

Critical Review:
Is telepractice an effective model for providing Auditory-Verbal Therapy (AVT) for children with hearing loss?

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This critical review examines the evidence regarding the delivery of AVT services via telepractice for children with hearing loss. Study designs include case control studies, a randomized control trial and case study. Overall, the evidence gathered from this review was positive, however, more research is still needed. Recommendations for future research and clinical practice are provided.

Introduction

Hearing loss is an international health issue which affects nearly 34 million children worldwide (World Health Organization, 2018). Approximately three children per every 1000 are born with a permanent hearing loss. If hearing loss is not identified and treated early, children with severe losses will likely experience delays in both speech and language, subsequently contributing to problems with academic, cognitive and social development (Blaiser, Behl, Callow-Heusser, & White, 2013).

Auditory Verbal Therapy (AVT) is an effective, early intervention approach that teaches listening and spoken language to children with hearing loss, with the goal of allowing them to reach their full hearing potential. AVT is a parent-focused treatment approach that promotes active caregiver participation. AVT, in combination with early hearing loss diagnosis and hearing aid fitting helps to stimulate auditory brain development. Subsequently, children learn to make meaning of what they hear and create the appropriate neural pathways for the development of optimal speech and language (Constantinescu, 2012).

Telepractice is the application of technology that allows clinicians to deliver speech and language pathology services to their clients at a distance. Tele-intervention involves the delivery of treatment specific services via a video conferencing application (Lowman & Kleinert, 2017). AVT intervention services via telepractice can also be referred to as telemedicine or eAVT, however, will be referred to as tele-intervention for the purposes of this review.

With rural areas experiencing shortages in speech-language pathology services, telepractice often acts as an essential service delivery model (Lowman & Kleinert, 2017). Telepractice may improve access to specialized treatment such as AVT for children with

hearing loss living in rural and remote areas, and at risk for further isolation in their communities. (Constantinescu et al., 2014).

Objectives

The primary objective of this paper is to critically evaluate existing literature regarding the effectiveness of providing AVT to children with hearing loss via telepractice. The secondary objective is to provide recommendations for clinical practice and future research.

Methods

Search Strategy

Articles related to the topic of interest were found using the following computerized databases: PubMed, ERIC and SagePub. Keywords used for the database search were as follows: (Auditory Verbal Therapy OR AVT) AND (tele\$).

The search was limited to articles written in English.

Selection Criteria

Studies selected for inclusion in this critical review were required to investigate traditional AVT through the use of telepractice with children under the age of eight.

Data Collection

Results of this literature search yielded the following types of articles that met the aforementioned selection criteria: randomized control trial (1), retrospective case-control study (2), and case-study design (1).

Results

Randomized Control Trial

Randomized control trial designs are appropriate when studying the efficacy of new treatments. Due to the randomization used, these studies typically exclude

population bias. Randomized control trials are often regarded as the “gold standard”, providing a strong level of evidence (Ebbels, 2017).

Blaiser et al. (2013) conducted a randomized control trial to measure the costs and outcomes of tele-intervention with children with hearing loss, compared to traditional in-person intervention. Twenty-seven families enrolled in the Utah School for the Deaf and Blind Parent Infant Program participated in this study. Families were randomly assigned to receive either the tele-intervention or in-person (control) intervention. It was noted that due to state policies, the tele-intervention group received half of their sessions via video conference and the remaining half in-person. The in-person control intervention group received all sessions in-person. Pre- and post-test data were collected regarding child language outcomes using the SKI-HI Language Development Scale. During a six-month period, families were seen for two visits per month. Results indicated that mean scores for receptive and expressive language skills were higher for children in the tele-intervention group, as compared to the control group. Differences in expressive language between the two groups were significantly different, while differences in receptive language were not.

Despite inherent variability in this population, the researchers attempted to control for a variety of factors including age, degree of hearing loss, geographic location, and communication modality. Researchers did not employ statistical analyses to confirm there were no significant differences between groups on the stated matching criteria.

The language measure used in this study demonstrates strong validity and reliability, particularly in respect to inter-rater reliability, test-retest reliability and internal consistency. Although this assessment demonstrates sound psychometric properties, the researchers only used this one measure, reducing the impact of their findings. Although AVT focuses on teaching listening, no measures were used to assess listening outcomes specifically. Furthermore, researchers were not blinded to group allocation which could lend itself to observation bias.

Researchers noted some limitations of the study including reduced intensity and short duration of therapy. Although the sample size was larger than many other tele-intervention studies, larger samples are needed to ensure reliability. Nevertheless, the methods used in this study were clearly outlined, allowing for future replication.

Although the statistical analyses used are appropriate for this study, it would have been strengthened further if the tele-intervention group had received all sessions via video conferencing, to ensure validity. This study provides a highly suggestive level of evidence provided in this study, which offers support for the effectiveness of delivering AVT via telepractice.

Retrospective Case-Control

Case-control designs are appropriate for less common disorder populations. They are typically subject to bias as groups are not representative of the greater population, and subsequently results cannot always be generalized. Overall, case-control studies provide a moderate level of evidence (Ebbels, 2017).

Chen and Liu (2017) conducted a retrospective case-control study to investigate the effectiveness of a telepractice AVT program for Mandarin-speaking children with hearing loss, as compared to traditional in-person intervention. Ten children with hearing loss participated in this study. Five children were assigned to the tele-intervention group, while the remaining five children were assigned to the in-person (control) intervention. Post-intervention data regarding language comprehension and oral expression using the Revised Preschooler Language Assessment (RPLA) were collected two years after enrollment in the program. Results indicated no significant differences in language performance between the tele-intervention and in-person AVT groups.

Despite inherent variability in this population, the researchers attempted to control for a number of variables including pre-amplification extent of hearing loss, chronological age, duration of enrolment in the AVT program, and age when fitted with amplification. Researchers reported no significant differences between the groups on these matching criteria.

Researchers clearly outlined participant eligibility criteria, language assessment procedures and protocols for each intervention type, which allow for future replication. Furthermore, it was noted that all sessions conformed to the recommended principles of AVT, ensuring reliability across sessions and participants.

The language measure used in this study demonstrates strong validity and reliability, with test-retest reliability particularly strong at .96. Although this language assessment demonstrates sound psychometric properties, the researchers could have strengthened the impact of their findings but utilizing other measures, such as an assessment of overall listening ability.

Although statistical analyses are appropriate for this study, no confidence intervals were reported. The study would have been strengthened further if researchers had included pre-intervention language data as a baseline. Without baseline data, it is difficult to assess the direct impact tele-intervention AVT may have had on the participants' language outcomes. Overall, this study provides a suggestive level of evidence, which offers some support for the effectiveness of delivering AVT using telepractice.

Constantinescu et al. (2014) conducted a retrospective case control study to investigate the effectiveness of a telepractice AVT program in promoting the spoken language development of children with hearing loss. Fourteen children with hearing loss participated in this study. Seven children were assigned to the tele-intervention group, while the other seven children were assigned to the traditional, in-person (control) intervention group. Intervention data were collected every six months using formal and informal speech and language assessments. Results regarding auditory comprehension, expressive communication and total language ability using the Preschool Language Scale – 4 (PLS – 4) were also obtained approximately two years post optimal amplification. These results indicated no significant differences between the tele-intervention and in-person AVT groups regarding auditory comprehension, expressive communication or total language.

Despite inherent variability in this population, the researchers attempted to control for a number of factors including age at fitting for optimal amplification, severity of pre-amplification hearing loss, and age at enrollment of AVT. Researchers reported no significant differences between the groups on these matching criteria.

The language measure used in this study demonstrates appropriate reliability and validity, and is widely used across pediatric speech and language programs. Another strength of this study is that researchers assessed the participants' language gains throughout the program, as opposed to only a single time. This reinforces that the growth demonstrated by the participants was consistent and reliable. Researchers could have strengthened the impact of their findings by employing other measures, such as an assessment of listening ability.

Researchers noted some limitations of the study, including the inability to control for environment, noise, and middle ear issues, which may have affected the outcomes of some participants, possibly introducing bias in the data.

Although statistical analyses are appropriate for this study, and protocols for each intervention group were clearly outlined for replication, no confidence intervals were reported. The study would have been strengthened if all the participants in both groups had attended all scheduled sessions. Overall, this study provides a highly suggestive level of evidence, which offers support for the effectiveness of delivering AVT via telepractice.

Case Study

Case study designs are nonexperimental, and typically used when studying a small cohort of individuals. They are often used in directing further research. Case studies are weak in level of evidence due to small sample size and therefore provide limited generalization to larger populations (Ebbels, 2017).

Stith et al. (2012) conducted a case study design to investigate the use of telepractice to serve children with hearing loss. Two children whose families could secure funding for AVT sessions were selected as part of the study. Their session schedules were inconsistent and differed in length. After two months of tele-intervention, the first child began responding to sounds, and his name more often than prior to therapy. He also began inconsistently imitating some sounds. Therapy was discontinued by the parents after two months. The second child was seen for 14 months, and demonstrated an increase in spoken words, and the ability to use complete and complex sentences, ask relevant questions, and follow three to four step directions by listening.

Participant eligibility criteria were not specified. Instead, two families in the region who were able to financially secure services were included in the study, potentially skewing the overall findings by including parent motivation and family socioeconomic status as a variable for success. The participants differed in regards to age, severity and configuration of hearing loss, and age of cochlear implantation.

When assessing speech and language abilities, researchers did not administer any formal measures, or employ statistical analyses. Changes and improvements in abilities were noted only through clinician observation, which demonstrates reduced reliability. The impact of the researchers' findings would have been strengthened if standardized measures with appropriate psychometric properties were employed.

The validity of this study could have been improved with the selection of matched controls. Similarly, reliability could have been improved if language abilities had been observed by multiple, blinded professionals. Overall, this study provides an equivocal

level of evidence, which offers little support for the effectiveness of delivering AVT via telepractice.

Discussion

A commonality among studies looking at the effectiveness of telepractice AVT services involved analyses of cost, as well as caregiver and clinician satisfaction.

Many of the studies explored the perceptions of caregivers regarding the tele-intervention AVT program. Typically, caregivers felt that tele-intervention facilitated family engagement, was helpful in reducing the number of sessions missed due to inclement weather, and did not interfere with their interactions with clinicians. It was noted however, that many parents demonstrated difficulty keeping their children engaged throughout the session (Blaiser et al., 2013; Constantinescu et al., 2014). Overall, researchers found that caregivers reported overall positive feelings toward the tele-intervention AVT programs. These findings were further supported by a survey study that found that parents participating in tele-intervention AVT programs were “very satisfied” with the service and reported they would recommend this service to others (Constantinescu, 2012).

Similarly, clinicians reported feeling more comfortable with coaching, encouraging child-caregiver interactions, and operating the necessary equipment when participating in tele-intervention AVT services. Reduced travel time and avoiding exposure to illness were other benefits noted by clinicians (Blaiser et al., 2013; Chen & Liu, 2017). However, some clinicians expressed reservations regarding the lack of personal contact and naturalistic environments when utilizing tele-intervention (Blaiser et al., 2013). Overall, most clinicians rated their general satisfaction with the tele-intervention AVT programs as high.

Cost effectiveness of the tele-intervention programs was also investigated in some cases. One of the studies found that tele-intervention services have a growing financial advantage as compared to in-person intervention (Blaiser et al., 2013). Another study however, found that costs of improving internet services can often be high (Stith et al., 2012). Ultimately, for tele-intervention to be a cost-effective and worth-while investment, children with hearing loss and their families need to be committed to frequent, long-lasting services (Blaiser et al., 2013).

Conclusion

Overall, the findings from these studies indicate that telepractice may be an effective service delivery model for providing AVT to children with hearing loss. AVT services provided via telepractice are cautiously recommended, as larger studies and stronger evidence is needed. However, these services may be recommended when in-person sessions are not feasible.

Clinical Implications

As technology continues to develop, it will be critical for clinicians to be aware of various telepractice advancements in the area of AVT. Tele-intervention AVT is cautiously recommended. Although the evidence appears promising, and studies may suggest tele-intervention AVT promotes positive language outcomes, larger and more strongly designed studies are required. Clinicians should note that early intervention and parental involvement remain critical to the success of tele-intervention AVT.

References

- Blaiser, K. M., Behl, D., Callow-Heusser, C., & White, K.R. (2013). Measuring costs and outcomes of tele-intervention when serving families of children who are deaf/hard-of-hearing. *International Journal of Telerehabilitation*, 5(2), 3-10.
- Chen, P., & Liu, T. (2017). A pilot study of tele-practice for teaching listening and spoken language to Mandarin-speaking children with congenital hearing loss. *Deafness & Education International*, 19(3-4), 134-143.
- Constantinescu, G. (2012). Satisfaction with telemedicine for teaching listening and spoken language to children with hearing loss. *Journal of Telemedicine and Telecare*, 18, 267-272.
- Constantinescu, G., Waite, M., Dornan, D., Rushbrooke, E., Brown, J., McGovern, J.,... Hill, A. (2014). A pilot study of telepractice delivery for teaching listening and spoken language to children with hearing loss. *Journal of Telemedicine and Telecare*, 20(3), 135-140.
- Ebbels, S. H. (2017): Intervention research: Appraising study designs, interpreting findings and creating research in clinical practice, *International Journal of Speech- Language*

Pathology, 19(3), 218-231. DOI:
10.1080/17549507.2016.1276215

Lowman, J. J., & Kleinert, H. L. (2017). Adoption of telepractice for speech-language services: A statewide perspective. *Rural Special Education Quarterly*, 36(2), 92-100.

Stith, J., Stredler-Brown, A., Greenway, P., & Kahn, G. (2012). TeleCITE: Telehealth – A cochlear implant therapy exchange. *The Volta Review*, 112(3), 393-402.

World Health Organization. (2018). *Deafness and hearing loss*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/deafness-and-hearing-loss>