

TELEHEALTH USE IN SPEECH, LANGUAGE AND HEARING PATHOLOGY IN BRAZIL: SYSTEMATIC REVIEW

Telessaúde em Fonoaudiologia no Brasil: revisão sistemática

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ABSTRACT

The Speech, Language and Hearing Pathology, like other professions, absorbed the applications of telehealth. The other remote services are already provided by the Speech, Language and Hearing Pathology. Nevertheless, Telehealth in Speech, Language and Hearing Pathology in the country still needs further scientific development and a broader access to the population. This systematic review aimed to analyze the studies on Telehealth in Speech, Language and Hearing Pathology in Brazil in the last ten years considering the following categories: level of scientific evidence described by the American Speech and Hearing Association in 2005; area of speech therapy involved; branch of telehealth and institution of origin. As for the categories, this review identified 26 eligible publications, especially clinical studies (level 4, according to ASHA criteria); the areas covered were distributed in audiology (50%), educational speech associated with audiology (15%), language (12%), educational speech associated with language (8%) and the remaining distributed with less than 5% each. With regard to the field of telemedicine, the practice of teleducation exceeded the teleservice. The included studies are from higher education institutions of the State of São Paulo, and 92.3% coming from the heartland of the state. A systematic review concluded that the Telehealth in Speech, Language and Hearing Pathology is expanding in Brazil, which should expand the supply of therapy services and scientific growth in the area.

KEYWORDS: Speech, Language and Hearing Sciences; Telemedicine; Review

■ INTRODUCTION

Currently, the human being is permeated by the use of technology. The access to information and communication at distance is now a reality, even in developing countries. According to the Brazilian Institute of Geography and Statistics (IBGE), half of Brazilians had Internet access in 2013¹. According to eMarketer, Brazil should become, in 2014, the fourth country with the largest population of Internet users in the World².

However, the same cannot be said about access to services in health care. The distribution of professionals among Brazilian regions is still uneven

and the inland access of services is considered a challenge.

Specifically in Speech, Language and Hearing Pathology the access, also demonstrate scarce. Data from the Federal Board of Speech, Language and Hearing Pathology (CFFa) 2014 reveal that Brazil has 37,574 speech, language and hearing pathologists. Most of these professionals are located in the Southeast and South. In the Northeast, for example, there are 6101 professionals, which corresponds approximately to half the amount in the state of São Paulo, which concentrates 11,505 professionals. In the North, the discrepancy is even greater. Only 1,660 speech, language and hearing pathologists work in the seven states of the region³.

Considering the size of the country, the Internet access scenario and the heterogeneity in the distribution of professionals, the resoluteness to the demand for speech, language and hearing therapy services can be achieved using Information and Communication Technologies (ICTs). Various

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health services around the world have used ICTs in providing accurate information for diagnosis, prevention, treatment of disease, continuing education, as well as for purposes of research and evaluation, especially where distance is a barrier for professional update⁴.

Thanks to the development of ICTs, a new form of professional practice has been particularly widespread. It is called telehealth, which is defined by the availability of services at a distance through the transfer of information between different locations. With this initiative, several actions can be developed, involving patient care, educational activities and professional training⁵.

Telehealth replaces personal contact between participants and health facilities involved in the care, since that enables the health services at a distance through ICT, allowing to reduce services inequality to approximate the geographic and socioeconomic barriers and generate logistics cost and benefit in health^{6,7,8}.

Thus, telehealth practices in speech, language and hearing therapy are joining and functionally renewing health services. It is imperative that actions be informed ethically and legally so that professionals can act properly. In this condition, the CFFa proposed regulation of Telehealth in Speech, Language and Hearing Pathology through the resolution No. 427 of 1 March 2013⁹. It defined it as "The exercise of the profession through the use of information and communication technologies, with which can provide services in health as teleconsulting, second formative opinion, teleconsultation, telediagnosis, telemonitoring and tele-education aimed at increasing the quality, equity and efficiency of services and professional education provided by these means."

Facing the presented situation, the aim of this study was to perform a systematic literature review on publications on Telehealth in speech, language and hearing pathology in Brazil. The review sought to identify the methodological approach used in publications as levels of scientific evidence established by *American Speech and Hearing Association - ASHA*¹⁰; categorizing the studies according to the area of Speech, Language and Hearing Pathology contemplated and the branch of Telehealth involved; and identify the institution of origin of the work.

METHODS

This is a systematic review of the literature guided by criteria recommended by *Cochrane Handbook*¹¹, namely the formulation of the research question; location and selection of studies; and classification of material evidence levels. The question that supported this systematic review had as a starting point the following guiding question: "What is the current situation of Telehealth in Speech, Language and Hearing Pathology in Brazil?"

Searches in scientific databases LILACS (Latin American and Caribbean Health Sciences) MEDLINE (*Medical Literature Analysis and Retrieval System Online*); Periodicals Portal bases from CAPES and BDTD (Brazilian Digital Library of Theses and Dissertations) were performed.

The search strategy employed advanced search based on keywords in Portuguese indexed in Descriptors of Health Sciences (DeHS). We used the following terms combined to Speech, Language and Hearing Pathology: Telehealth, Teleconsultation and education at distance. Two other terms, also linked with Speech, Language and Hearing Pathology, Teleaudiology and Telepractice were inserted in the survey although not in DeHS. However, they consistently appear in scientific articles.

The selection of studies followed inclusion and exclusion criteria. The criteria adopted comprised subject in attendance / Speech, Language and Hearing Pathology study, Speech, Language and Hearing pathologists and other professionals in Brazil. Studies of specific issues about the use of telehealth tools in speech, language and hearing therapy in Brazil; delimitation of published studies over the period of 2004-2014; publications in Portuguese; and studies published in indexed journals, dissertations and theses according to scientific evidence levels proposed by ASHA¹⁰, shown in Table 1. Were excluded: repeated publication from the surveyed databases and whose goal was not compatible with the subject in question, articles written in other languages and studies of experiences abroad.

The studies were prepared and identified according to the areas of Speech, Language and Hearing Pathology specialties, considering, for the seven existing (Audiology, dysphagia, Educational

Table 1 – Levels of scientific evidence according to the criteria proposed by ASHA ¹⁰

Levels of Evidence	Type of study
1a	Systematic review or high quality meta-analysis of randomized controlled trials
1b	Randomised controlled trials of high quality
2a	Systematic review or high quality meta-analysis of notrandomized controlled trials
2b	Not randomized high quality controlled trials
3a	Systematic review of cohort studies
3b	Individual cohort studies or randomized controlled trials of low quality
4	Clinical outcomes studies
5a	Systematic review of case-control study
5b	Individual case-control study
6	Case series
7	Expert opinion without explicit critical appraisal

Speech, Language, Orofacial Motricity, Collective and Voice Health) and new specialties recognized by CFFa, through Resolution No. 453, of September 26, 2014, which are: Neurofunctional Speech, Labour Speech Therapy, Gerontology and Neuropsychology ¹².

With respect to telehealth, data were classified according to the presentation that organizes this practice in tele-education, Telehealth (Teleconsultation / Epidemiological Surveillance) and Research Multicentric ¹³.

■ LITERATURE REVIEW

Between the years 2004 and 2014 were identified 172 studies, 11 of which in the LILACS database, seven of MedLine, 115 Periodicals Portal bases from CAPES and 39 of BDTD.

Data were organized into charts, presented in sequence. Of the 172 studies obtained in the initial

query, 32 studies were selected after reading the titles, while 140 were excluded, since 91 were not directly related to the theme, 44 were repeated among the surveyed bases and five accounted for experiences outside Brazil. Of the 32 publications elected in this first phase and six publications were disqualified after reading the abstracts for not meeting the inclusion criteria. Thus, 26 works composed this systematic review, as shown in Figure 1.

Regarding the number of scientific publications per year, it was observed that, of the 26 entered, none was identified in 2004, 2005 and 2007, being present in the other years including 2006 and 2008 to 2014. The publications were gathered and listed in Figure 2, for better visualization of the findings.

The analysis of the levels recommended by scientific evidence ASHA ¹⁰ showed a tendency for clinical study results (50%). The distribution of levels of evidence of the included studies can be viewed in

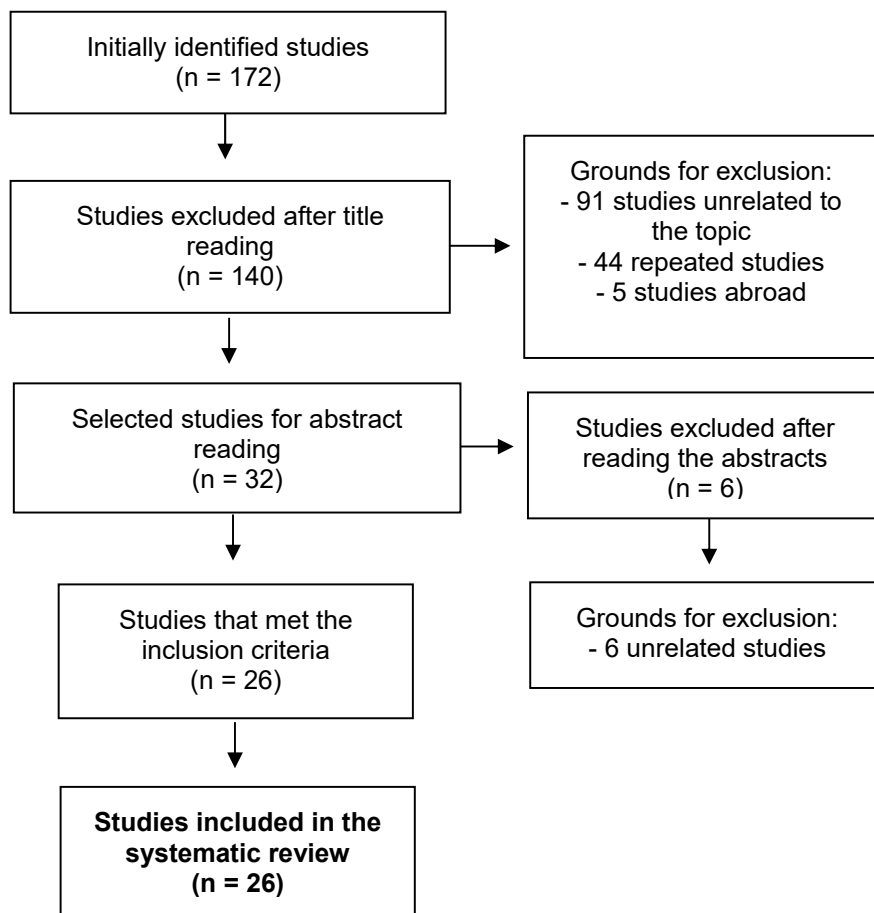


Figure 1 – Selection process of the publications included in the systematic review

Title / author / year	Goals	ASHA (2005)	Speech Area	Branch of Telehealth	Sending institution
1. A multimídia como uma nova proposta de ensino da Audiologia. Blasca e Bevilacqua-2006	Prepare a multimedia teaching materials on the subject Headset mold.	6	Audiology	Tele-education	FOB / USP
2. Educação a distância na capacitação de Agentes Comunitários de Saúde na área de saúde auditiva infantil. Melo (2008)	Evaluate the effectiveness of training community health workers by videoconference.	3b	Audiology / Health Collective	Tele-education	FOB / USP
3. Ensino à Distância: elaboração de um CDROM para a capacitação de professores quanto à Comunicação Humana e seus distúrbios. Oliveira (2009)	Prepare and present and evaluate a CDROM on aspects of development and possible changes of Human Communication.	7	Language	Tele-education	FOB / USP
4. Telefonaudiologia: desenvolvimento e avaliação do CDROM "Procedimentos Terapêuticos no Transtorno Fonológico". Spinardi (2009)	Present a hypermedia materials on the treatment of phonological disorder, and assess their quality in teaching speech therapy.	7	Language	Tele-education	FOB / USP
5. Novas tecnologias educacionais no ensino da Audiologia. Blasca et al. (2010)	Analyze a model of Interactive Tele education for teaching Audiology.	4	Audiology / Speech Therapy Education	Tele-education	FOB / USP
6. Desenvolvimento de material educacional interativo para orientação de professores de ensino fundamental quanto aos Distúrbios da Linguagem Escrita. Gonçalves (2011)	Develop an interactive educational materials for elementary school teachers, on the Learning Disorders.	4	Language / Speech Therapy Education	Tele-education	FOB / USP
7. Internet e educação ao paciente. Bastos e Ferrari (2011)	Present some initiatives in audiology about it.	4	Audiology	Tele-education	FOB / USP
8. Teleducação Interativa no Transtorno Fonológico: desempenho de alunos com e sem utilização de uma mídia eletrônica. Pulga (2011)	Apply and analyze a model of distance education in Child Language area for graduate students in speech therapy three public universities of São Paulo.	1b	Language / Speech Therapy Education	Tele-education	FOB / USP
9. Telessaúde: avaliação de um website como ferramenta de auxílio ao aconselhamento de pais de crianças usuárias de aparelho de amplificação sonora individual. Bastos (2011)	Check aspects of technical quality and content of a website.	4	Audiology	Tele-education	FOB / USP
10. Adaptação à distância de próteses auditivas acústicas: A teleaudiologia aplicada na melhoria da condução das Políticas Públicas no Brasil. Penteado et al. (2012)	To describe a case of adapting to distance held between two cities.	5b	Audiology	Telehealth	FMUSP
11. Curso à distância para professores: Conhecendo os segredos da voz e da expressividade. Santos (2012)	Draw up a distance learning course on vocal health and expressiveness for teachers.	4	Voice / Speech Therapy Education	Tele-education	FOB / USP
12. Jovem doutor: promoção da saúde auditiva e inclusão do deficiente auditivo com malformação de orelha externa e/ou média. Oliveira (2012)	Prepare and analyze an educational program for elementary school students in the Youth Project Doctor.	4	Audiology / Speech Therapy Education	Tele-education	FOB / USP
13. Teleducação interativa na capacitação de profissionais em saúde auditiva. Ascencio (2012)	Develop a training program for Individual Sound Amplification Device (HA).	4	Audiology	Tele-education	FOB / USP
14. Telessaúde: avaliação da eficácia da teleconsulta na programação e adaptação de aparelho de amplificação sonora individual. Campos e Ferrari (2012)	And evaluate the effectiveness of fi teleconsultation for programming, veri fi cation and adaptation of hearing aids.	1b	Audiology	Telehealth	FOB / USP
15. Verificação da prótese auditiva realizada face a face e via teleconsulta: medidas repetidas Ferrari et al. (2012)	Evaluate repeated measures of the external ear resonance response, conducted face to face and via teleconsultation.	2b	Audiology	Telehealth	FOB / USP

Title / author / year	Goals	ASHA (2005)	Speech Area	Branch of Telehealth	Sending institution
16. Aconselhamento informativo para adultos e idosos usuários de aparelho de amplificação sonora individual: avaliação da eficácia de um material online. Jokura (2013)	Prepare and verify the effectiveness of an online multimedia content for informative advice regarding the use and hearing aid care.	4	Audiology	Tele-education	FOB / USP
17. Aplicação de instrumento administrativo para orientação das pesquisas em Telefonaudiologia na Faculdade de Odontologia de Bauru. Zanferrari (2013)	Develop an instrument to guide research in telehealth area at Bauru Dental School.	4	Other	Tele-education	FOB / USP
18. Projeto Jovem Doutor Bauru: capacitação de estudantes do ensino médio em saúde auditiva Blasca et al. (2013)	Develop a training program for high school students on the topic hearing health.	4	Audiology / Speech Therapy Education	Tele-education	FOB / USP
19. Rede de aprendizagem colaborativa de educação em saúde auditiva. Falsetti (2013)	Create a model of education in hearing health through tele-education Interactive.	4	Audiology / Speech Therapy Education	Tele-education	FOB / USP
20. Seleção e adaptação de aparelhos de amplificação sonora individuais via teleconsulta: análise da interação profissional/paciente. Poles-Reginato (2013)	Evaluate the professional communication / Patients and you see the satisfaction in teleconsultation and compare it to the query face to face.	1b	Audiology	Telehealth	FOB / USP
21. Telessaúde: Ambiente Virtual de Aprendizagem em aquisição e desenvolvimento da linguagem infantil. Martins (2013)	Develop and analyze a virtual learning environment to guide pediatricians.	7	Language	Tele-education	FOB / USP
22. Telessaúde em Audiologia: Avaliação da eficácia de uma rede social online como apoio aos pais de crianças com deficiência auditiva. Aiello (2013)	Create online social network "Portal of Babies" for parents and / or caregivers of children with hearing impairment and evaluate their effectiveness.	4	Audiology	Tele-education	FOB / USP
23. Telessaúde: avaliação de websites sobre triagem auditiva neonatal na língua portuguesa. Chaves (2013)	Verifying the quality and content of websites on newborn hearing screening in Portuguese.	7	Audiology	Tele-education	FOB / USP
24. Modelo de educação em saúde auditiva. Blasca et al. (2014)	Present a model of education in hearing health.	N. C.	Audiology	Tele-education	FOB / USP
25. Projeto Jovem Doutor: ações de educação em saúde voltadas à Síndrome da Apnéia e Hipopnéia Obstrutiva do Sono. Corrêa (2014)	Implement a reasoned health education model the dynamics of Young Doctor Project.	5b	Orofacial Motricity / Speech Therapy Education	Tele-education	FOB / USP
26. Teleaudiometria como método de triagem em escolares. Botasso (2014)	Evaluate the accuracy and feasibility of implementing Teleaudiometry in school.	4	Audiology	Telehealth	FMUSP

Figure 2 – Identified characteristics in the reviewed studies

Figure 3. Only one study could not be framed within the criteria set by the ASHA ¹⁰, introduced as “not rated” (NR), which accounted for 4% (Figure 3).

As for identified audiology and speech-language pathology specialties, illustrated in Figure 4, it was found that the audiology area was predominant, since concentrated 13 studies, thus corresponding

to half of the publications (50%), and the language area, with three isolated study, accounted for 11% of the total.

It is worth noting that the Educational Speech was highlighted as playing field of some work, even though the focus of the research was permeated by another specialty. Therefore, it appeared jointly

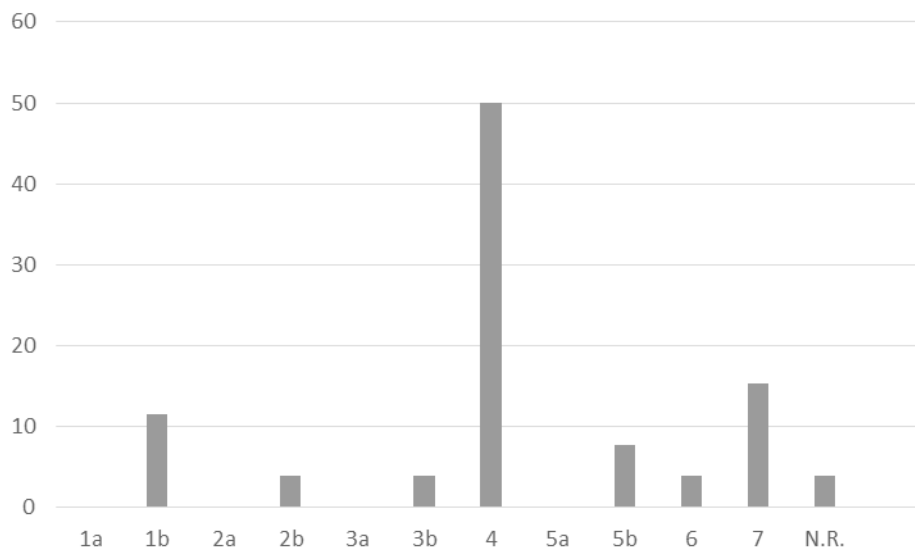


Figure 3 – Characteristics of papers evidence levels according to ASHA ¹⁰

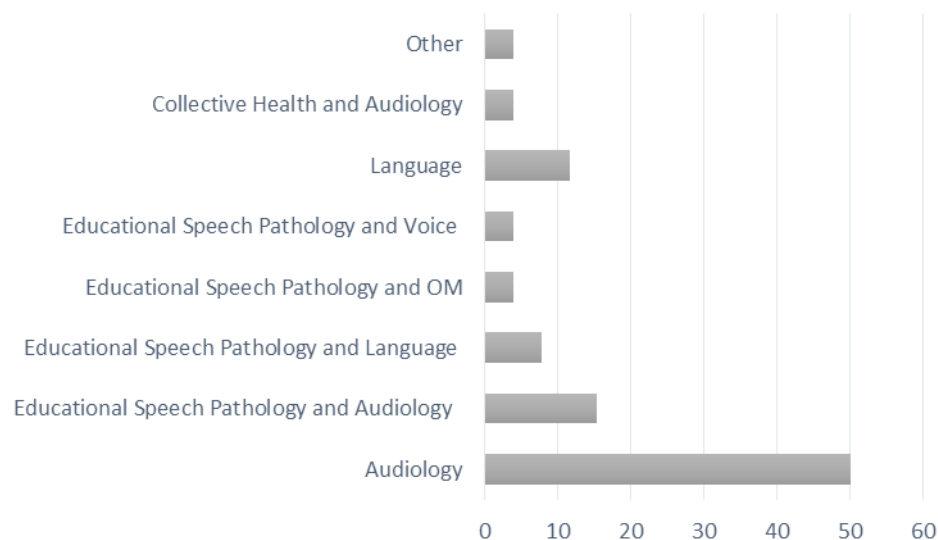


Figure 4 – Studies identified as the areas of speech therapy found: Audiology, Speech Therapy Education, Language, Orofacial Motricity (OM), Public Health and Voice

with those who had direct integration. The combination of Educational Speech and Audiology was the most frequent among those presented, with a percentage of 15%, whereas the aggregate Language, Educational Speech amounted to 8%. This combination also incorporated the areas of Orofacial Motricity (OM) and Voice, accounting for 4% each.

Only one publication did not fit among the specialties offered, because it was aimed at the evaluation of telehealth in general (4%). The Dysphagia area had no specific representation in the studies found, which also occurred with the new specialties recognized by the Federal Council - Neurofunctional Speech, Labour Speech Therapy, Gerontology and Neuropsychology.

By linking the work set to the branch of employee telehealth (Figure 5), there was significant superiority of Tele-education activities (81%), in contrast to the practices of Telehealth (19%). There was no evidence that observing the presence of exposure Multicentric Research as a method in use.

It drew attention to the fact that all classified studies belong to the Southeast of the country, mainly the state of São Paulo. Of all the studies analyzed, 24 were developed in the city of Bauru in Bauru School of Dentistry, University of São Paulo (FOB / USP) and two were developed in the School of Medicine, USP (USP), belonging to the same institution, but within São Paulo campus.

It is known that much information would be lost in systematic reviews were included only studies that necessarily had high levels of evidence. In audiology, for example, there are few studies

that show the design of systematic reviews and randomized controlled trials ¹⁴, recollecting that in this work systematic reviews were not identified, while three studies corresponded to randomized controlled trials (in table 2 articles numbered 8, 14 and 20).

In that same light, researchers conducted a survey aimed at gathering studies of Telehealth in Speech, Language and Hearing Pathology between the years 2005 and 2009. It was performed through the search of themes Education at Distance/ Telehealth and Speech Pathology/Audiology in databases of national and international literature. The discoveries totaled 25 works (23 international and two national), which revealed the predominance of Audiology (34%) over other areas of the profession, followed by language (19%), speech (12%), cleft lip and palate (4%), Individual Sound Amplification Device - HA (4%) and 27% other areas, this research agrees with that the data found in this systematic review of national publications ¹⁵.

Authors advocate low cost as a crucial element of growth and prevalence of Telehealth in Audiology, exemplifying *webcams* and broadband connectivity as effective resources created in this area. It is undeniable that other procedures makes it more robust, varied, as the development of audiological diagnostic equipment, and computerized cochlear implants ¹⁶.

The literature shows that despite recent in Brazil, telehealth, especially in Audiology, managed to beneficial results in the areas of education and assistance. It is believed that the continued use of ICTs will lead to a positive impact on the future of Brazilian Audiology ⁵.

A study in the form of systematic review, comprising 20 publications on Telehealth in Audiology, stressed the predominance of telehealth activities (65%), exceeding the index obtained by the tele-education (35%). Most studies reported therapeutic care practices, as well as adjustment and guidance to patients and users of hearing aids and Cochlear Implant (CI). While divergent in the prevalence of teleassistance and tele-education, this systematic review presents data coincide with the occurrence of telehealth studies in audiology, because of five papers found in this segment (in table 2 the items numbered 10, 13, 14, 20 and 26) They are framed only in the audiology area and not in the other ¹⁷.

Still, this study warned that tele-education has grown together with the development of several distance learning tools for different audiences, which postulates as one of the priority areas for the development of future research, a reality until now apparent in the Southeast of Brazil.

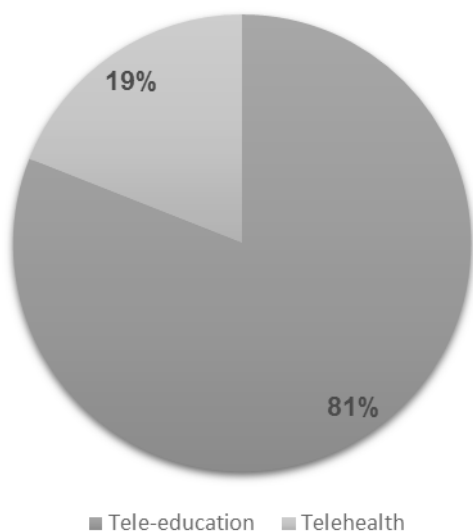


Figure 5 – Studies identified as the branch of Telehealth

In 2009, it was created the line of research "Telehealth in Speech, Language and Hearing Pathology" in the graduate program in Speech, Language and Hearing Pathology, FOB / USP. The idea was to organize work on two major projects: telehealth and tele-education, in which are concentrated most of the studies of the different areas of speech, language and hearing pathology. Over the years, Audiology strongly represented the consolidation of this proposal with recognized work in Brazil and in the World ¹⁸.

This is due to the growth of the Brazilian scientific production, which has been optimized in the last twenty years by graduate policy and a vision that society has come to build on the relationship between science and technology. Outreach activities also benefited by this system with the recent recognition of the integration between educational actions, research and extension ¹⁹.

A good example was the creation of *Cybertutor*, which works as an electronic guardian, in which information is displayed in real time via text, pictures, videos, animations and *links* for websites. Because it is a dynamic and multifaceted feature, *Cybertutor* it makes the tele-education is interactive and dynamic for the population that query. This tool is included in the Youth Doctor Project, within the tele-education that in addition to *Cybertutor*, uses other teaching methods to bring motivation and new knowledge in health, establishing a supply chain knowledge and promoting better health through a sustained and continued action ²⁰.

However, the resources of ICT should not be treated as immediate solutions to the current problems of education. It is essential to know how to use these technologies in order to disseminate the learning of subjects, considering a socio-cultural context and didactic and pedagogical aspects ²¹.

Some authors denote that the expansion of these processes with content relating to health makes people intensely using this tool, providing positive behaviors to health care ²².

In general, the activities of tele-education added to telehealth practices has been configured as important strategies for students, professionals,

patients, families and community. The telehealth programs been affected as alternatives to promote the continuing professional development, in addition to providing educational deficiencies, thus creating a new paradigm in the educational process at a distance ^{23,24}.

The evolution of ICTs has strengthened the structure and accessibility of providing health care, influencing the reduction of inequalities observed in the provision of services. Thus, public policy may be revised in order to ensure equal health for the population ²⁵.

■ CONCLUSION

It is important to note that Telehealth in Speech, Language and Hearing Pathology in Brazil is in expansion, showing that the use of its resources is effective.

Analysis of the data found and the considerations made throughout this systematic review made it possible to infer that most publications did not fit in highly scientific evidence methodologies. It is noteworthy that the number of searches of audiological area was higher than in other specialties of speech, language and hearing pathology. There was also higher recurrence proposals based on Tele-education, approaching closely the activities of the institutions of higher education with studies centered on an institution of the State of São Paulo countryside.

Despite the remarkable growth in recent years, the Telehealth in speech, language and hearing pathology still needs to be expanded in Brazil, which will favor the science and the provision of speech therapy services to populations that still lack such access. Studies carried out in the country are the basis for good telehealth practices in speech, language and hearing pathology and greater progress can be achieved with this practice.

RESUMO

A Fonoaudiologia, a exemplo de outras profissões, absorveu as aplicações da Telessaúde e os serviços prestados à distância já fazem parte do cenário fonoaudiológico. Apesar disso, a Telessaúde em Fonoaudiologia no país ainda necessita de maior aprofundamento científico e de amplo acesso à população. Esta revisão sistemática objetivou analisar os estudos relativos à Telessaúde em Fonoaudiologia no Brasil nos últimos dez anos, categorizando-os segundo os níveis de evidência científica apontados pela *American Speech and Hearing Association - ASHA* (2005), as áreas da Fonoaudiologia contempladas, o ramo da Telessaúde envolvido e a instituição de origem dos estudos. Foram identificadas 26 publicações elegíveis com predominância de estudos clínicos (nível 4) pela análise da ASHA (2005). A área de Audiologia esteve presente em 50% dos estudos avaliados, a área da fonoaudiologia educacional associada com a audiologia em 15%, a área da linguagem em 12%, a área da fonoaudiologia educacional associada com a linguagem em 8% e as demais áreas distribuídas com menos de 5% cada uma. A prática de Teleeducação superou a de Teleassistência entre os ramos da Telessaúde. Os estudos incluídos são provenientes de Instituições de Ensino Superior do Estado de São Paulo, sendo que 92,3% foram realizados no interior. A revisão sistemática permitiu concluir que a Telessaúde em Fonoaudiologia está em plena expansão no Brasil, o que deverá expandir a oferta de serviços fonoaudiológicos e o crescimento científico na área.

DESCRIPTORES: Fonoaudiologia; Telemedicina; Revisão

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