Measuring Sound-Processor Threshold Levels for Pediatric Cochlear Implant Recipients Using Visual Reinforcement Audiometry via Telepractice

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• No conflicts to disclose
Introduction

• Why is telepractice needed for CI recipients?

**Reason #1: Lots of visits!**
Introduction

• Why is telepractice needed for CI recipients?

Reason #2: CI centers (especially pediatric ones) are not on every corner!
Introduction

• Why is telepractice needed for CI recipients?

**Reason #2: CI centers are not on every corner!**

Omaha: 3 CI centers

7-hr drive
Introduction

Specific to pediatrics:

• Special techniques
  – Conditioned play audiometry (CPA)
  – Visual reinforcement audiometry (VRA)

• Special equipment
  – Toys/games
  – Lighted/animated objects
Introduction

• Previous research:

  – Threshold (T) and upper-comfort (M/C) levels in adults & adolescents are not significantly different between remote and in-person measures.
    
    (Ramos et al., 2009; McElveen et al., 2010; Wesarg et al., 2010; Hughes et al., 2012; Eikelboom et al., 2014; Kuzovkov et al., 2014)

  – Only one study has been done using CPA
    
    (Hughes et al., 2017)

  – No study has been done utilizing VRA with this population
Study Goals

• Compare in-person vs. remote behavioral thresholds (T-levels) in young children with Cis via VRA

• Hypothesis: T-levels not significantly different between conditions
VRA Methods

• Goal: 20 pediatric CI recipients
  – Data to Date: 16 recipients
  – Age at Test: 1.1–3.4 y
  – Avg. Duration CI Use: 0.66y (~8m)
  – Devices: 3 Cochlear, 11 Advanced Bionics, 2 MED-EL
Methods

• 2 visits
  – ABBA design (A = in-person, B = remote)
  – Both visits at BTNRH

• T-levels averaged across visits for each condition due to limited hit rate.
VRA Methods

In-Person Condition:

• Audiologist controls programming software
• Child seated to avoid visual cues from computer or audiologist
• Play assistant engages child in behavioral task
• Other outcome measures:
  – Hit Rate
  – Test Time
  – Parent/caregiver questionnaire
VRA Methods

Remote Condition:

- Audiologist remotely controls programming software at recipient site (requires peripheral hardware at recipient site)
- Child seated to avoid visual cues from videoconferencing system
- Same play assistant engages child in behavioral task
VRA Results

**T levels:**
- No significant effect of condition or electrode (p>0.6)

![Box plots showing T-levels for Basal, Middle, and Apical regions for In-person and Remote conditions with N = 16.](image-url)
VRA Results

Hit Rate:
• No significant difference in # attempts (p = 0.3)
  – In-Person = 6.9 attempts
  – Remote = 7.2 attempts

• No significant difference in Hit Rate (p = 0.9)
  – In-Person = 77.8%
  – Remote = 76.8%
VRA Results

Test Time:

• 2-way RM ANOVA:
  – No significant effect of Visit or Condition (p > 0.2)
  – Visit 1 = 13.5 min; Visit 2 = 12.3 min
  – In person = 12.5 min; Remote = 13.3 min
VRA Results

Questionnaire:

• 50% of respondents reported it can be hardship to attend programming appointments

• 81% of respondents said they would use telepractice “some or all of the time” for routine programming needs

• 100% of respondents did not feel overwhelmed at all by the distance technology
Conclusions

• T levels are not significantly different between in-person and remote conditions → it can be done!

• Activation or device/equipment checks should be done in-person.
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