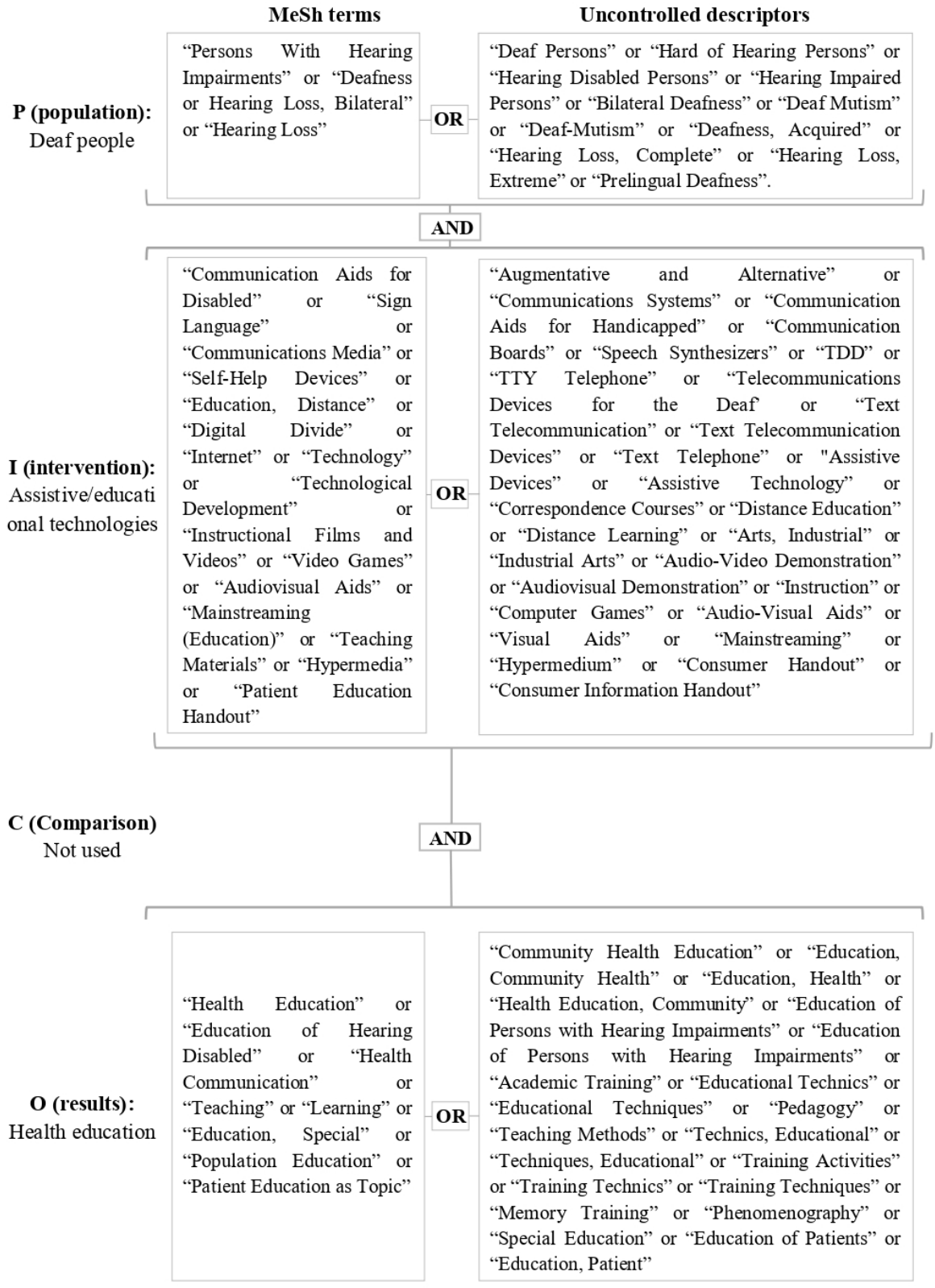

Figure 1 – Search strategy used in integrative review. Fortaleza, CE, Brazil, 2018

3367 articles were found for review: 71 in LILACS, 201 in CINAHL, 306 in Web of Science, 1260 in Scopus and 1529 in MEDLINE. The inclusion criteria were: if it is a research related to the technology constructed and/or used for health education of deaf people, be available in English, Spanish or Portuguese and published in the last 15 years. As exclusion criteria were established: be a dissertation, thesis, editorial, case report, literature review or if repeated in another researched database. It should be noted that repeated articles were counted for analysis once only. The sample selection is shown in Figure 2.

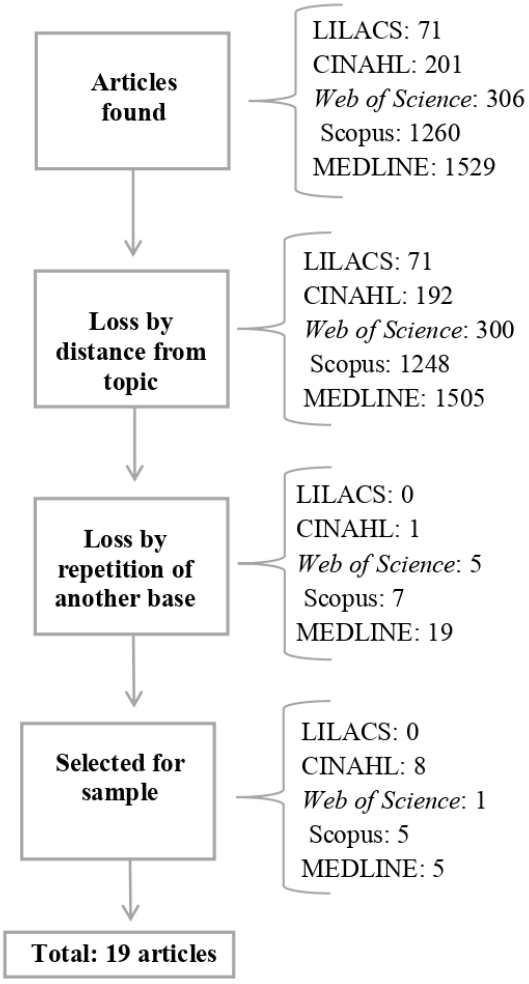

Figure 2 – Selection of the articles of the integrative review. Fortaleza, CE, Brazil, 2018

It was constructed and used instrument that approached information about the year and period in which the article was published; population investigated, type and place of study; objectives and results. In addition to this information, information was also extracted from the articles regarding the type of technology that was the subject of research/study.

In addition, the level of evidence was characterized, according to the method of the studies, in six levels: level 1 for meta-analyzes of controlled and randomized studies, level 2 for experimental studies, level 3 for quasi-experimental, level 4 for descriptive/non-experimental or qualitative criteria, level 5 for case and experience reports, level 6 for consensus and expert opinions.[12]

RESULTS

The years in which publications occurred most were in 2012 and 2013 (four in each year) and there were predominant publications in the English language (17), followed by the Portuguese language (two publications). In relation to the means of scientific dissemination, eight articles were published in specific Oncology journals, four in Nursing periodicals, two in psychology journals and two in Public Health journals. In addition, periodicals of Education of deaf, of medicine and of Technology / informatics had a publication each.

Of the countries surveyed, 12 studies were conducted in the United States, two in Thailand, two in Brazil, one in Taiwan, one in Iran and one in Romania.

Regarding the topics that were discussed in the technologies for health education for the deaf, it was observed that the cancer was considered in ten studies, oral health in three, sexuality in two and depression, healthy eating and uncertainty were in a study each. In addition, the topics asthma, lead poisoning and chemical accident in the laboratory were addressed in a single study, concomitantly. The populations participating in the research were composed of deaf people in general in seven studies; deaf women in five; deaf children in three; deaf men and sign language professionals in one study each and two articles had no participants because they were scientific reports of methodological studies.

As for the study design, in addition to the two methodologies mentioned above, one was cross-sectional, one was evaluative, four quasi-experimental, and 11 were randomized trials. Thus, 11 studies (randomized trials) had level of evidence 2, four (quasi-experimental) had evidence level 3, two (cross-sectional and evaluative) had level 4 and for two (methodological) studies the classification at the level of evidence did not apply. It is noteworthy that in 17 studies the application of technology with deaf people occurred and in 16 of these, efficacy and/or viability for health education was proven. Regarding the type of technological resource, the use of video prevailed in ten studies. Computer technologies, such as websites and online course, have been found in four articles. Printed materials in two and virtual avatar, application and film in a study each.

The synthesis of the articles, regarding the year, country, theme, educational technology, results/conclusion, is presented in Table 1.

Table 1 – Summary of the articles of the integrative review according to the year, country, type of technology, theme, results and conclusion. Fortaleza, CE, Brazil, 2018. (n=19)

Year Country	Educational technology Theme	Results/Conclusion
2017 Iran[13]	Application Oral Health	Effective application for teaching.
2016 Brazil[14]	Online course Sexual health	Course adapted to accessibility standards.
2015 Romania[15]	Avatar Oral Health	Animated Avatar is more complex, more time-consuming and costly construction, lower quality, compared to the human avatar.
2015 United States[16]	web sites Skin cancer	Web sites insufficient usability by deaf people with less schooling.
2014 Taiwan[17]	Flyer Uncertainty of deafness	Experimental group there was a reduction of uncertainty.
2013 Thailand[18]	Computer Healthy eating	Greater knowledge in the post-test.
2013 United States[19]	Video Testicular cancer	Increase in the knowledge of deaf men and listeners.

Table 1 – Cont.

Year Country	Educational technology Theme	Results/Conclusion
2013 United States[20]	Video Ovary cancer	Improvement in the knowledge of deaf and hearing after video.
2013 United States[21]	Video Breast cancer	Increased knowledge after two months.
2012 Thailand[22]	Video and book Oral Health	Improvement in oral health in both groups.
2012 United States[23]	Video Skin cancer	Experimental group obtained greater knowledge.
2012 United States[24]	Video Cervical cancer	Video increased awareness of deaf and hearing women.
2012 United States[25]	Video Cancer Prevention	Knowledge improved in the post-test, but no difference between groups.
2010 United States[26]	Video Colorectal cancer	Experimental group gained more knowledge.
2010 United States[27]	Video Cervical cancer	Knowledge was greater after video.
2009 United States[28]	Telehealth Depression	Knowledge increased after telehealth.
2009 United States[29]	Video Cervical Cancer	There was greater knowledge in the intervention group.
2009 United States[30]	Films Asthma, chemical poisoning and chemical accident	The themes and contents were understood by the deaf.
2003 Brazil[31]	Book Sexual health	There was apprehension of the knowledge in the post-test.

DISCUSSION

Communication gaps of the majority of health professionals with the deaf corroborate the limited knowledge of this community about the health-disease process. This fact brings diverse repercussions for the quality of life of this population, as lack of autonomy for the self care and dependence of listeners, relatives, friends and sign interpreters.[32]

Interventions to improve health communication for the deaf should be valued in order to direct activities that contribute to their access to health information and conversations that include visual learning skills and access assisted by interpreters.[33]

To build educational technologies, health professionals and researchers should consider incorporating best practices that take into account the low level of health literacy and the communication skills of deaf people.[34] This consideration is due to the fact that, even with a high educational level, there is low literacy in health for deaf people, which corroborates the relevance of the adequacy of educational and informational materials in this area.[35]

The analysis of articles evidences a lack of technologies for health education for the deaf, since only 19 technologies were found, whose themes of the majority (ten) were cancer.

The approach to cancer in technology is relevant to its high incidence rates with growth directly proportional to aging and population growth: according to Global *Burden of Disease* Cancer Collaboration, in 2015, 17.5 million people were affected by cancer, there were 8.7 million deaths and, between 2005 and 2015, their incidence increased by 33%.[36] Given its magnitude and impact,

it is pertinent that the issue be addressed with as many people as possible, among them the deaf. However, considering that the scientific research strands should be in line with social demands,[37] it is pertinent to highlight the need and importance of building, disseminating, conducting research and using technologies that address the multiplicity of aspects and specialties in health.

The predominance of cancer technologies justifies the fact that most publications have occurred in specific oncology journals. Despite the existence of timid production published in nursing, psychology, medicine and public health journals, it is pertinent that greater investments be made in the various journal specialties of the categories that make up the multiprofessional health team, so that its researchers carry out studies and disseminate them, on educational technologies aimed at the deaf.

In order for the technological options to be adapted for the deaf, it is necessary to allow the use of communication comprehensible to this population, such as sign language, images and/or subtitles with short sentences. The features that commonly allow such adaptations are multimedia, computer programs (softwares) or educational videos that can make learning more attractive and enjoyable.[9]

It was verified that educational video was the type of educational technology most used in health education of the deaf population. Moreover, 17 articles dealt with scientific investigations about the application of the video, that could verify the effectiveness and viability of its use. The results presented by this resource showed significant improvements in learning and point to the effectiveness of this technological option. Such effectiveness is confirmed by a study conducted in the United States whose results show that the use of bilingual video (with English subtitles and sign language) resulted in a statistically significant improvement in the learning of the deaf with low schooling.[8]

The videos allow the visualization of phenomena through various techniques, such as demonstrations, simulations and models, which aid in the understanding of concepts through mental images or visual association, which are more realistic and interesting than the verbal description. In particular, videos for educational purposes promote the quality of teaching and learning, increase the willingness to learn, memorize and conduct specific teaching skills.[13]

For the deaf, accessible videos are appealing to education because they allow the use of a number of simultaneous and playful resources that stimulate learning and enable the use of sign language.[38] In addition, the use of videos in health education activities contributes to the assistance and communication of the information of the non-proficient professional in sign language and to the dissemination of information in mass and in places where professionals do not arrive/are not present.

Another finding to highlight was the successful use of printed materials for health education of the deaf, reported in two studies that integrated the sample of the present review. In this context, it should be noted that, for deaf people, learning based on visual resources and signaling the text in sign language assists in the construction of meaning. Thus, the use of various appropriate technologies can create situations that allow meaningful learning.[39] In this way, printed materials can be used as teaching-learning resources. However, deaf educators emphasize the use of simple concepts and short phrases in order to facilitate the understanding of learners.[9]

The majority of listeners believe that the deaf person has only a hearing impairment, which does not prevent him from seeing and understanding written texts. This assumption does not work because, despite visualizing the content of the text, many can not understand the information due to the language barrier that the deaf have in relation to the spoken/written language. Some deaf people report that even if they are proficient in the written language, depending on the size of the text, they may find it difficult to read and interpret the information, without taking into account those who do not have the knowledge of this second language (written).[40] Thus, it should be emphasized that written texts should be used with caution in educational technologies and activities in which the health promotion of deaf people is sought.

Materials developed for educational purposes must obey the simple language, with lower level of reading, which allows to transmit accurate information. In this sense, illustrations in printed technologies can help with these requirements, since they make communication clearer and elucidate the written text. This fact can be observed in a study carried out in South Africa, with 23 deaf people and ten health professionals, with the objective of defining effective techniques to provide comprehensible information for the deaf, whose results point to the effectiveness of the use of sign language and illustrations associated with simple texts.[41]

In addition to videos and printed technologies, another resource option found in the studies, which was used for health education for the deaf, was computer mediated, such as telehealth, websites and online courses. These options use distance education as a teaching method and are effective in promoting learning with the active involvement of students through an interactive scenario, with the possibility of associating previously acquired knowledge with new information.[42]

Computer-mediated technologies that target distance education present the challenge of designing content that remains attractive to students. In this way, they allow the use of several pedagogical resources simultaneously, like videos, images, texts, animations, dramatizations. These advantages are corroborated by results of a study carried out in Iran, with 82 deaf teenagers, which identified that the use of information technology can statistically improve the learning achievement of deaf students.[13]

Thus, the process of training, guidance and information is a right of deaf people and presents itself as a challenging demand for professionals who work with health education. In order to cope with this problem, the studies indicate that the use of printed, computer-mediated or video technologies contributes to the effectiveness of health education with deaf people, as long as they are adapted to the communication and understanding of this community.

The findings of the present review point to the scientific evidence on the technologies for health education of deaf people, as well as the topics of which these technologies are treated and the institutions responsible for research. In this way, it is possible to identify that the studies indicate, in most cases, the effectiveness of some modalities of technologies, such as educational videos, which support future research to use this type of technological resource for health education for the deaf.

Moreover, it is observed that many health topics do not yet have available technologies in sign language and that these technologies are concentrated in few countries. It is therefore relevant that future research addresses the shortcomings noted and that the institutions responsible for studies can engage in international partnerships for the accomplishment of multicentric studies and contribution of the state of the art on the subject.

It is a limitation that the search occurred with the descriptors in the English language, so that articles without the availability in that language and that would be eligible to integrate the study sample may not have been found. However, it is pointed out that English is the standard language of the scientific environment, so that journals, in order to deal with widespread dissemination, tend to make their articles available in that language.

CONCLUSION

Scientific evidence indicates that, from the technologies used in health education for deaf people, there was a predominance of educational videos, followed by printed materials and computer mediated technologies. In addition, the theme that was addressed in more studies was cancer, followed by sexual and oral health. The studies showed that the contents and information of the technologies were understood by the deaf and that it was effective in its use for health education.

It is suggested that future research addresses the construction of technologies on various health topics and specialties, comparing the use of more than one technological resource option and

carrying out longitudinal prospective research, so that the effects of technologies used for health education of deaf people in the long term are evaluated. In addition, researchers in the field should explore the side effects to the knowledge of these educational resources, since the publications predominantly evaluated the knowledge, but did not contemplate the verification of the change in the behavior, attitude and practice.

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NOTES

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