

Routine-Based Remote Microphone Strategies in the Home

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Presented by:

Brittany Slaff, AuD, CCC-A, PASC

Sarah Mullervy, AuD, CCC-A

Elaine Kim McCarty, AuD, CCC-A

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Introductions - Brittany

Brittany Slaff, Au.D., CCC-A, PASC is a Pediatric Audiologist at Rocky Mountain Pediatric ENT Associates. She earned her Doctorate of Audiology from the University of Iowa in 2016 and her Bachelor of Arts degree from Appalachian State University in 2012. Prior to joining RMPENTA, Brittany worked as an audiologist at Children's Healthcare of Atlanta where she was the Central Auditory Processing Disorders team lead and a member of the cochlear implant and vestibular specialty teams. She currently manages the Cochlear Implant Program at RMPENTA.

Specialty Areas: pediatric diagnostic evaluations, hearing aids, and cochlear implants

Fun fact: Brittany is an avid gardener and grows flowers year-round.



Introductions - Sarah

Sarah Mullervy, AuD, CCC-A is an audiologist by trade with experience working with both adults and pediatric patients as a clinical audiologist. She earned her Doctorate of Audiology from the University of Colorado at Boulder in 2021. Prior to studying audiology, Sarah received her undergraduate degree in Ecology and Evolutionary Biology from the University of Colorado at Boulder in 2012.

Sarah joined the Colorado Hearing Resource Coordinator (CHIP Coordinator) team in February of 2023 and currently serves families in Mesa and Garfield county with the Colorado Home Intervention Program (CHIP).

Specialty Areas: cochlear implants, early intervention (Part C), routine-based services

Fun Fact: Sarah grew up with a deaf younger brother who received bilateral cochlear implants as a young child





Introductions - Elaine

Elaine Kim McCarty, AuD, CCC-A is an audiologist by trade with experience working with the pediatric population as a clinical audiologist and an educational audiologist. She earned her Doctorate in Audiology from Illinois State University in 2017 and her undergraduate degree from the University of Iowa in 2013. Elaine had exposure in early intervention (EI) in 2014, during her time at ISU and continues to work as an EI provider in Colorado. In addition, she serves as a Regional Hearing Resource Coordinator (CHIP Coordinator) with the Colorado Home Intervention Program (CHIP) since April 2022.

Specialty Areas: educational audiology (Part B), early intervention (Part C), routine-based services

Fun Fact: Elaine adopted an Aussie Cattle Dog who was born deaf





Financial Disclosures

- Elaine is a salaried employee with the Colorado School for the Deaf and the Blind.
- Sarah is a salaried employee with the Colorado School for the Deaf and the Blind.
- Brittany is a salaried employee with Rocky Mountain Pediatric ENT Associates (HealthOne)



Today's Objectives

- Brief review of research about remote microphone technology
- Case studies with routine-based strategies
- Access to remote microphone technology

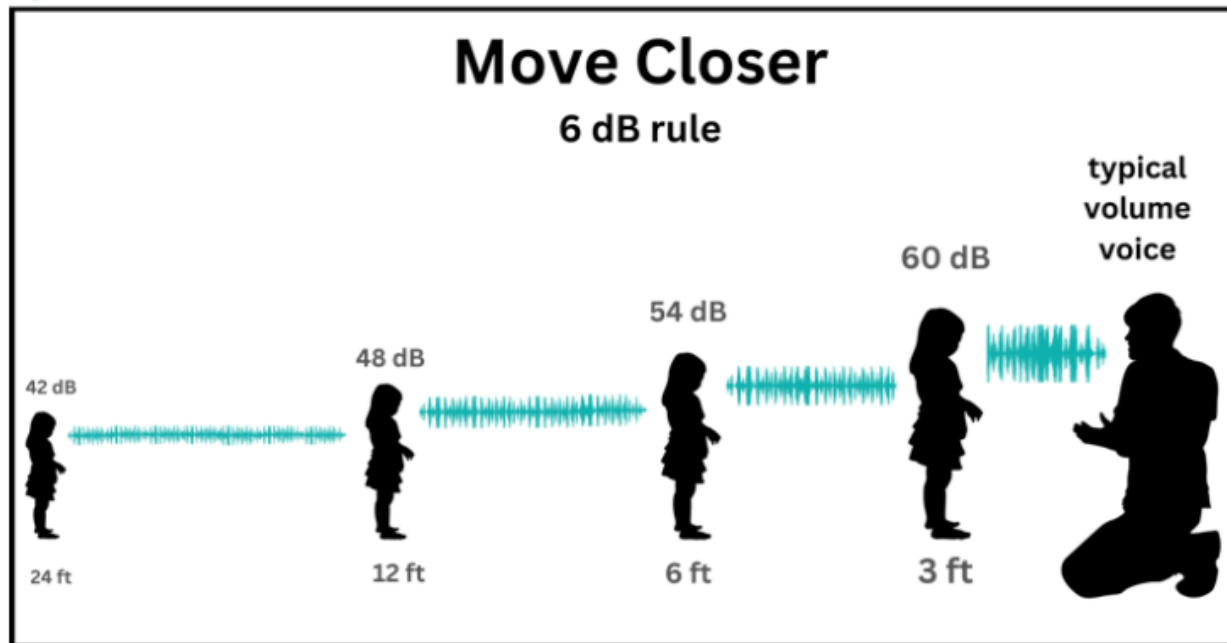


What does the research say about remote microphone systems?

- Remote microphone technology reduces the negative effects of background noise, reverberation, and effects of distance for individuals with hearing differences by providing an increased signal to noise ratio (SNR)

On average, children hear *11 more words per minute* when caregivers or parents use remote microphones.

- Use of remote microphones resulted in greater child attentiveness, *reduced parent repetitions*, increased speaking from a distance, and reduced listening fatigue and effort for children
- Caveat: How do we still learn to listen in noise?
 - The auditory system reaches maturity after 10 - 12 years. When we have a good language base, we are better able to process speech in noise



This 6 dB rule example shows the impact of distance on listening.

Sound loudness is measured in units called decibels, abbreviated as dB.

When distance doubles (is greater), a speaker's voice decreases by 6 decibels.

When distance is halved (is less), the voice of the person speaking increases by 6 decibels.

Moving closer makes the signal (voice or noise) louder. Moving away makes the signal quieter.

Following the 6 dB rule improves listening for anyone but especially individuals with hearing loss.



What does the research say about remote microphone systems?

- How do we hear more language? Improve the signal to noise ratio in the home:
 - Average SNR in home-setting: +7.9 dB SNR
 - The American Speech-Language Hearing Association (ASHA) recommendation for optimal language learning: +15 dB SNR
- Special Considerations: medically complex patients or who have additional medical equipment
 - These children are more likely to hear consistent ambient background noise at the level of the ear.
- Remote microphones help to reduce some of this background noise and provide a better speech input due to an improved SNR.

Strategies with case studies

- How is the remote microphone used in real, everyday life and routines?



Strategies to try around routines: Within the home

- Meal preparation or cooking and baby is in another room, or not at eye level
- Playing at home – especially those children who may be exposed to more ambient noise from medical equipment (ventilators, feeding tubes)
- Large family gatherings
- Reading books and singing songs

*Special considerations – for children who cannot self-report (and even for those who can!) it is especially important for parents and caregivers to perform weekly listening checks of FM systems to ensure appropriate sound quality and clarity.

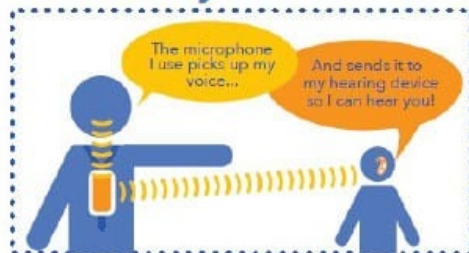


Strategies to try around routines: At daycare or out and about

- Car rides
- Playground
- Story time/Music time at daycare/library
- Walks around the block
- Birthday parties
- Extracurricular activities: sporting events/stadiums
- Safety component: hearing important language around alarms, alerts, or sirens (Helpful even for children who use ASL as primary language that have access to auditory awareness)

REMOTE MICROPHONES: LEARNING HAPPENS EVERYWHERE!

How do they work?



Why use them?

We live in a noisy, active world! Young children need to hear your voice clearer than other noises so they can learn to listen and talk. When you wear a remote microphone your child can hear you even when it is noisy or if they are not near you.



Who should use them?



Where to use them?



Curran, et al. (2019) *JSLHR*, 62(3), 564-576 | Walker, et al. (2019) *IJA*, 58(4), 200-207. | Avivi-Reich, et al. (2020) *JSLHR*, 63(1), 345-35.

Benitez-Barrera, et al. (2019) *JSLHR*, 62(6), 2002-2008. | Thompson, et al. (2020) *JSLHR*, 63(2) 633-642.

Contributors: Meredith Spratford, Boys Town National Research Hospital; Elizabeth Walker, University of Iowa; Karen Muñoz, Utah State University



Access To Remote Microphones

- Only 36% children had access to personal remote microphone technology before school age.
 - As of 2018, there are free remote microphones with hearing aid purchases for Phonak, Oticon, and the Resound Education Program
 - Many bluetooth-enabled hearing aids can access “live-listen” to use your iPhone as a remote microphone*
- Remote Microphone Loaner bank
 - Colorado School for the Deaf and the Blind
 - Colorado Department of Education
 - State-Specific hearing technology loaner banks
 - Generally housed under Dept. of Health
- Clinical pediatric audiologist (home-use only)
- Educational/school-based audiologist (in-school use)
- Vocational Rehabilitation (at work access)



Link for videos - Pairing a variety of manufacturers

- **Pairing and using a ReSound Multi Mic (two videos):** <https://www.resound.com/en-us/hearing-aids/accessories/multi-mic>
- **Pairing and using a Phonak Partner Mic:**
<https://www.youtube.com/watch?v=hdFJNRRxtjA>
<https://www.phonak.com/en-us/support-options/phonak-how-to-videos/accessories-videos#accordion-2ea40f3ef9-item-a192f751dd>
- **Pairing and using a Oticon Connect Clip:**
<https://www.oticon.com/support/downloads> → Click on “How To Videos” on the right side of the screen → Select “How to Pair Hearing aids and Oticon Connect Clip” and “How to Use Oticon Connect Clip as Remote Microphone”
 - There are several videos here that discuss multiple options for how to utilize the Oticon Connect Clip!
- **Pairing and using Cochlear Americas Mini Mic 2+:**
https://www.youtube.com/watch?v=BkbSeQKmH_U





References

- Articles:
 - <https://journals.lww.com/thehearingjournal/pages/articleviewer.aspx?year=2020&issue=07000&article=00011&type=Fulltext>
 - <https://journals.lww.com/thehearingjournal/pages/articleviewer.aspx?year=2020&issue=07000&article=00011&type=Fulltext>
 - Jacob RTdS, Paccola ECM, Bucuvic EC, Salgado MH. Fitting Assistive Technology for People with Hearing Loss: The Importance of Remote Microphone Systems' Electroacoustic Verification. *International Journal of Environmental Research and Public Health*. 2021; 18(24):13251. <https://doi.org/10.3390/ijerph182413251>
 - Benítez-Barrera, Carlos R.; Grantham, D. Wesley; Hornsby, Benjamin W.Y.. The Challenge of Listening at Home: Speech and Noise Levels in Homes of Young Children With Hearing Loss. *Ear and Hearing* 41(6):p 1575-1585, November/December 2020. | DOI: 10.1097/AUD.0000000000000896
 - Benítez-Barrera, Carlos R.; Thompson Emily C.; Angley, Gina P.; Woynaroski, Tiffany.; Tharpe, Anne Marie. Remote Microphone System Use at Home: Impact on Child-Directed Speech. *JSLHR* Volume 62(6): p 2002-2008, June 2019. https://doi.org/10.1044/2019_JSLHR-H-18-0325
 - Curran, Mara; Walker, Elizabeth; Roush, Patricia; & Spratford, Meredith. Using Propensity Score Matching to Address Clinical Questions: The Impact of Remote Microphone Systems on Language Outcomes in Children Who Are Hard of Hearing. *JSLHR* Volume 62 (3): p 564-576, March 2019. https://doi.org/10.1044/2018_JSLHR-L-ASTM-18-0238
 - Thompson, Emily C. AuD; Benítez-Barrera, Carlos R. PhD; Tharpe, Anne Marie PhD. Home Use of Remote Microphone Systems by Children with Hearing Loss. *The Hearing Journal* 73(7):p 34,35,36, July 2020. | DOI: 10.1097/01.HJ.0000689436.33289.83
- Organizations:
 - John Tracy Clinic – Parent Resources handouts
 - Audiology Outside of the Box
 - Hands & Voices



Questions?! - Please ask

Contact: Email us!

Sarah Mullervy, AuD, CCC-A

Brittany Slaff, AuD, CCC-A, PASC

smullervy@csdb.org

Brittany.James@healthonecares.com

Elaine Kim McCarty, AuD, CCC-A

ekimmccarty@csdb.org