



The Benefits of Telepractice in Audiology



Audiology Telepractice Services are Feasible and Effective and Yield High Satisfaction, Treatment Adherence, and Follow-up Rates.

Audiology services delivered remotely are feasible and effective for...



Hearing Assessment

- Otoscopy^{1, 2, 3, 4}
- Immittance testing^{3, 5, 6}
- Audiometry^{7, 8, 9, 10, 11}
- Pure-tone screenings^{3, 4, 5, 12}
- Otoacoustic emissions^{4, 5, 9, 13}
- Auditory brainstem response^{13, 14, 15}
- Speech-in-noise testing¹⁶



Treatment and Management

- Hearing aid (HA) fitting^{17, 18, 19, 20}
- HA programming and real-ear measurement^{18, 21, 22, 23}
- Cochlear implant (CI) mapping^{17, 24, 25, 26, 27, 28, 29, 30, 31}
- Aural rehabilitation: Counseling and education^{32, 33, 34}
- Tinnitus treatments^{35, 36, 37}
- Ototoxic monitoring^{38, 39, 40}



Individuals Across the Lifespan

- Newborns¹³
- Infants^{14, 15}
- Children^{3, 4, 5, 12, 24, 27, 28}
- Adults^{7, 18, 22, 23, 24, 25}

People receiving audiology services via telepractice were highly satisfied and likely to follow their treatment plan.



Adherence To Management and Treatment Plans

- **80%–90%**^{19, 23} used their HA(s) daily following remote fitting, with mean daily use times (**11 hours/day**)²² being comparable to the mean daily use times of those who received in-person fittings.
- The use of remote HA fittings required fewer follow-up visits for experienced HA users.⁴¹
- Adherence to ototoxicity monitoring is significantly higher with remote testing protocols (**83.3%**) than with usual in-person protocols (**4.5%**).³⁸



Improved Follow-Up Rates

- Rates of follow-up among children who failed initial hearing screenings were **11%–22%** higher with the implementation of telehealth than with in-person testing.^{14, 42}



Satisfaction With Telepractice Services

- HA fittings provided via telepractice yielded a **91%**¹⁹ satisfaction rate. **Eighty percent** of HA users indicated that remote and in-person follow-up consultations were of similar quality.²³
- Satisfaction rates of **85%–100%**^{25, 29, 43} were reported following remote CI programming, with **56%–100%**^{27, 28, 29, 30, 44} of people saying that they were likely to use it again or recommend it to others.
- **97%–100%** of parents were satisfied with remote delivery of newborn hearing screening and follow-up services, and **90%** of parents reported that it was easier to attend a telepractice appointment than to attend an in-person one.^{14, 15}

Additional telepractice benefits to patients

Improved Access to Care^{10, 42, 45, 46}



Reduced Costs^{26, 44}



Decreased Travel^{24, 44}



Saved Time²⁴



Learn more about telepractice and state-by-state requirements:

<https://www.asha.org/practice-portal/professional-issues/telepractice/>

References

- ¹ Biagio, L., Swanepoel, D. W., Adeyemo, A., Hall, J. W., III, & Vinck, B. (2014). Asynchronous video-otoscopy with a telehealth facilitator. *Telemedicine Journal and e-Health*, 19(4), 252–258. <https://doi.org/10.1089/tmj.2012.0161>
- ² Eikelboom, R. H., Mbaou, M. N., Coates, H. L., Atlas, M. D., & Gallop, M. A. (2005). Validation of tele-otology to diagnose ear disease in children. *International Journal of Pediatric Otorhinolaryngology*, 69(6), 739–744. <https://doi.org/10.1016/j.ijporl.2004.12.008>
- ³ Lancaster, P., Krumm, M., Ribera, J., & Klich, R. (2008). Remote hearing screenings via telehealth in a rural elementary school. *American Journal of Audiology*, 17(2), 114–122. [https://doi.org/10.1044/1059-0889\(2008/07-0008\)](https://doi.org/10.1044/1059-0889(2008/07-0008))
- ⁴ Monica, S. D., Ramkumar, V., Krumm, M., Raman, N., Nagarajan, R., & Venkatesh, L. (2017). School entry level tele-hearing screening in a town in South India—Lessons learnt. *International Journal of Pediatric Otorhinolaryngology*, 92, 130–135. <https://doi.org/10.1016/j.ijporl.2016.11.021>
- ⁵ Ciccio, A. H., Whitford, B., Krumm, M., & McNeal, K. (2011). Improving the access of young urban children to speech, language and hearing screening via telehealth. *Journal of Telemedicine and Telecare*, 17(5), 240–244. <https://doi.org/10.1258/jtt.2011.100810>
- ⁶ Kleindienst, S. J. (2014). *The use of tympanometry in telehealth for the assessment of otitis media in the Alaska native population* [Doctoral dissertation, Gallaudet University].
- ⁷ Givens, G. D., & Elangovan, S. (2003). Internet application to tele-audiology—“Nothin’ but net.” *American Journal of Audiology*, 12(2), 59–65. [https://doi.org/10.1044/1059-0889\(2003/011\)](https://doi.org/10.1044/1059-0889(2003/011))
- ⁸ Choi, J. M., Lee, H. B., Park, C. S., Oh, S. H., & Park, K. S. (2007). PC-based tele-audiometry. *Telemedicine and e-Health*, 13(5), 501–508. <https://doi.org/10.1089/tmj.2007.0085>
- ⁹ Krumm, M., Ribera, J., & Klich, R. (2007). Providing basic hearing tests using remote computing technology. *Journal of Telemedicine and Telecare*, 13(8), 406–410. <https://doi.org/10.1258/135763307783064395>
- ¹⁰ Visagie, A., Swanepoel, D. W., & Eikelboom, R. H. (2015). Accuracy of remote hearing assessment in a rural community. *Telemedicine and e-Health*, 21(11), 930–937. <https://doi.org/10.1089/tmj.2014.0243>
- ¹¹ Swanepoel, D. W., Koekemoer, D., & Clark, J. (2010). Intercontinental hearing assessment—a study in tele-audiology. *Journal of Telemedicine and Telecare*, 16(5), 248–252. <https://doi.org/10.1258/jtt.2010.090906>
- ¹² Botasso, M., Sanches, S. G. G., Bento, R. F., & Samelli, A. G. (2015). Teleaudiometry as a screening method in school children. *Clinics*, 70(4), 283–288. [https://doi.org/10.6061/clinics/2015\(04\)11](https://doi.org/10.6061/clinics/2015(04)11)
- ¹³ Krumm, M., Huffman, T., Dick, K., & Klich, R. (2008). Telemedicine for audiology screening of infants. *Journal of Telemedicine and Telecare*, 14(2), 102–104. <https://doi.org/10.1258/jtt.2007.070612>
- ¹⁴ Dharmar, M., Simon, A., Sadorra, C., Friedland, G., Sherwood, J., Morrow, H., Denies, D., Nickell, D., Lucatorta, D., & Marcin, J. P. (2016). Reducing loss to follow-up with tele-audiology diagnostic evaluations. *Telemedicine and e-Health*, 22(2), 159–164. <https://doi.org/10.1089/tmj.2015.0001>
- ¹⁵ Hatton, J. L., Rowlandson, J., Beers, A., & Small, S. (2019). Telehealth-enabled auditory brainstem response testing for infants living in rural communities: The British Columbia Early Hearing Program experience. *International Journal of Audiology*, 58(7), 381–392. <https://doi.org/10.1080/14992027.2019.1584681>
- ¹⁶ Ribera, J. E. (2005). Interjudge reliability and validation of telehealth applications of the Hearing in Noise Test. *Seminars in Hearing*, 26(1), 13–18. <https://doi.org/10.1055/s-2005-863790>
- ¹⁷ Bush, M. L., Thompson, R., Irungu, C., & Ayugi, J. (2016). The role of telemedicine in auditory rehabilitation: A systematic review. *Otology & Neurotology*, 37(10), 1466–1474. <https://doi.org/10.1097%2FMAO.0000000000001236>
- ¹⁸ Pross, S. E., Bourne, A. L., & Cheung, S. W. (2016). TeleAudiology in the veterans health administration. *Otology & Neurotology*, 37(7), 847–850. <https://doi.org/10.1097/MAO.0000000000001058>
- ¹⁹ Novak, R. E., Cantu, A. G., Zappler, A., Coco, L., Champlin, C. A., & Novak, J. C. (2016). The future of healthcare delivery: IPE/IPP audiology and nursing student/faculty collaboration to deliver hearing aids to vulnerable adults via telehealth. *Journal of Nursing & Interprofessional Leadership in Quality & Safety*, 1(1), 1–11. Retrieved from <https://digitalcommons.library.tmc.edu/uthoustonjqualsef/vol1/iss1/1>
- ²⁰ Campos, P. D., & Ferrari, D. V. (2012). Teleaudiology: Evaluation of teleconsultation efficacy for hearing aid fitting. *Jornal da Sociedade Brasileira de Fonoaudiologia*, 24(4), 301–308. <https://doi.org/10.1590/S2179-64912012000400003>
- ²¹ Ferrari, D. V., & Bernardes-Braga, G. R. A. (2009). Remote probe microphone measurement to verify hearing aid performance. *Journal of Telemedicine and Telecare*, 15(3), 122–124. <https://doi.org/10.1258/jtt.2009.003005>
- ²² Venail, F., Picot, M. C., Marin, G., Falinower, S., Samson, J., Cizeron, G., Balcon, M., Blanc, D., Bricaud, J., Lorenzi, A., Ceccato, J. C., & Puel, J. L. (2021). Speech perception, real-ear measurements and self-perceived hearing impairment after remote and face-to-face programming of hearing aids: A randomized single-blind agreement study. *Journal of Telemedicine and Telecare*, 27(7), 409–423. <https://doi.org/10.1177/1357633X19883543>
- ²³ Tao, K. F. M., Moreira, T. D. C., Jayakody, D. M. P., Swanepoel, D. W., Brennan-Jones, C. G., Coetzee, L., & Eikelboom, R. H. (2021). Teleaudiology hearing aid fitting follow-up consultations for adults: Single blinded crossover randomised control trial and cohort studies. *International Journal of Audiology*, 60(S1), S49–S60. <https://doi.org/10.1080/14992027.2020.1805804>
- ²⁴ Wesarg, T., Wasowski, A., Skarzynski, H., Ramos, A., Gonzalez, J. C. F., Kyriafinis, G., Junge, F., Novakovich, A., Mauch, H., & Laszig, R. (2010). Remote fitting in Nucleus cochlear implant recipients. *Acta Oto-Laryngologica*, 130(12), 1379–1388. <https://doi.org/10.3109/00016489.2010.492480>
- ²⁵ Ramos, A., Rodríguez, C., Martínez-Beneyto, P., Perez, D., Gault, A., Falcon, J. C., & Boyle, P. (2009). Use of telemedicine in the remote programming of cochlear implants. *Acta Oto-Laryngologica*, 129(5), 533–540. <https://doi.org/10.1080/00016480802294369>

References

- ²⁶ Hughes, M. L., Goehring, J. L., Baudhuin, J. L., Diaz, G. R., Sanford, T., Harpster, R., & Valente, D. L. (2012). Use of telehealth for research and clinical measures in cochlear implant recipients: A validation study. *Journal of Speech, Language, and Hearing Research, 55*(4), 1112-1127. [https://doi.org/10.1044/1092-4388\(2011/11-0237\)](https://doi.org/10.1044/1092-4388(2011/11-0237))
- ²⁷ Goehring, J. L., & Hughes, M. L. (2017). Measuring sound-processor threshold levels for pediatric cochlear implant recipients using conditioned play audiometry via telepractice. *Journal of Speech, Language, and Hearing Research, 60*(3), 732-740. https://doi.org/10.1044/2016_JSLHR-H-16-0184
- ²⁸ Hughes, M. L., Goehring, J. L., Sevier, J. D., & Choi, S. (2018). Measuring sound-processor thresholds for pediatric cochlear implant recipients using visual reinforcement audiometry via telepractice. *Journal of Speech, Language, and Hearing Research, 61*(8), 2115-2125. https://doi.org/10.1044/2018_JSLHR-H-17-0458
- ²⁹ Schepers, K., Steinhoff, H. J., Ebenhoch, H., Böck, K., Bauer, K., Rupprecht, L., Moltner, A., Mörettini, S., & Hagen, R. (2019). Remote programming of cochlear implants in users of all ages. *Acta Oto-Laryngologica, 139*(3), 251-257. <https://doi.org/10.1080/00016489.2018.1554264>
- ³⁰ Slager, H. K., Jensen, J., Kozłowski, K., Teagle, H., Park, L. R., Biever, A., & Mears, M. (2019). Remote programming of cochlear implants. *Otology & Neurotology, 40*(3), e260-e266. <https://doi.org/10.1097%2FMAO.0000000000002119>
- ³¹ Eikelboom, R. H., Jayakody, D. M., Swanepoel, D. W., Chang, S., & Atlas, M. D. (2014). Validation of remote mapping of cochlear implants. *Journal of Telemedicine and Telecare, 20*(4), 171-177. <https://doi.org/10.1177/1357633X14529234>
- ³² Thorén, E., Svensson, M., Törnqvist, A., Andersson, G., Carlbring, P., & Lunner, T. (2011). Rehabilitative online education versus Internet discussion group for hearing aid users: A randomized controlled trial. *Journal of the American Academy of Audiology, 22*(5), 274-285. <https://doi.org/10.3766/jaaa.22.5.4>
- ³³ Thorén, E. S., Öberg, M., Wänström, G., Andersson, G., & Lunner, T. (2014). A randomized controlled trial evaluating the effects of online rehabilitative intervention for adult hearing-aid users. *International Journal of Audiology, 53*(7), 452-461. <https://doi.org/10.3109/14992027.2014.892643>
- ³⁴ Malmberg, M., Lunner, T., Kähäri, K., & Andersson, G. (2017). Evaluating the short-term and long-term effects of an Internet-based aural rehabilitation programme for hearing aid users in general clinical practice: A randomised controlled trial. *BMJ Open, 7*(5), e013047. <https://doi.org/10.1136/bmjopen-2016-013047>
- ³⁵ Henry, J. A., Thielman, E. J., Zaugg, T. L., Kaelin, C., McMillan, G. P., Schmidt, C. J., Myers, P. J., & Carlson, K. F. (2019). Telephone-based progressive tinnitus management for persons with and without traumatic brain injury: A randomized controlled trial. *Ear and Hearing, 40*(2), 227-242. <https://doi.org/10.1097/AUD.0000000000000609>
- ³⁶ Beukes, E. W., Manchaiah, V., Allen, P. M., Baguley, D. M., & Andersson, G. (2019). Internet-based interventions for adults with hearing loss, tinnitus, and vestibular disorders: A systematic review and meta-analysis. *Trends in Hearing, 23*, 1-22. <https://doi.org/10.1177/2331216519851749>
- ³⁷ Beukes, E. W., Andersson, G., Fagelson, M., & Manchaiah, V. (2022). Internet-based audiologist-guided cognitive behavioral therapy for tinnitus: Randomized controlled trial. *Journal of Medical Internet Research, 24*(2), Article e27584. <https://doi.org/10.2196/27584>
- ³⁸ Konrad-Martin, D., O'Connell Bennett, K., Garinis, A., & McMillan, G. P. (2021). A randomized controlled trial using automated technology for improving ototoxicity monitoring in VA oncology patients. *American Journal of Audiology, 30*(3S), 870-886. https://doi.org/10.1044/2021_AJA-21-00032
- ³⁹ Dille, M. F., McMillan, G. P., Helt, W. J., Konrad-Martin, D., & Jacobs, P. (2015). A store-and-forward tele-audiology solution to promote efficient screenings for ototoxicity during cisplatin cancer treatment. *Journal of the American Academy of Audiology, 26*(9), 750-760. <https://doi.org/10.3766/jaaa.15028>
- ⁴⁰ Brittz, M., Heinze, B., Mahomed-Asmail, F., Swanepoel, D. W., & Stoltz, A. (2019). Monitoring hearing in an infectious disease clinic with mHealth technologies. *Journal of the American Academy of Audiology, 30*(6), 482-492. <https://doi.org/10.3766/jaaa.17120>
- ⁴¹ Duckworth, Z., Beckman, A., & Heinrich, A. (2022). Did changes to adult hearing aid pathways due to COVID-19 affect patient outcomes? A service evaluation. *American Journal of Audiology, 31*(3S), 876-891. https://doi.org/10.1044/2022_AJA-21-00195
- ⁴² Ramkumar, V., Nagarajan, R., Shankarnarayan, V. C., Kumaravelu, S., & Hall, J. W. (2019). Implementation and evaluation of a rural community-based pediatric hearing screening program integrating in-person and tele-diagnostic auditory brainstem response (ABR). *BMC Health Services Research, 19*, Article 1. <https://doi.org/10.1186/s12913-018-3827-x>
- ⁴³ Kuzovkov, V., Yanov, Y., Levin, S., Bovo, R., Rosignoli, M., Eskilsson, G., & Willbas, S. (2014). Remote programming of MED-EL cochlear implants: Users' and professionals' evaluation of the remote programming experience. *Acta Oto-Laryngologica, 134*(7), 709-716. <https://doi.org/10.3109/00016489.2014.892212>
- ⁴⁴ Wasowski, A., Skarzynski, H., Lorens, A., Obrycka, A., Walkowiak, A., Skarzynski, P. H., Włodarczyk, A. W., & Bruski, L. (2012). The telefitting method used in the national network of teleaudiology: Assessment of quality and cost effectiveness. *Journal of Hearing Science, 2*(2), 81-85. <https://doi.org/10.17430/882767>
- ⁴⁵ Penteado, S. P., de Lima Ramos, S., Battistella, L. R., Marone, S. A. M., & Bento, R. F. (2012). Remote hearing aid fitting: Tele-audiology in the context of Brazilian public policy. *International Archives of Otorhinolaryngology, 16*(3), 371-381. <https://doi.org/10.7162/S1809-9772012000300012>
- ⁴⁶ Pearce, W., Ching, T. Y., & Dillon, H. A. (2009). A pilot investigation into the provision of hearing services using tele-audiology to remote areas. *The Australian and New Zealand Journal of Audiology, 31*(2), 96-100. <http://dx.doi.org/10.1375/audi.31.2.96>