

1. This document is created for accessibility and is intended to be a supplemental resource. If you would like to print a hard copy of this document, please follow the general instructions below to print multiple slides on a single page or in black and white.
2. This handout is for reference only. Non-essential images have been removed for your convenience. Any links included in the handout are current at the time of the live webinar but are subject to change and may not be current at a later date.
3. Copyright: Images used in this course are used in compliance with copyright laws and where required, permission has been secured to use the images in this course. All use of these images outside of this course may be in violation of copyright laws and is strictly prohibited.
4. Social Workers: For additional information regarding standards and indicators for cultural competence, please review the NASW resource: Standards and Indicators for **Cultural Competence in Social Work Practice**
5. Need Help? Select the “Help” option in the member dashboard to access FAQs or contact us.

How to print Handouts

On a Mac

- Open PDF in Preview
- Click File
- Click Print
- Click dropdown menu on the right “preview”
- Click layout
- Choose # of pages per sheet from dropdown menu
- Checkmark Black & White if wanted.

How to print Handouts

On a PC

- Open PDF
- Click Print
- Choose # of pages per sheet from dropdown menu
- Choose Black and White from “Color” dropdown

No part of the materials available through the continued.com site may be copied, photocopied, reproduced, translated or reduced to any electronic medium or machine-readable form, in whole or in part, without prior written consent of continued.com, LLC. Any other reproduction in any form without such written permission is prohibited. All materials contained on this site are protected by United States copyright law and may not be reproduced, distributed, transmitted, displayed, published or broadcast without the prior written permission of continued.com, LLC. Users must not access or use for any commercial purposes any part of the site or any services or materials available through the site.

Aural Rehabilitation Approaches for Adults with Early Onset Hearing Loss and Long-Term Deafness, In partnership with RIT/National Technical Institute for the Deaf

Erin Pickett, AuD, CCC-A/SLP





Erin Pickett, AuD CCC-A/SLP

Erin Pickett is a dual certified audiologist and speech-language pathologist. She began her career as a research SLP for 6 years before pursuing her audiology degree. Erin is a full-time audiologist at RIT/NTID where she has been for 11 years, supporting deaf and hard-of-hearing students and clients as they work towards their communication goals.

Disclosures

- **Presenter Disclosure:** Financial: Erin Pickett is an employee of RIT/NTID. Non-financial: Erin Pickett has no relevant non-financial relationships to disclose.
- **Content Disclosure:** This learning event does not focus exclusively on any specific product or service.
- **Sponsor Disclosure:** This course is presented in partnership with RIT/National Technical Institute for the Deaf.

Limitations/Risks

- The applicability and accuracy of the course content may vary by the clinical, geographical, and cultural context; you should evaluate the course accordingly.
- As healthcare is rapidly evolving, new findings may change the validity of the information presented in this course. Providers should always consult the latest research and guidelines from professional associations.
- The interventions discussed in this course may be limited in generalizability, requiring practitioners to consider specific individual and population factors.
- The course may not cover all possible risk factors, diagnostic methods, or treatment options, and complex cases may require additional considerations.
- Healthcare providers should apply cultural competence and sensitivity to ensure effective and respectful care based on their patients' diverse needs.
- Providers should always evaluate the limitations of diagnostic and screening tools, considering their potential for false results as well as any ethical implications.
- It is the responsibility of course participants to critically evaluate the evidence from multiple sources to guide professional practice.

Learning Outcomes

After this course, participants will be able to:

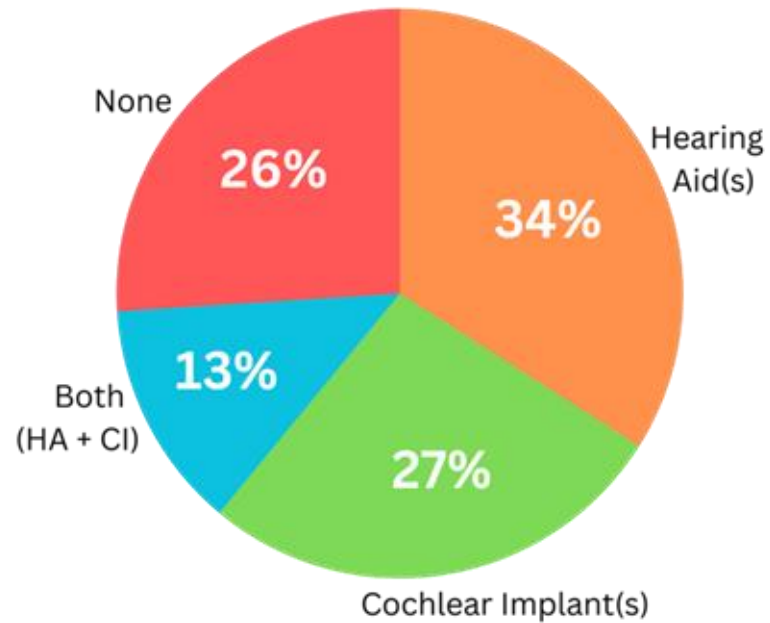
- Identify factors of aural rehabilitation practices that apply to individuals with early-onset hearing loss and long-term deafness.
- Describe 2 aural rehabilitation goals based on client motivators, communication abilities, and/or functional needs.
- List 3 tools/activities to incorporate into future aural rehabilitation practices.

About NTID

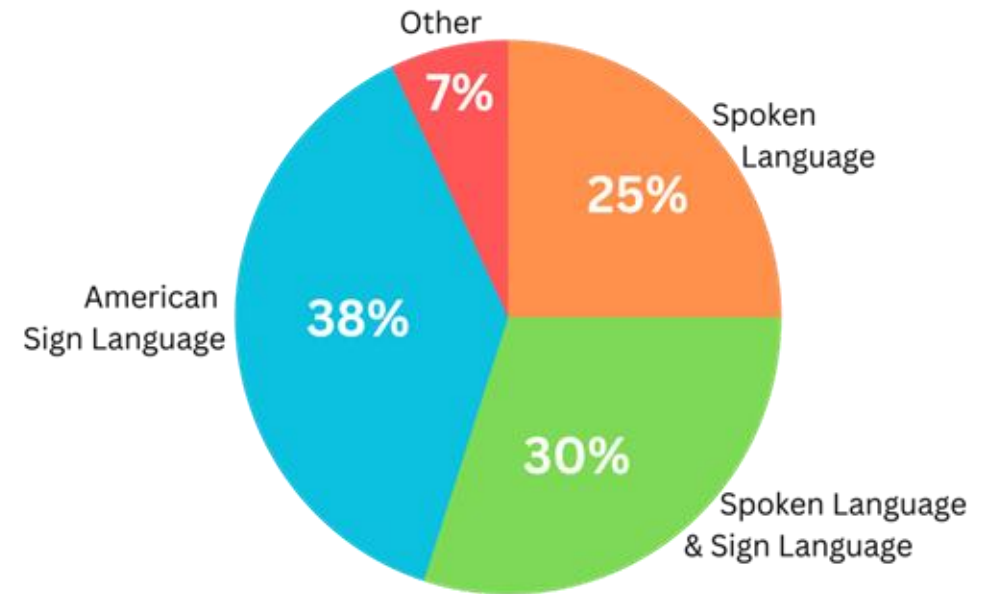
- The **National Technical Institute for the Deaf (NTID)** is one of the nine colleges of the **Rochester Institute of Technology (RIT)** in Rochester, New York.
- NTID was established by U.S. Congress in 1965 to provide higher education opportunities for deaf and hard-of-hearing students.

About NTID Students

Listening Technology Use



Communication Modes



About NTID AuDs & SLPs

ASHA-certified Audiologists and Speech Language Pathologists at NTID provide on-campus audiological and speech-language services to members of the RIT and NTID Community. Our primary mission to serve and support the diverse communication needs and communication skill development for our deaf and hard of hearing college students.

Our AuDs and SLPs are fluent in American Sign Language and prioritize matching each student and client's language and communication modalities.

<https://www.rit.edu/ntid/css/>

About NTID Services

• Audiology Center

- Hearing tests
- Consultations
- FM/Roger loans
- Speechreading and/or listening training
- Cochlear implant mapping
- Hearing aid and cochlear implant adjustments, troubleshooting, repairs, and upgrades

• Speech & Language Center

- Speech intelligibility
- Grammar and technical/professional vocabulary and practice
- Communication strategies for work-related interactions/job interviews
- Presentation skill development and practice
- Use of mobile applications as communication tools



Agenda

1. Introduction: About NTID
2. Typical Aural Rehabilitation (AR)
Process and Protocol
3. NTID AR Clientele
4. Case Studies
5. Takeaways
6. Q & A



Definition of Aural Rehabilitation

- As stated by Boothroyd (2007) and used by the ASHA Clinical Practice Guideline on AR for Adults with Hearing Loss (2023)

“the reduction of hearing-loss-induced deficits of function, activity, participation, and quality of life through sensory management, instruction, perceptual training, and counseling”

ASHA Clinical Practice Guideline on AR for Adults with Hearing Loss (2023)

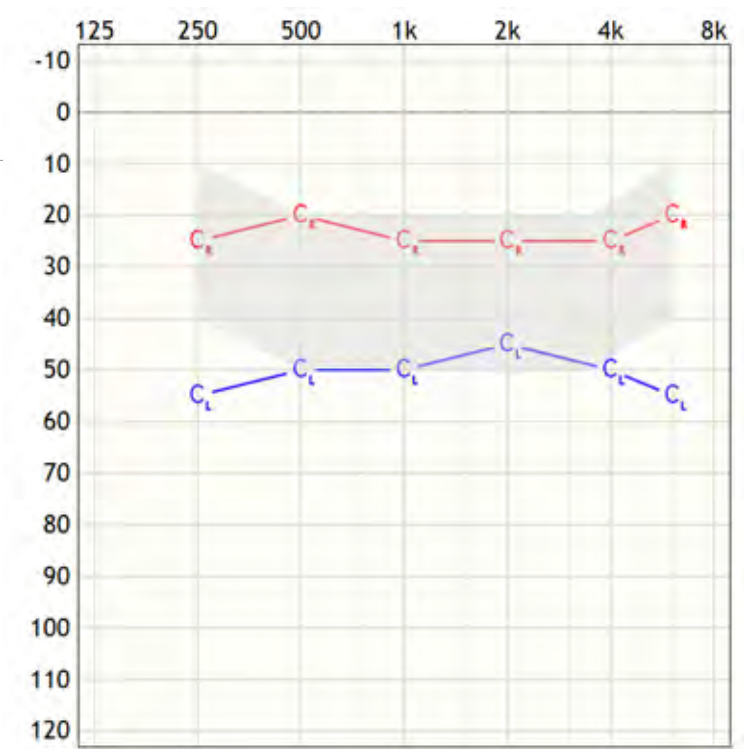
- AR should be person-centered
- AR has four main components
 - Sensory management (e.g., hearing aid/cochlear implant)
 - Informational counseling (e.g., audiogram explanation)
 - Perceptual training (i.e., listening practice)
 - Personal adjustment counseling (e.g., social/emotional impact)
- May use multicomponent approach for some clients

ASHA Clinical Practice Guideline on AR for Adults with Hearing Loss (2023)

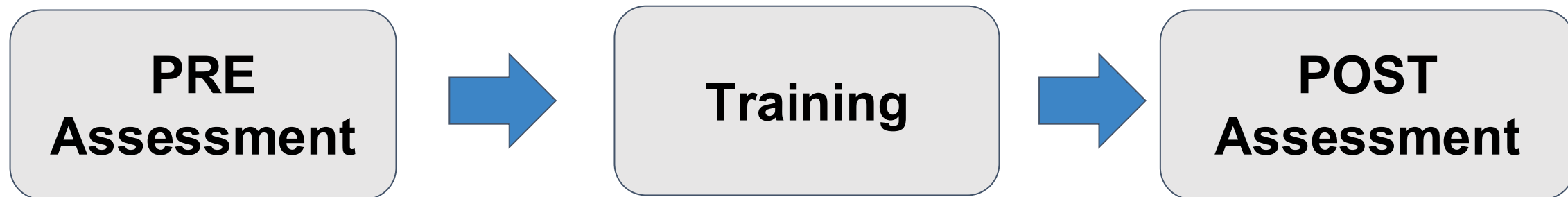
- Recommendations apply to adults with all types and degrees of hearing loss, including both early and late onset
- However, most studies evaluated for the guideline had participants with mild to moderate hearing loss
- A few mentioned severe-to-profound losses, but early vs. late onset was not specified
- In our experience at NTID, early onset population needs less informational and personal adjustment counseling than late onset

Some AR Basics

- Before beginning - ensure optimal listening with devices and understand client's auditory access
- **How?** - check the following and *refer* to audiology if needed
 - Hearing aid (HA)/Cochlear Implant (CI) programming is meeting their current needs (e.g., client knows how to activate features for listening in noise)
 - Review audiogram
 - Aided audiogram and speech recognition testing within past year
 - Keep an eye out for upcoming NTID presentations: "Audiogram Reading: Foundations and Applications, Part 1" in July followed by "Part 2" in October



Some AR Basics – Typical Protocol



- *Formal (e.g., speech recognition tests in sound booth)
- Informal (e.g., speechreading everyday sentences, tracking speed)
- Questionnaires to establish current functioning, needs, & goals

- Repeat assessments to compare performance

*Refer to audiologist if possible



AR Basics

Recommend using approaches like:

Erber's Hierarchy

- Detection
- Discrimination
- Identification
- Comprehension

Analytic (bottom- up) vs

Synthetic (top - down) training

- Analytic: e.g., phoneme ID
- Synthetic: e.g., sentence recognition

BUT REMEMBER!

Working with *ADULTS*!

Adult Learner Model

- Shared decision making - client helps to develop goals and rank them in order of importance; counsel on realistic expectations
- Collaboration - audiologist, SLP, and client are partners
 - Other medical professionals if needed
- Challenge - a safe space to push beyond comfort zone
 - Explore worst-case scenarios, plan for “what-ifs”



NTID Clientele for AR

- Typically young adults (students) but also see range of adult ages (faculty/staff)
- At NTID, most of our clients have listening experience and use some sort of listening technology
 - But amount varies tremendously
- Match client's preferred communication modality
- Services are free for RIT students, faculty, and staff

NTID Clientele for AR

Why do clients seek out AR services at NTID? Some examples:

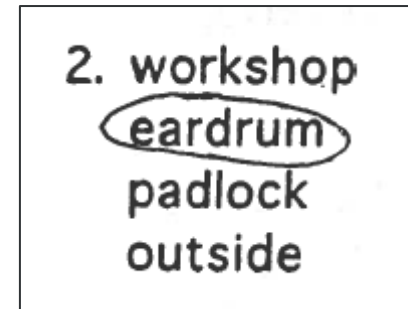
- Recent first cochlear implantation or new hearing aid (HA)
- Experienced unilateral cochlear implant (CI) user and recently got second CI
- Long-term bilateral CI but never got used to second CI and wants to try again
- Stopped using device(s) for a time but wants to retrain with device(s)
- HA and/or CI user who communicates primarily in ASL but wants to build confidence interacting with hearing individuals

Resources and Activities

Assessments

- Word recognition
 - Four-Choice Spondee Test*
 - CNC Word Test
- Sentence recognition
 - CID Everyday Sentences*
 - e.g., “Here we go”
 - HINT
 - e.g., “The cat jumped over the fence”
 - AzBio
 - e.g., “She wanted to follow in his footsteps”

Four Choice Example



*(Included in the Minimal Auditory Capabilities (MAC)© battery by Auditec)

Assessments

- NTID Speechreading Test
 - Videos of female speaker saying CID Everyday Sentences
 - Can compare 3 conditions: auditory only, visual only, auditory + visual
- Screening Tests from “Guide for Clinicians: Adult Cochlear Implant Home-Based Hearing Therapy”
 - Can use for pre- and post-assessment
 - Helps determine what level to start training

Assessments

Speech Perception Category
 1 - No pattern perception
 2 - Pattern perception
 3 - Some word identification
 4 - Consistent word identification

- Early Speech Perception Test (ESP)

	Shoe	Ball	Fish	Cookie	Baby	Apple	Airplane	Toothbrush	Hotdog	Hamburger	Birthday cake	Ice cream cone
Shoe	✓		✓									
Ball		✓										
Fish	✓		✓									
Cookie					✓	✓						
Baby		✓		✓	✓							
Apple				✓					✓			
Airplane							✓	✓				
Toothbrush												
Hotdog						✓		✓	✓			
Hamburger							✓			✓	✓	
Birthday cake												✓
Ice cream cone										✓	✓	✓

Total Correct: 20/24 category (83%); 8/24 words (33%) Speech Perception Category: 2 - pattern perception (1 = 0-16, 2 = 17-24)

AR Treatment/Training Examples

Analytic	Synthetic
• Minimal pairs • The Color Vowel® Chart (Taylor & Thompson, 2018; colorvowel.com) • *Angel Sound™	• Speech tracking • Alphacats • Phonak + Advanced Bionic's HearingSuccess site (includes SoundSuccess™ and *The Listening Room™)

That's not all! (Hint: See handout)

*Also include environmental sound recognition activities



Speech Tracking

- Practice listening to connected speech
- Can choose materials based on client's interests and language level
- Main method:
 - Break passage into appropriate chunks (words, phrases, sentences).
 - Client repeats each chunk you say.
 - Time how long it takes to get through a passage, then calculate words per minute.

Speech Tracking

Versatile!

- With or without visual cues
- Practice various strategies (e.g., using context or auditory clues, conversational repair strategies)
- Check overall comprehension
- Infuse target vocabulary



Speech Tracking

Example:

Serena loved to play softball. This was not to be her season, however. The first three games were rained out, and then she broke her foot. She loved her team, though, so she kept going to games and cheering on her teammates.

of words: 42

Time to get through passage: 1 minute 30 seconds

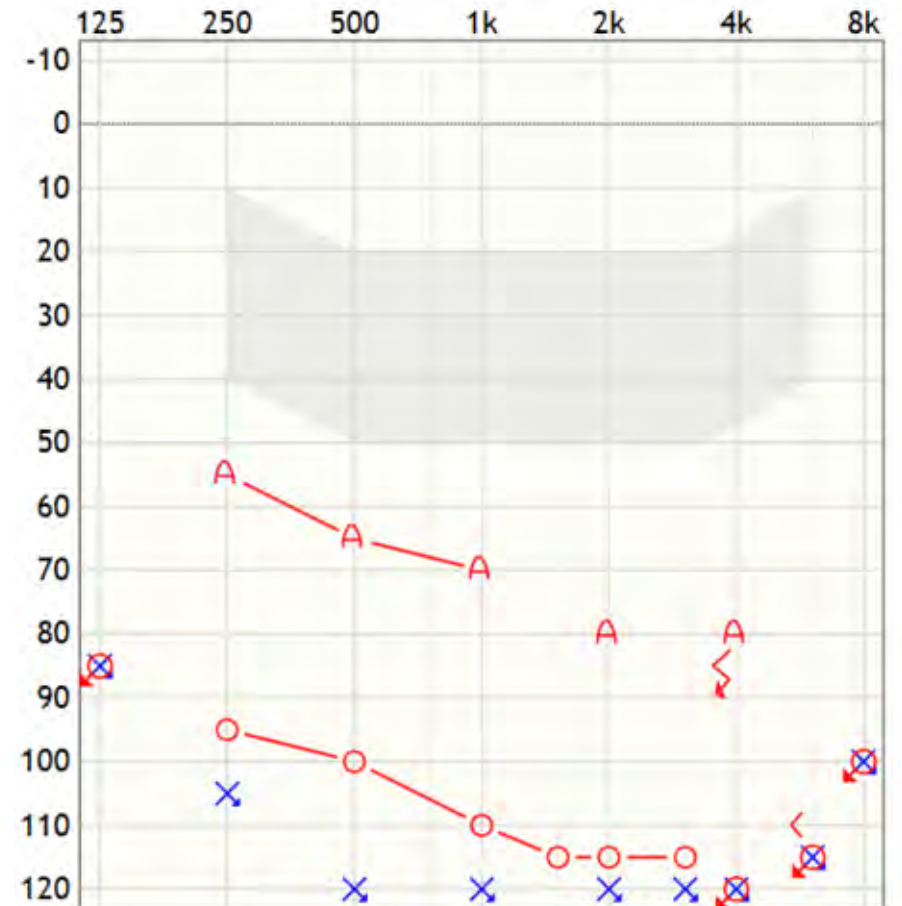
42 words / 1.5 minutes = 28 wpm

Case Studies

#1

Case Study #1 - Unilateral hearing aid user

- NTID student, primarily uses ASL
- Deaf since infancy
- Started using bilateral HAs at age 8 with subsequent intermittent use
- Currently uses HA on right ear only, consistent for past two years
- Attended speech-language therapy to work on expressing functional words and phrases
- Attended indiv. AR for 3 semesters





Client Goals

- Improve ability to speech-read mom
- Improve ability to understand common things people say at restaurants and other public places
- Improve ability to recognize environmental sounds to reduce being startled

Pre-AR Assessment

Skill Assessed	Name of Test	Performance
Closed set word recognition	Four Choice Spondee Test	30% correct
Sentence recognition, auditory + visual	NTID Speechreading Test (CID Everyday Sentences)	0% correct
Pattern perception (word length and stress)	Early Speech Perception Test (ESP)	Speech Perception Category 1 - No pattern perception*

Pre-AR Assessment - Interpretation

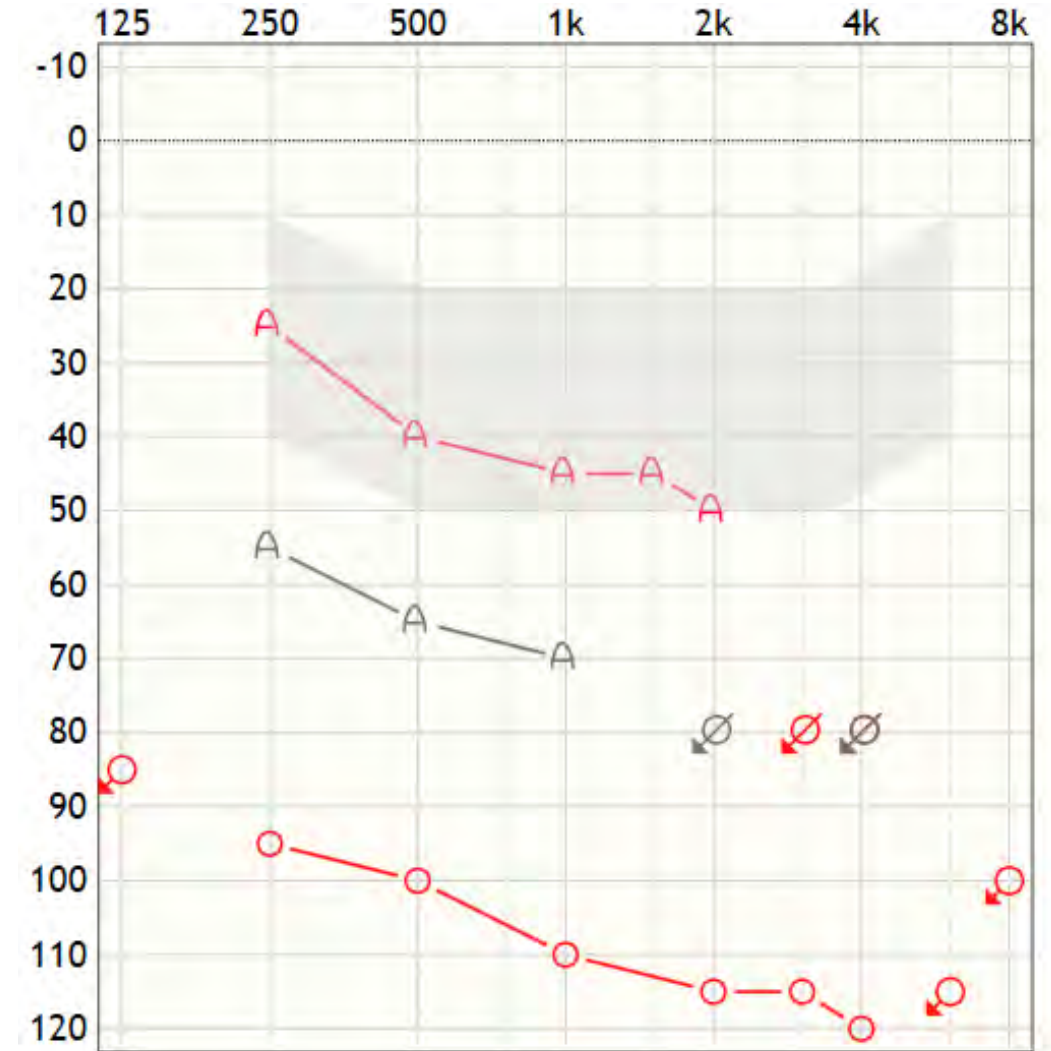
- No speech recognition ability
- Limited speechreading skills
- Limited word length/pattern perception skills

What are your thoughts for some goals/objectives?

1. Our objectives for intervention:
2. Pattern perception/word length recognition (to support speechreading)
3. Environmental sound recognition
4. Speechreading with sound (common words and phrases)

But first!

- Spent a lot of first semester optimizing audibility with hearing aid
 - Reprogrammed incoming hearing aid
 - Worked with Vocational Rehabilitation to obtain a new power hearing aid



Therapy activities and materials

- **Environmental sound recognition** (e.g., Angel Sound™)
- **Pattern perception/word length discrimination** (e.g., the Listening Room™)
- **Speechreading with sound** (e.g., custom lists)
- **Vowel discrimination** (e.g., The Color Vowel® Chart (Taylor & Thompson, 2018; colorvowel.com)
 - This goal replaced environmental sound recognition during one semester

Outcomes

Environmental sound recognition

- Angel Sound™ Environmental Sounds Test
 - Pre: 40% correct Post: 56% correct

Pattern perception

- Word length identification test from Cochlear Rehabilitation Manual
 - Pre: 65% correct Post: 80% correct
- Pattern perception test from ESP
 - Pre: 14/24 Post: 14/24

Outcomes

Speechreading with Sound - Formal

- NTID Speechreading Test (CID Everyday Sentences)
 - Presented in both recorded and live-voice conditions
 - Pre: 0% Post: 0%
- Spondee identification test from ESP (auditory + visual)
 - Pre: 5/12 Post: 7/12

Outcomes

Speechreading with Sound - Informal (Custom Lists)

- Numbers 1-10
 - Pre: 60% Post: 90%
- Family names
 - Pre: 70% Post: 100%
- Workbook list of 12 common phrases and sentences
 - Pre: 60% Post: 90%
- Custom list of 15 common words and phrases
 - Pre: 53% Post: 80%

Outcomes

- NTID Post-Aural Rehabilitation Outcomes SELF Assessment

	PRE	POST
Listening without lipreading	2-Only a few words	2-Only a few words
Lipreading without listening	2-Only a few words	1-No words
Lipreading with listening	2-Only a few words	3-About half of what is said
Confident listening and lipreading	2-Rarely	3-Half the time
Communication has improved because of AR	N/A	5-Strongly agree

Outcomes

- AR Progress Scale

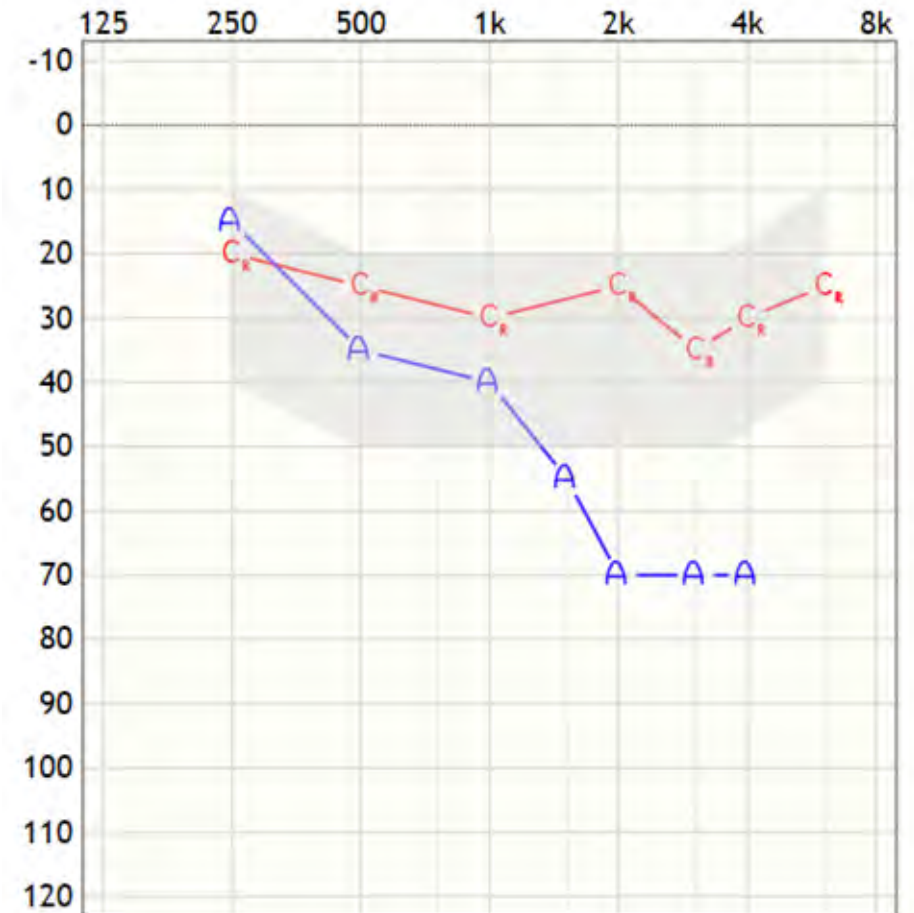
SPECIFIC NEEDS	Worse	No Difference	Slightly Better	Better	Much Better
Improve ability to speechread mom				X	
Improve ability to understand common things people say at restaurants and other public places			X		
Improve ability to recognize environmental sounds to reduce being startled				X	

Case Studies

#2

Case Study #2 - International Unilateral Cochlear Implant Recipient

- Graduate student (immigrated to U.S. age 7)
- Profound sensorineural hearing loss since childhood
- Bilateral HAs since age 12; Age 22: underwent R-side CI implantation & upgraded L HA
- L1 Cantonese; L2 & L3 English and ASL introduced simultaneously age 7.
- Currently dependent on mixed communication (listening, speechreading, and ASL)
- Bimodal (CI (electroacoustic) + HA)
- Started AR about 1 month after initial activation
- Attended weekly AR for 2 semesters



Pre-Assessment

	CI Alone	Bimodal (CI + HA)
CNC - Words	10%	32%
CNC - Phonemes	57%	55%
AzBio Sentences	11%	N/A

Student's goal for AR was to have dedicated listening practice to improve speech understanding with his cochlear implant.

Intervention

- Interprofessional collaboration approach
- 1x/week AR services with audiologist for receptive listening goals using new devices and technology support
- 1x/week speech-language services for articulation and pronunciation support using new devices and self-monitoring for speech errors (Historically received more intensive speech-language instruction prior to procedure. Reduced due to school schedule.)

Therapy activities – Audiology (CI only)

- Analytic training
 - Ling sound identification /m, ah, oo, ee, sh, s/
 - Vowels & consonants recognition
 - Voiced vs. voiceless consonant discrimination
- Synthetic training
 - Sentences on AB SoundSuccess (closed set topic-related)
 - Word recognition (e.g., numbers, colors, dance-themed vocab)
 - Everyday conversation, small talk
- Many appointments spent on troubleshooting and fixing equipment

Therapy activities – SLP

- Repair strategy use when communication breakdown occurred
- Pronunciation practice of novel words from organic conversations about academics and hobbies/extracurriculars (phonetic transcriptions and syllable breakdown)
- Professional communication via presentation practice

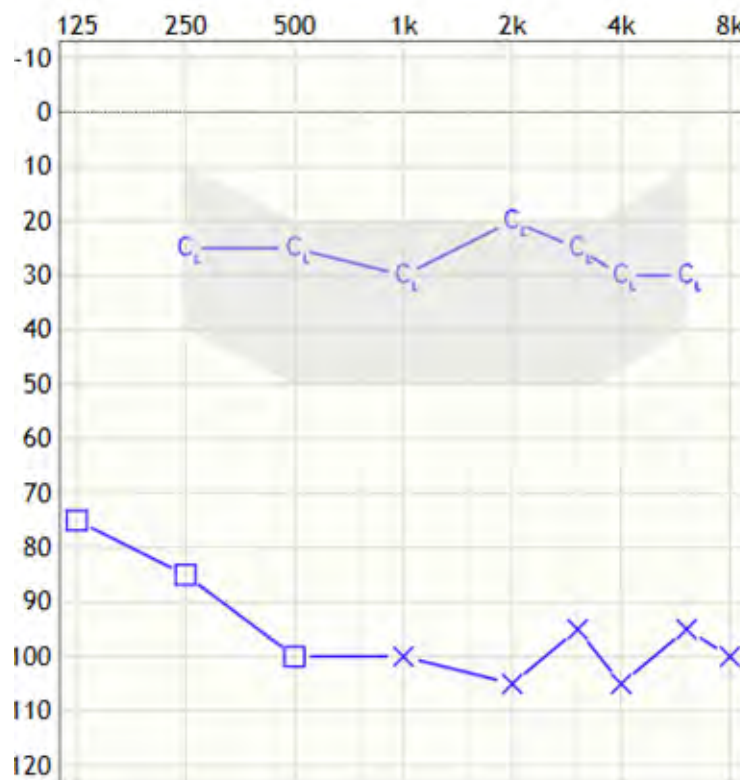
Outcomes

- Objective
 - Speech: Improved articulation and intelligibility scores on assessment
 - Listening (CI alone): AZBio sentence recognition increased to 33% (11% baseline)
- Subjective
 - While student reported that listening was still challenging, he reported feeling more confident speaking across various communication scenarios (academic and personal)

Case Studies

#3

Case Study #3 - Bimodal Cochlear Implant Recipient



- 35-year-old professional
- Onset at birth, etiology unknown
- Bilateral, steeply sloping moderate to profound sensorineural hearing loss until cochlear implant surgery
- Consistent bimodal user (14hrs+ daily)
- Dependent on mixed communication (listening, speechreading and ASL)

Hearing Aid Use (30 yrs)
Resound Enzo Q 798

Cochlear Implant Use (2 yrs)
Kanso 2

Request for AR (7 months post CI activation)

- Depends on hearing aid now; feels like hearing with only one side compared to hearing with both sides
- Unable to distinguish sounds when wearing the CI alone.
- Sound quality with CI is poor and unnatural.
- CI is louder than hearing aid.
- No time to practice; prefers structured therapy sessions.

Goals: Improve word and sentence recognition with CI only and HA + CI



Intervention

- Weekly sessions over 4 semesters
- Live speech and recorded materials
- Initial presentation: auditory only, repeat, guess, auditory-visual confirmation
- CI only, contralateral ear plugged
- Bimodal listening for analytical training and in simulated noisy conditions

Session Structure

1. Technology check; communication success and challenges during the week - 10 minutes
2. Speech tracking (CI only, contralateral ear plugged) - 10 minutes
3. Analytic drill and practice (CI only, HA +CI) - 10 minutes
4. Topic related sentences computerized program (CI only & HA +CI) - 10 minutes
5. Customized vocabulary lists (CI only) - 10 minutes
6. Self assessment (level of difficulty using Likert scale) - 5 minutes
7. Plan for next session - 5 minutes

Audiology Technology Referrals Integrated into AR

- Biannual audiograms (CI only and Bimodal)
- CI programming/troubleshooting
 - Remapping (fine tuning) to validate audibility and comfort levels (narrow dynamic range was increased to adjust for greater tolerance for high frequency sounds)
 - Added Noise Reduction programs: SCAN on in P1 and SCAN on with Forward Focus in P2
 - Reported dull sound; microphone cover of speech processor replaced

Audiology Technology Referral Integrated into AR

- New HA fitting
 - Added Restaurant Program with noise reduction
 - HA linked to CI for bimodal streaming
- Fit with remote microphone utilized for listening practice (CI only/direct streaming)
 - Use of microphone with HA + CI with family, at conferences, and in the car

Synthetic Practice

- Customized alphabetical word lists on familiar topics (CI only)
 - Colors, Cars, School, Fruit, Countries: 100%
 - Work related topics with more complicated vocabulary: 90-100%
- Sentences Lists : 69% correct (CI only), 100% correct bimodal
- Started with highly predictable sentences with one key word missing (confidence builder)
- Speech tracking: work related materials 50-130 wpm

Analytic Training

- Ling 6 sounds (detect and ID all sounds)
- Minimal pairs
- High frequency word lists (e.g., pick, sheets)
- Counseled on overlapping phoneme formants (Advanced Bionics Tools for Schools™, 2014)

/m/: 1st formant 250-350 Hz, 2nd 1000-1500 Hz, 3rd 2500-3500 Hz

VS

/n/: 1st formant 250-350 Hz, 2nd 1000-1500 Hz, 3rd 2000-3000 Hz

Outcomes - Consonant Analysis (Live speech)

Category	Yr 1 Bimodal	Yr 2 Bimodal	Yr 2 CI only
Consonant Place*	58%	84%	66%
Consonant Manner*	59%	96%	91%
Consonant Voicing *	53%	100%	98%

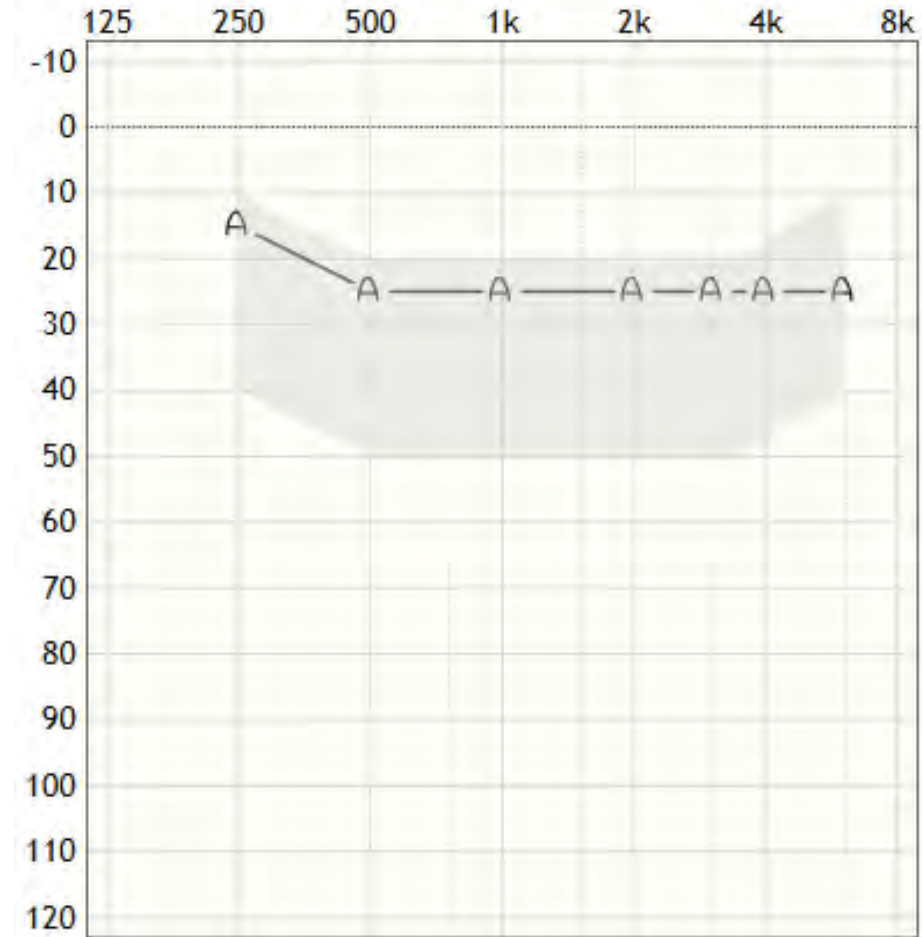
*Up to 4 repetitions

Overall, sounds most often missed were in similar frequency bands, and are more easily confused.

$$A = HA + CI$$

Outcomes

- CID Everyday Sentences
 - Bimodal 96% (80% in 2023)
 - CI only 84% (50% in 2023, 20% in 2022)
- AZBio Sentences (did not test in 2022)
 - Bimodal 88%
 - CI only 46%
- CNC words (did not test in 2022)
 - Bimodal: 58% words, 80% phonemes (26% and 55% in 2023)
 - CI only: 34% words, 58% phonemes (not tested previously)



Outcomes

- Observations: Primarily listens bimodally; CI and HA are blending more
- Independent listening: podcasts, TikTok videos, audiobooks, Co-Pilot App
- Relies on HA for music support

At a conference, reported a better ability to understand a variety of speakers (even with background noise) with CI compared to one year ago.

Takeaways

- When working with adults with early onset hearing loss and long-term deafness:
- Collaboration between SLPs and audiologists is critical
- Client involvement is key
- Informal and self-assessments may be an effective way to document progress
- There are multiple ways to deliver AR
 - Many clients find individual in-person AR helpful and supportive
- See handout for a list of resources - can also be used to develop home-based programs

Acknowledgements

A big thank you to my presentation co-creators:

- Catherine Clark, AuD, CCC-A
- Jewel Morris, MS, CCC-SLP

Survey: Please provide feedback

A secondary mission of RIT/NTID is preparing professionals to work with the deaf/hard of hearing population. Your completion of this 5-question survey will help us monitor our impact and bring you the content you want and need!

Course Title: Aural Rehabilitation Approaches for Adults with Early Onset Hearing Loss and Long-Term Deafness,
In partnership with RIT/National Technical Institute for the Deaf

Survey Link:

https://rit.az1.qualtrics.com/jfe/form/SV_3jSsLz8ViyPZDsQ



Thank you!

Erin Pickett, AuD, CCC-A/SLP





Congratulations!

- You've completed the course and can move on to the exam!
- From your account:
 - Go to pending Courses
 - Choose take exam