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CI2020 Online - Session 2

May 4, 2020

Presenters:
Michael Canfarotta, MD; Matthew Carlson, MD; Ivette Cejas, PhD;
Michael F. Dorman, PhD; Barbara Foster, AuD; Darla Franz;
Erika Gagnon, AuD; Ann Geers, PhD; Meredith Holcomb, AuD, CCC-A;
Jacob Hunter, MD

AudiologyOnline Course #35061

This handout accompanies Session 2 which covers the following topics:

- Cochlear Implantation in Young Children
- Supporting Patients and Families
- Increasing CI Market Penetration and Practice Management
- Closer to Hearing for Every Individual with MED-EL.

Cochlear Implantation in Young Children

Presenters:

Matthew Carlson, MD
Ann Geers, PhD
Erika Gagnon, AuD

Handouts for this Dr. Carlson's presentation will not be provided

Speech production and speech intelligibility as independent and interdependent outcomes in long-term pediatric implant users

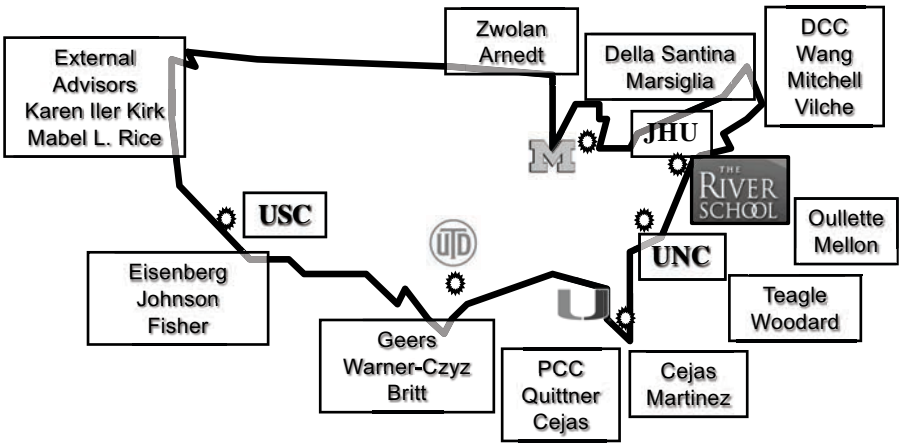
Ann Geers[1], Andrea Warner-Czyz[1], Nae-Yuh Wang[2], Christine Mitchell[2], Kathryn Wiseman[1], Laurie Eisenberg[3], and the CDaCI Investigative Team

[1]*The University of Texas at Dallas;* [2]*Johns Hopkins University;*
[3]*University of Southern California*

Childhood Development after Cochlear Implantation (CDaCI)

1

Childhood Development after Cochlear Implantation Study (CDaCI)



Childhood Development after Cochlear Implantation

2

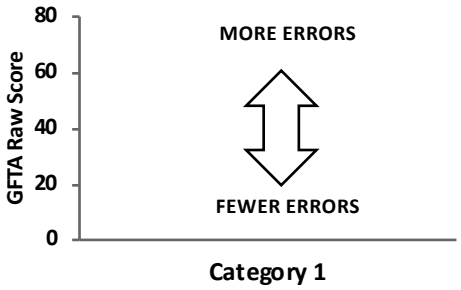
Participants (*n* = 120)

- Mean age at CI activation: 2.4 years (*SD* = 1.2)
- Duration of CI experience: 4 to 8 years
- 53.5% female
- 27.7% bilateral CI users by 4 years post-CI

3

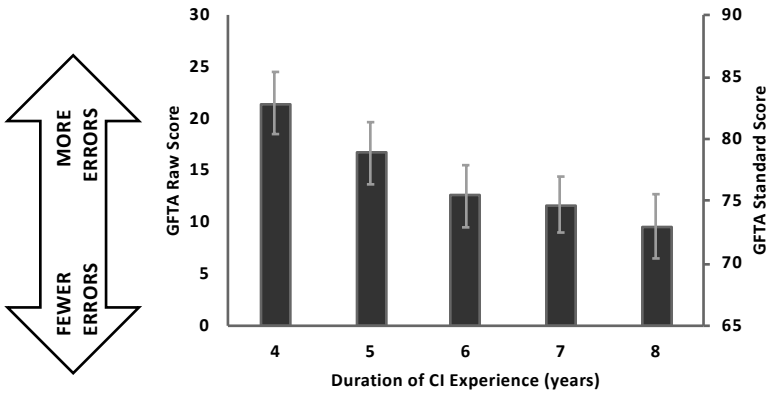
Measuring Articulation

- Goldman-Fristoe Test of Articulation-2



4

Mean number of errors and standard scores on the GFTA, 4-8 years post-CI



5

Predictors of Phoneme Production

- Longer duration of CI experience: 4 to 8 years
- Younger age at amplification
- Older age at onset of HL
- Better speech perception pre-implant
- Younger age at implantation

6

McGarr Sentence Intelligibility Test

- 36 English sentences
- 3, 5, and 7 syllables
- Keywords with **high** and **low** context

Read the book.

Is the fat baby crying?

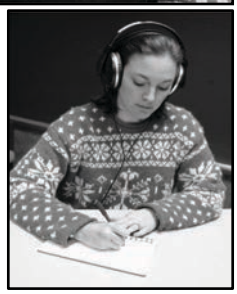
I need it.

The flag is red, white, and blue.

McGarr (1981)

7

McGarr Sentence Intelligibility Test



- 36 English sentences
- 3, 5, and 7 syllables
- Keywords with **high** and **low** context

Read the book.

Is the fat baby crying?

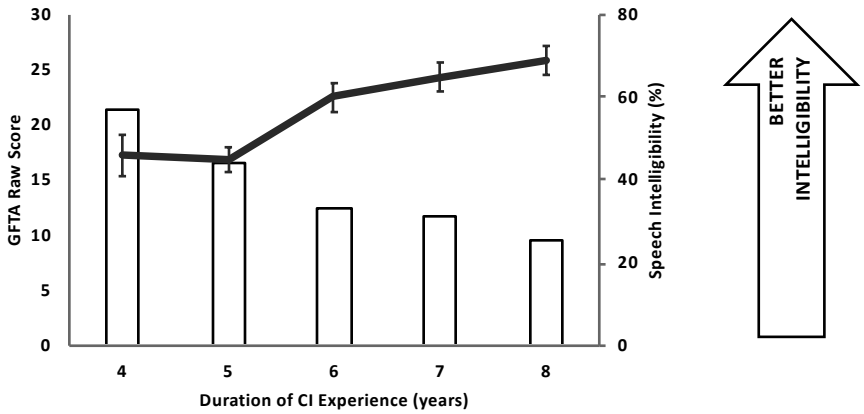
I need it.

The flag is red, white, and blue.

McGarr (1981)

8

Mean number of errors on the GFTA and speech intelligibility, 4-8 years post-CI



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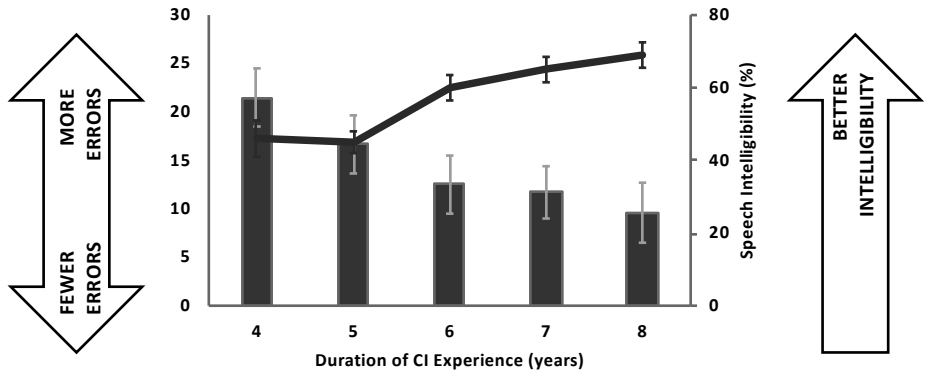
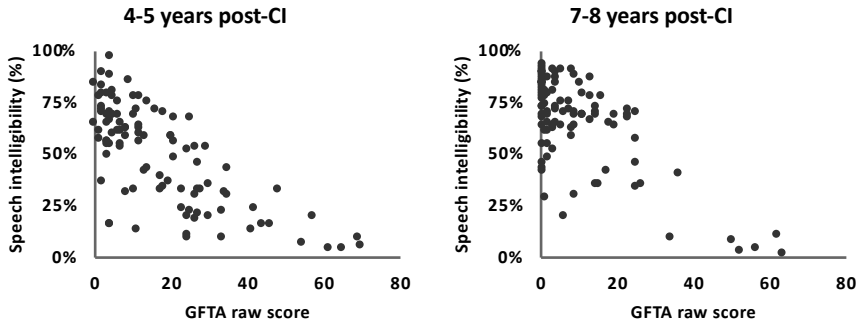
Mean number of errors on the GFTA and speech intelligibility, 4-8 years post-CI



10

Production accuracy does not guarantee speech intelligibility.

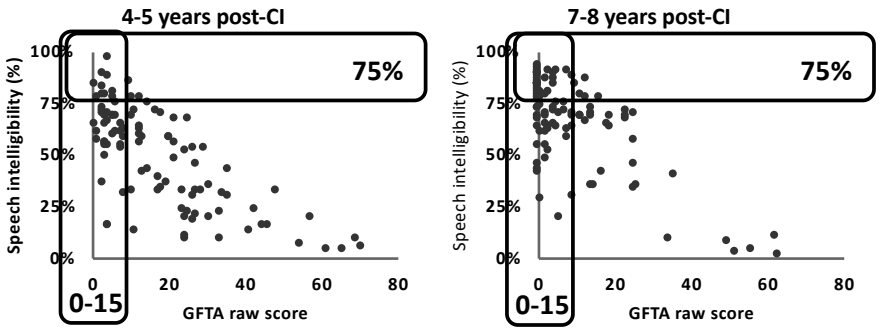


r = -0.73, *p* < .001

r = -0.71, *p* < .001

11

Production accuracy does not guarantee speech intelligibility.



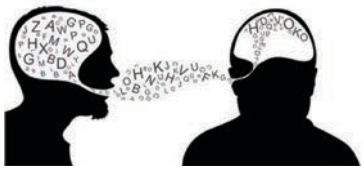
r = -0.73, *p* < .001

r = -0.71, *p* < .001

12

Predicting Intelligibility from Speech Articulation

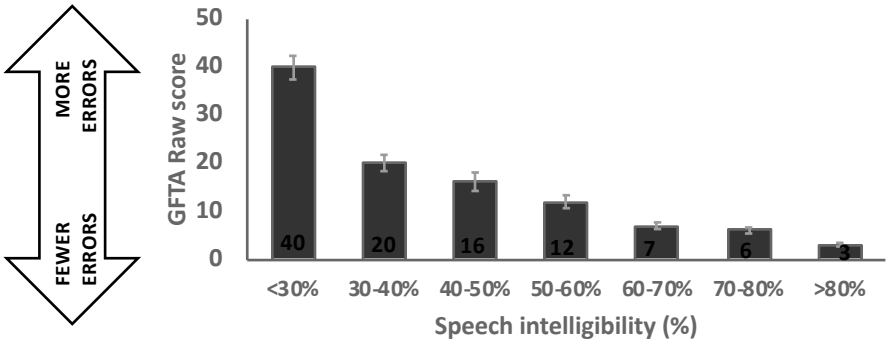
Speech articulation ≠ **Speech intelligibility**



Ertmer, 2010.

13

Can you use GFTA scores to estimate speech intelligibility in CI users?



14

Conclusions

- Mean consonant accuracy and speech intelligibility continue to improve after 4 years of CI experience.
- After controlling for CI experience, better speech production is associated with better access to sound at the youngest age possible.

15

Conclusions

- A complex relationship exists between production accuracy and speech intelligibility.
- Production accuracy is necessary but not sufficient for intelligible speech.

16

Defining and Exploring the Impact of Full-Time Use in Pediatric Cochlear Implant Users

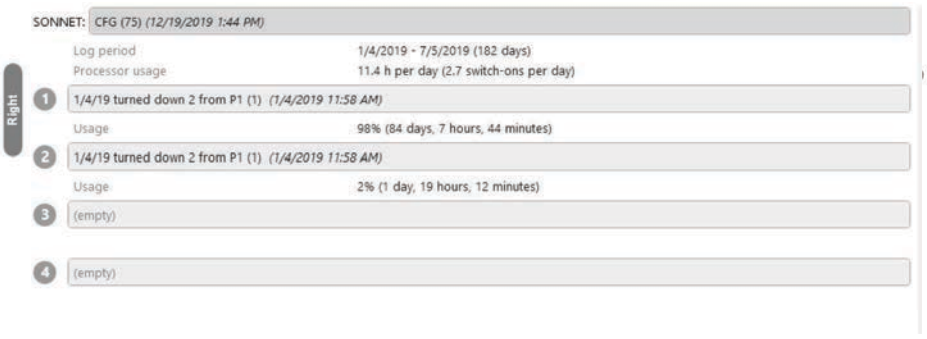
Erika B. Gagnon AuD, Hannah Eskridge MSP,
Kevin Brown MD PhD, Lisa Park AuD

1

Datalogging

- Objective measurement from the programming software regarding a recipient's device use.
- Manufacturer information may include:
  - Time processor is powered on
  - Time coil is connected to receiver/stimulator
  - Time coil is disconnected from receiver/stimulator
  - Number of times device is powered on
  - Program usage
  - Streaming
  - Listening environment

Datalogging



"Eyes Open Hours"

"All Waking Ears On"

Device Wear Time in Literature

- Outcomes and Achievement of Students Who Grew Up with Access to Cochlear Implants (Spencer et al, 2004)
  - 8 waking hours
- Rates of Long-Term Cochlear Implant Use in Children (Contrera et al, 2014)
  - 8 hours
- Factors Affecting Daily Cochlear Implant Use in Children: Datalogging Evidence (Easwar et al, 2016)
  - 9.86 hours
- A Multicenter Clinical Evaluation of Datalogging in Cochlear Implant Recipients Using Automated Scene Classification Technologies (Cristofari et al, 2017)
  - 9-10 hours

Hearing Hour Percentage

- "The HHP compares the amount of time the subject had access to sound to the amount of time a typically developing child with normal hearing would have access to sound." (Park et al, 2019)

Hearing Hour Percentage

- HHP Equation: (Wear Time/Mean Awake Time)*100
  - Mean wake time derived from a pediatric sleep meta-analysis (Galland et al, 2012)

Age	Average Potential Input Hours
Under 3 Months	9.4
3 Months	10.4
6 Months	11.1
9 Months	11.4
12 Months	11.1
2 Years	12
3 Years	12.25

7

Hearing Hour Percentage

- Park et al (2019) found that age of full-time use (80% HHP) was a great predictor of speech and language outcomes at age 3 over age at implantation
- Gagnon et al (2020) found that after one year of cochlear implant use, HHP was a significant predictor of receptive language scores

8

8 Hours of Device Use…

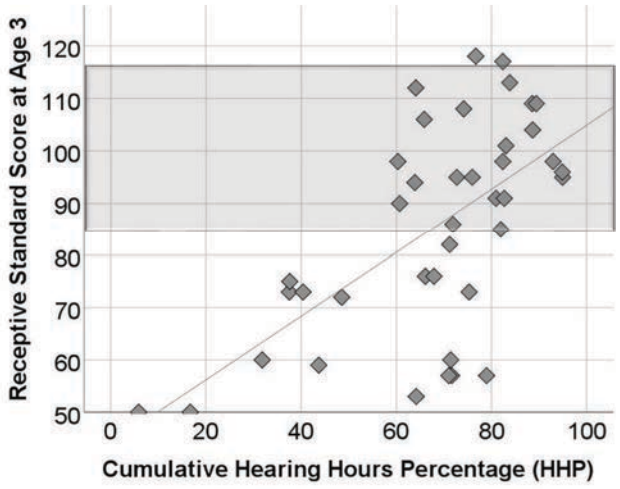
72% HHP in a 12 month old

64% HHP in a 4 year old

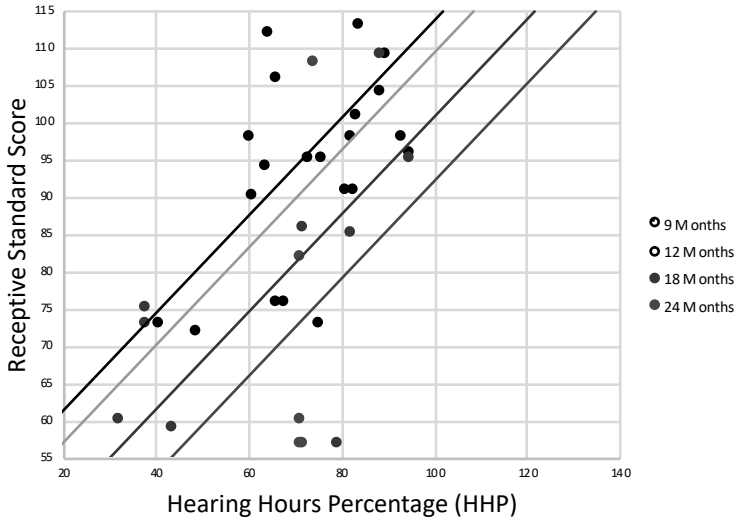
Methods

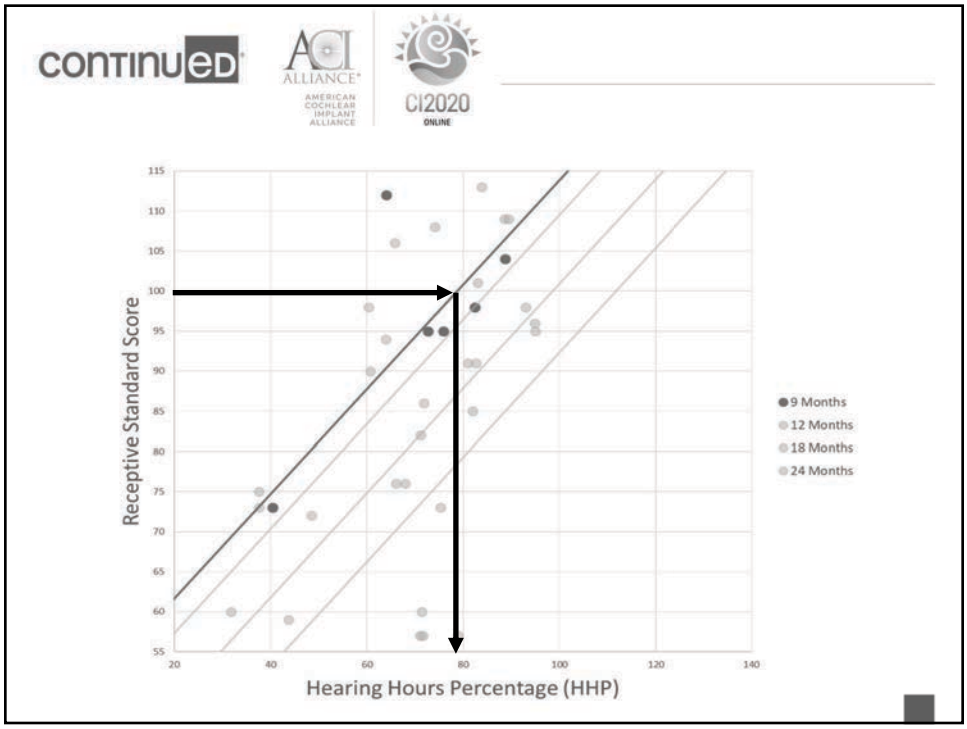
- Retrospective review of 40 congenitally deafened children implanted at approximately 2 years or under
  - No malformations that would preclude language development
  - Speech processor capable of datalogging
  - Speech and language testing completed at approximately 3 years
  - Minimum of one year of cochlear implant use
- Cumulative HHP was calculated from inception of device use to date of speech and language evaluation
- Multiple regression analysis completed including HHP and standard speech and language scores

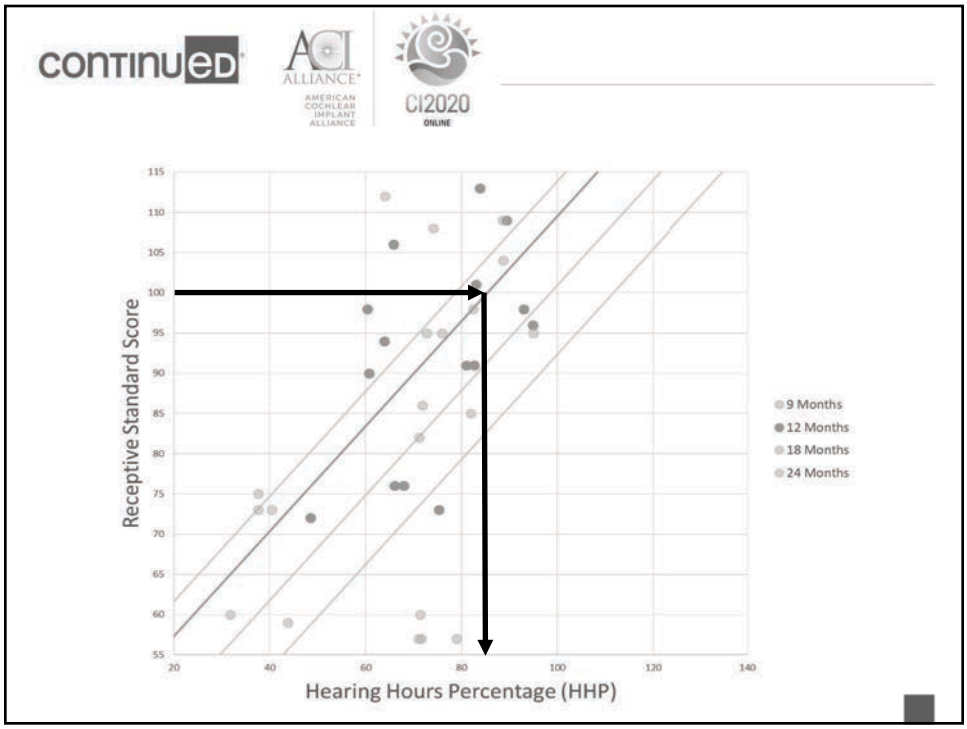
Receptive Language



R^2 = 0.546
***p* < 0.001**
(overall model)




Receptive Standard Score
Hearing Hours Percentage (HHP)
9 Months
12 Months
18 Months
24 Months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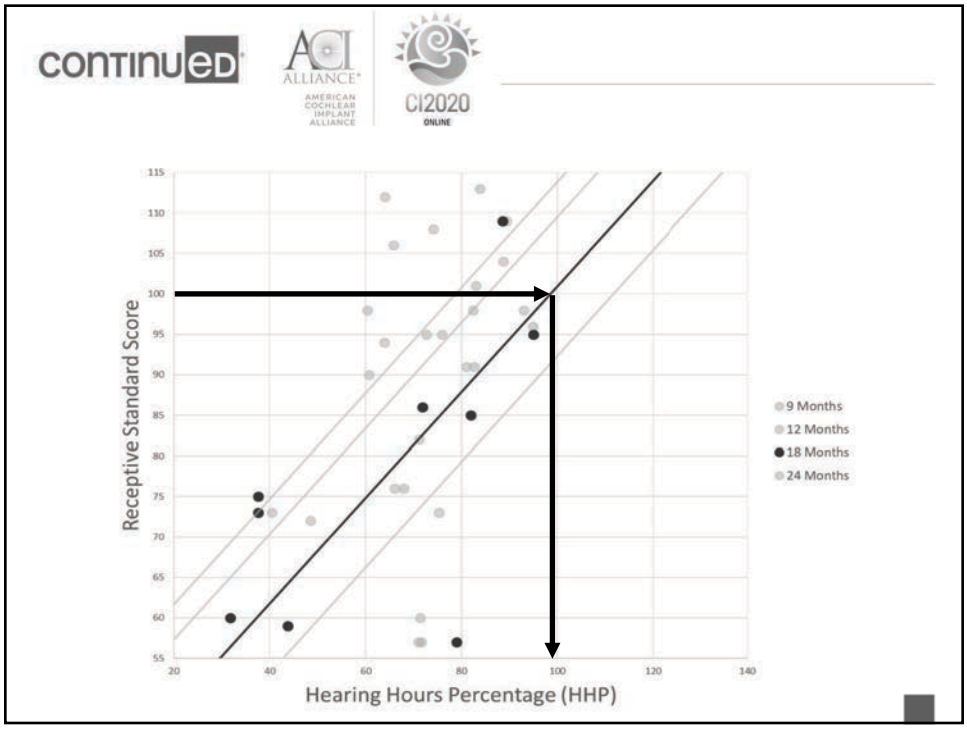
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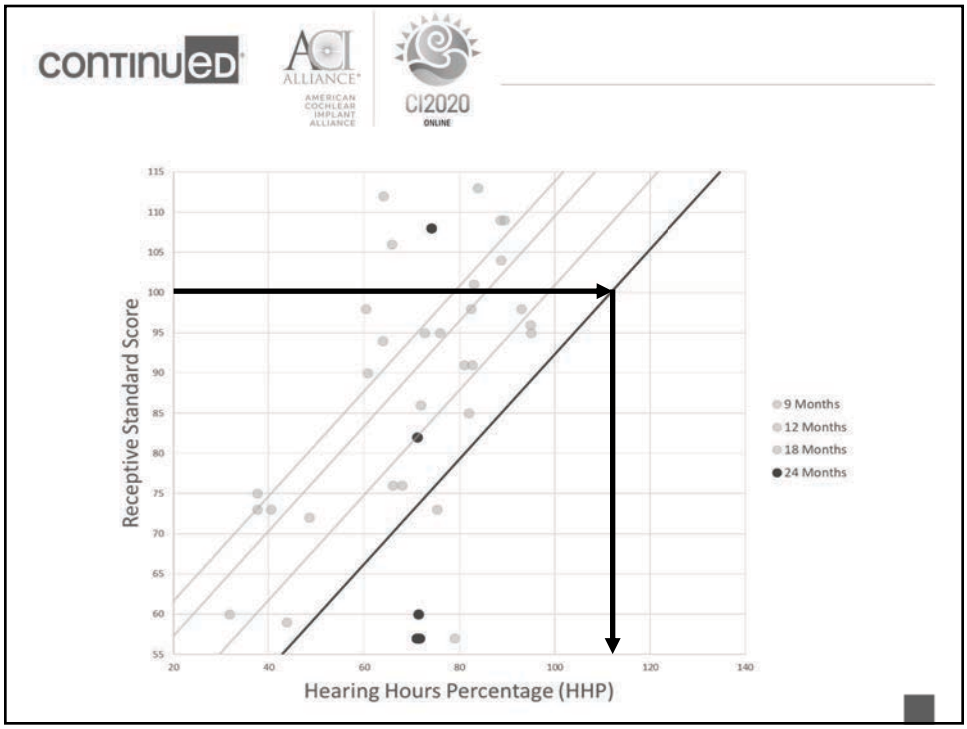
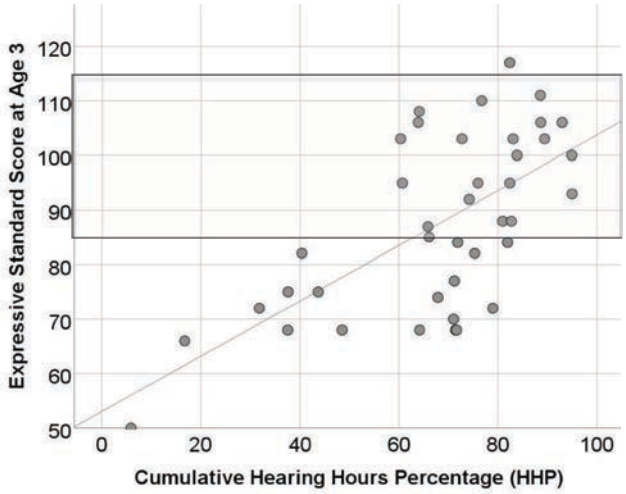

Receptive Standard Score
Hearing Hours Percentage (HHP)
9 Months
12 Months
18 Months
24 Months

Receptive Language and HHP

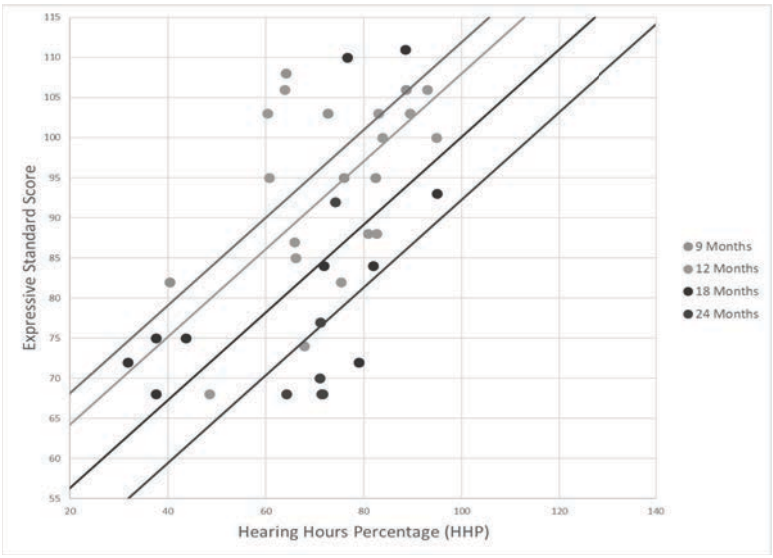
- Standard Score: 100

Age at Implantation	9 Months	12 Months	18 Months	24 Months
HHP	**79%**	**85%**	**99%**	**112%**

Expressive Language



R^2 = .637
***p* < 0.001**
(overall model)


Expressive Standard Score
Hearing Hours Percentage (HHP)
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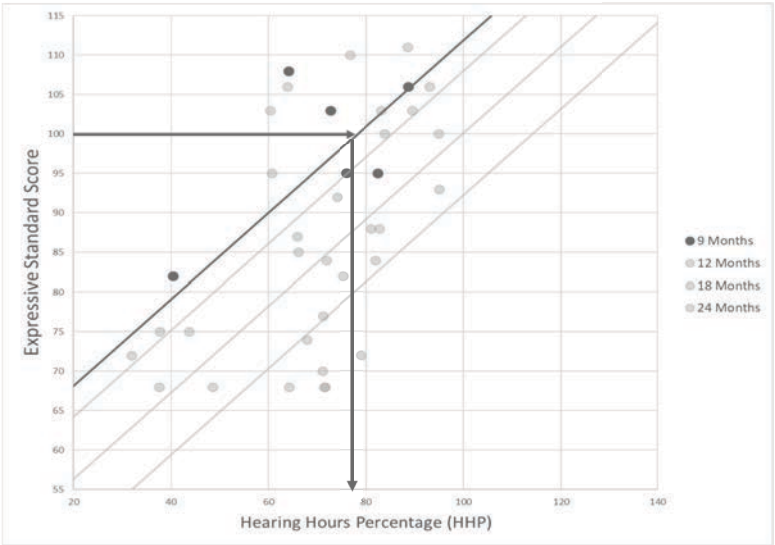
12 Months
18 Months
24 Months


Expressive Standard Score
Hearing Hours Percentage (HHP)
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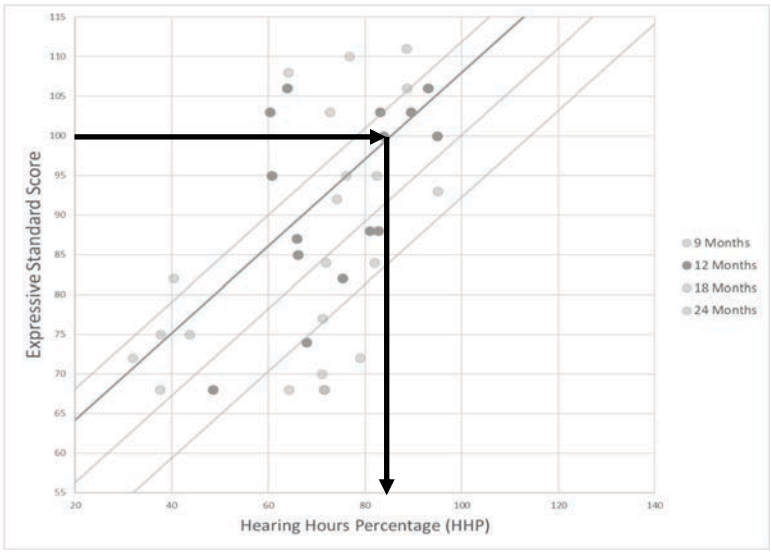
12 Months
18 Months
24 Months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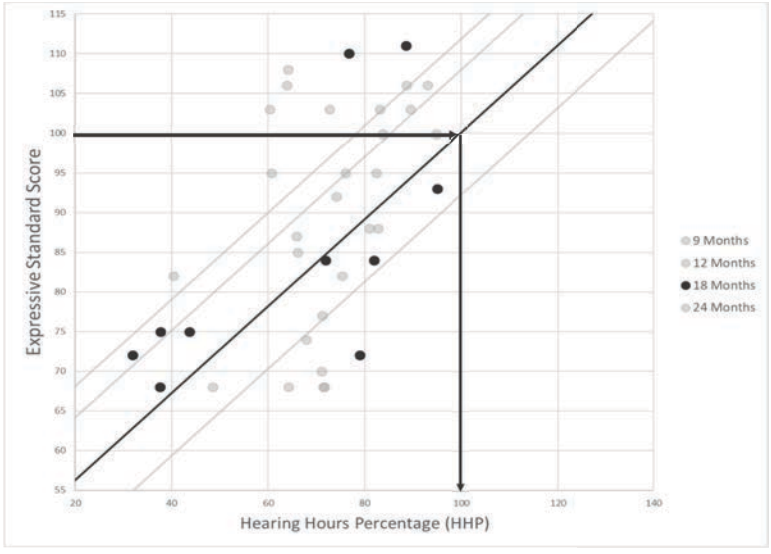
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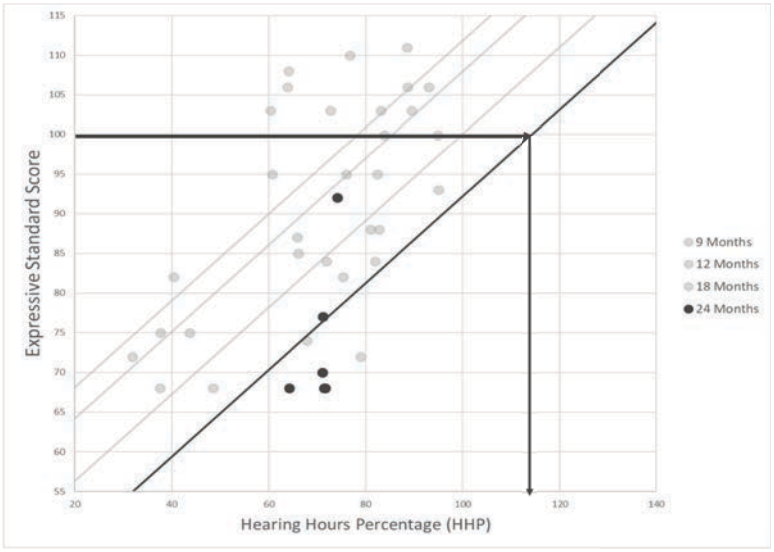
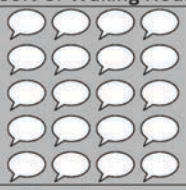


Expressive Language and HHP

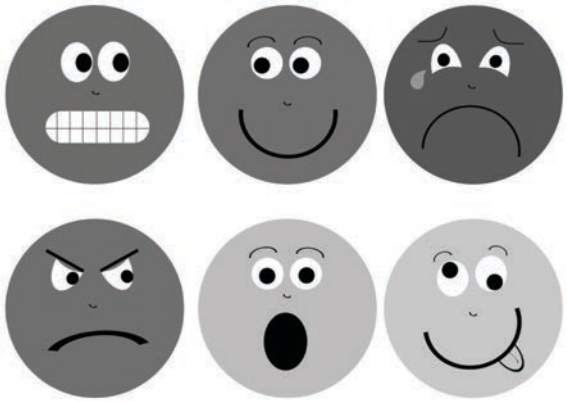
- Standard Score: 100

Age at Implantation	9 Months	12 Months	18 Months	24 Months
HHP	**78%**	**85%**	**100%**	**114%**

Why Cochlear Implant Wear Time Matters?

Child A Listens...	Child B Listens...	Child C Listens...
100% of Waking Hours	60% of Waking Hours	20% of Waking Hours
		
Normal spoken language at age 3	Delayed spoken language at age 3	Severely delayed spoken language at age 3
More speech in= More speech out		
Children implanted over 12 months need to listen more than 80% of their day for normal spoken language scores.		

The Wear Time Talk…



Conclusions

- Wear time recommendations should reflect a child's age and normal hearing peer's access to sound
- Hearing Hour Percentage is a viable wear time metric
- Cumulative Hearing Hour Percentage was found to be a statistically significant factor in both receptive and expressive speech and language development at age 3

Conclusions

- Wear time goals should be set to a minimum of 80% HHP with the ultimate goal of 100% HHP
- Lower age at implantation with increased device use yielded better speech and language standard scores

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NC TraCS

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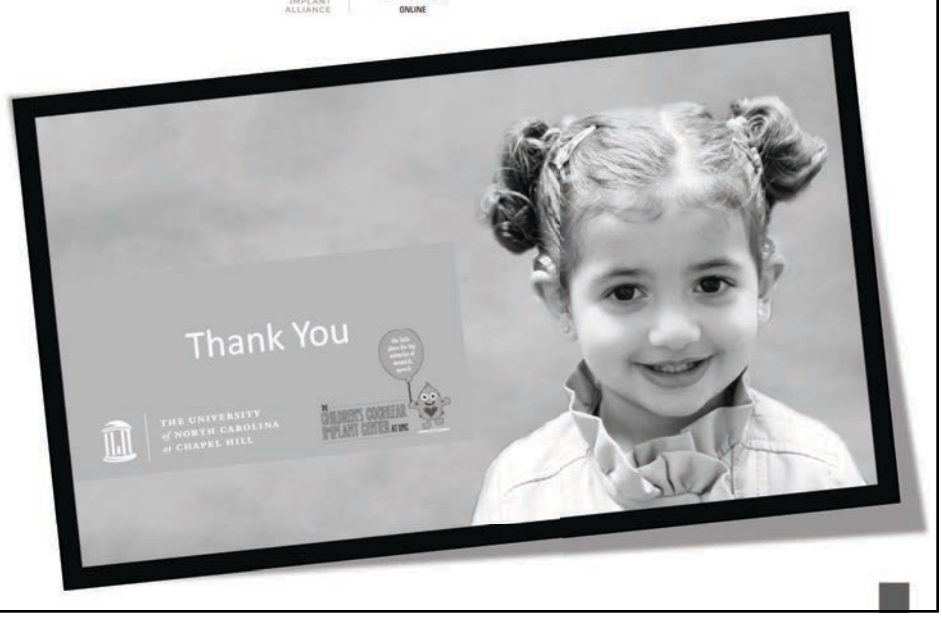


Supporting the Patient and Family

Presenters:

Ivette Cejas, PhD

Joanne Travers

Holly Teagle, AuD

Parenting Stress, Self-efficacy & Involvement: Impact on Spoken Language

Ivette Cejas, PhD
Christina Sarangoulis, BA
Christine Mitchell, MPH
Alexandra L. Quittner, PhD

What is Parenting Stress?

- Stress: the physiological or psychological response to internal or external stressors
- Stress affects every system of the body, influencing how people feel and behave" (https://dictionary.apa.org/stress).
- Parenting stress can be general and/or context specific
  - General: discipline, safety
  - Context specific: managing child's cochlear implant, explaining child's hearing loss to others

Parenting Stress: What We Know

Parenting Stress and Language

- There is a significant correlation between parent stress and child vocabulary (Sarant, J., Garrard, P. 2014)
- Parents who were less stressed had children with better language outcomes (Sarant, J., Garrard, P. 2014)
- Parents experienced significantly more stress when their children had delayed language (Sarant, J., Garrard, P. 2014)
- Parenting stress was negatively related to language development in deaf children (Markman, MM., et al. 2011)

- Parenting stress in parents of children with hearing loss
  - Some studies report stress levels are the same for parents with children with hearing loss and parents with children with normal hearing (Asberg et al., 2008; Meadow-Orlans, 1994; Pipp-Siegel et al., 20002)
  - However, context specific stress is higher in parents of children with hearing loss (Quittner et al., 2010)
    - Parents reported "communication difficulties, educational concerns, maintaining hearing aid devices, and having to be a language teacher for their child" as stressful
    - Language delays also impacted parenting stress through child behavior problems

3

What is Self Efficacy?

- Self-efficacy: how confident someone feels about changing a specific behavior

4

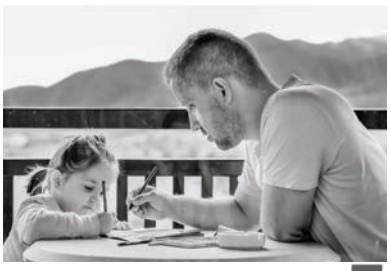
Self Efficacy: What We Know

- Fathers with a greater reported self-efficacy were more involved with their child's development and education. This is both self-reported and mother reported (Ingber, S., Most, T., 2012)
- "Mothers' perceived competence and involvement in developing their children's language skills" was significantly positively related to the mothers' qualitative linguistic input and qualitative facilitative language techniques (DesJardin, JL., Eisenberg, L. 2007)

5

What is Parental Involvement?

- Definitions of parental involvement vary across studies
  - Following through with interventions (DesJardin, 2003)
  - Family participation in early intervention (Moeller, 2000)
- Despite varying definitions, there is a positive relationship between parental involvement in their child's education program and academic success for children with normal hearing and children with hearing loss (DesJardin, 2003)



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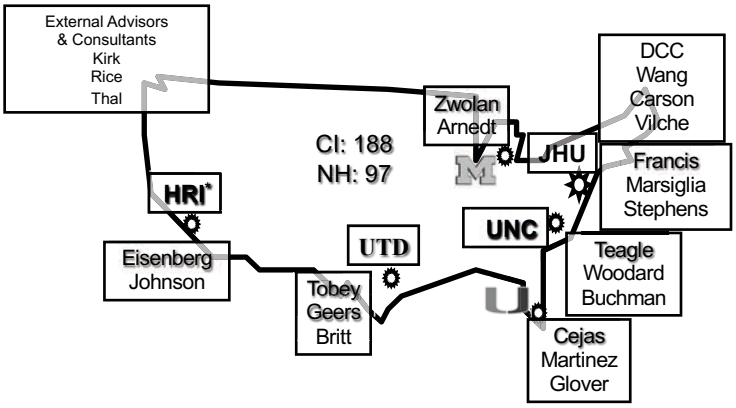
Parental Involvement: What We Know

- When parents are confident in their decision to get their child a CI they are more likely to be active in their child's rehabilitation (Zaidman-Zait, A., 2008)
- Parents who are involved in their child's early intervention before 11 months, had children with better language outcomes at 5 years old (Moeller, 2000)
- Maternal sensitivity (MS) and linguistic stimulation (LS) predict significant increases in the growth of spoken language (Quittner et al., 2013)
  - The magnitude of effects of MS and LS on the growth of language was similar to that found for age at cochlear implantation

7

Childhood Development after Cochlear Implantation

Study PI: Niparko/Eisenberg



* Researchers & participants from HRI have now moved to USC

8

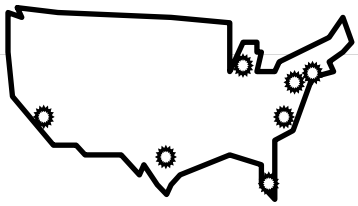
Demographics

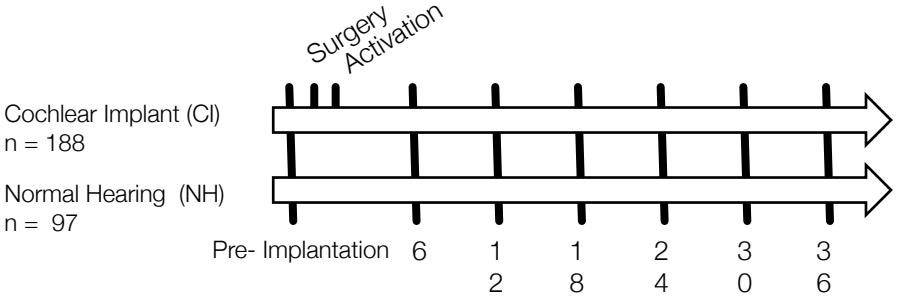
Child	CI (n=188)	NH (n=97)
Age (years)	2.2 (1.2)	2.3 (1.1)
Gender		
Male	90 (48%)	37 (38%)
Female	98 (52%)	60 (62%)
Ethnicity		
Non-Hispanic	145 (77%)	86 (89%)
Hispanic	37 (20%)*	9 (9%)*

Parent	CI (n=188)	NH (n=97)
Age 30-39	96 (51%)	59 (61%)
College Graduate	92 (49%) *	81 (84%) *
Income > $100,000	31 (16%)*	49 (51%) *

9

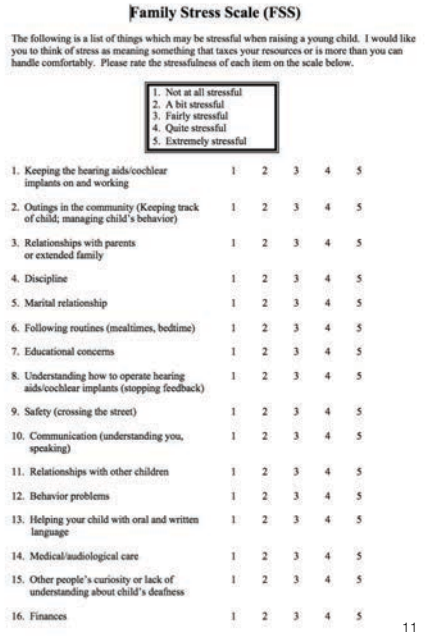
Childhood Development after Cochlear Implantation





Family Stress Scale

- Developed by Quittner and colleagues
- Parents rated how stressful each task is on a 5-point Likert scale
  - 1= Not at all stressful
  - 5= Extremely stressful
- Brief: 16 items



Family Stress Scale (FSS)

The following is a list of things which may be stressful when raising a young child. I would like you to think of stress as meaning something that taxes your resources or is more than you can handle comfortably. Please rate the stressfulness of each item on the scale below.

1. Not at all stressful
2. A bit stressful
3. Fairly stressful
4. Quite stressful
5. Extremely stressful

1. Keeping the hearing aids/cochlear implants on and working	1	2	3	4	5
2. Outings in the community (Keeping track of child; managing child's behavior)	1	2	3	4	5
3. Relationships with parents or extended family	1	2	3	4	5
4. Discipline	1	2	3	4	5
5. Marital relationship	1	2	3	4	5
6. Following routines (mealtimes, bedtime)	1	2	3	4	5
7. Educational concerns	1	2	3	4	5
8. Understanding how to operate hearing aids/cochlear implants (stopping feedback)	1	2	3	4	5
9. Safety (crossing the street)	1	2	3	4	5
10. Communication (understanding you, speaking)	1	2	3	4	5
11. Relationships with other children	1	2	3	4	5
12. Behavior problems	1	2	3	4	5
13. Helping your child with oral and written language	1	2	3	4	5
14. Medical/audiological care	1	2	3	4	5
15. Other people's curiosity or lack of understanding about child's deafness	1	2	3	4	5
16. Finances	1	2	3	4	5

11

Scale of Parental Involvement and Self-Efficacy (SPISE)

- Developed by DesJardin in 2002
- 25 questions
- Parents rate their involvement & self-efficacy on a Likert scale
- Sample Questions
  - "How much do you feel that you know how to help your child develop words?"
  - "How comfortable are you participating in the home visits/therapy with your child?"
  - "How hard is it for you and your child to go to scheduled appointments with the audiologist and/or speech and language therapist?"

Scale of Parental Involvement and Self-Efficacy (SPISE)
For Young Children with Hearing Loss

Developed by Jean L. DesJardin

Today's Date _____

Parent Information

Participant's Name: _____ Male ___ Female ___

Relationship to the child _____

Child Information

Child's Name _____ Male ____ Female ____

Age of child _____

Please circle a number from 1 – 7 for each of the following questions.

1. How much do you feel that you know about and are able to check and put on your child's hearing aids or cochlear implant on a daily basis?

1 Not at all 2 3 4 Somewhat 5 6 7 Very much

2. How much do you feel that you know about and are able to adjust the settings of your child's hearing aids (volume) or cochlear implant (programs) on a daily basis?

1 Not at all 2 3 4 Somewhat 5 6 7 Very much

3. How much do you feel that you know about and are able to check your child's listening skills using the six Ling sounds (a, oo, ee, s, sh, m) on a daily basis?

1 Not at all 2 3 4 Somewhat 5 6 7 Very much

4. How much do you feel that you know how to help your child develop sounds?

1 Not at all 2 3 4 Somewhat 5 6 7 Very much

5. How much do you feel that you know how to help your child develop words?

1 Not at all 2 3 4 Somewhat 5 6 7 Very much

6. How much do you feel that you know about and are able to do speech/language activities/strategies with your child at home on a daily basis?

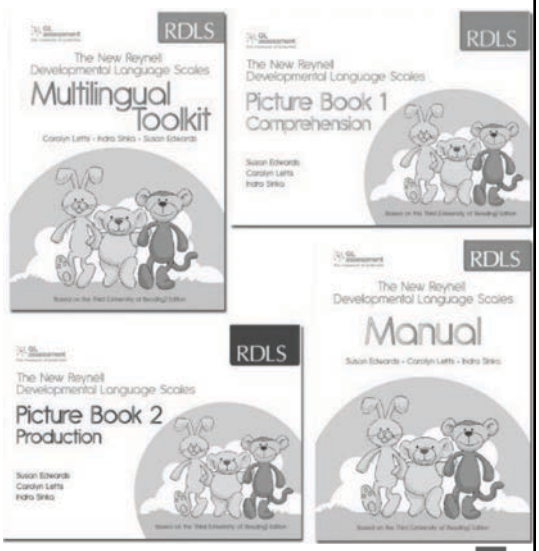
1 Not at all 2 3 4 Somewhat 5 6 7 Very much

1

12

Reynell Development Language Scales

- Measures expressive and receptive language skills in children 1-6 years old
  - Comprehension Scale
    - Vocabulary and grammar understanding
  - Production Scale
    - Ability to vocalize vocabulary and grammar understanding



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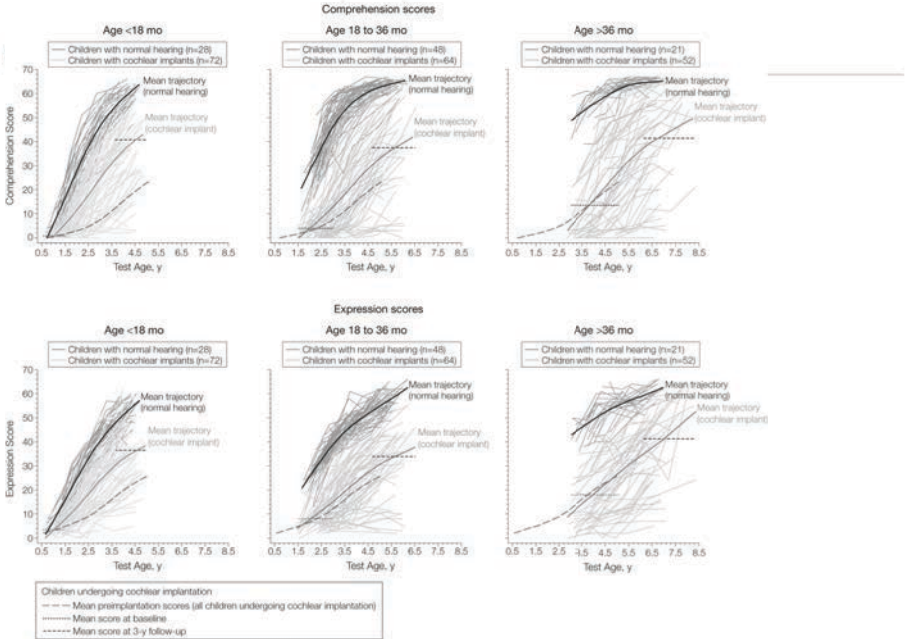
Results

14



From: **Spoken Language Development in Children Following Cochlear Implantation**
JAMA. 2010;303(15):1498-1506. doi:10.1001/jama.2010.451

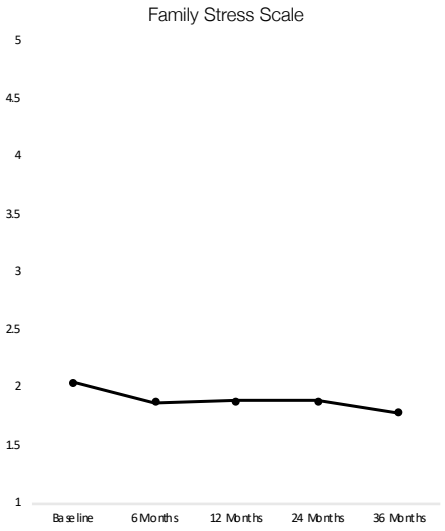
Date of download: 4/6/2020

15

	Baseline	6 Months	12 Months	24 Months	36 Months
Reynell-Receptive	64.8483	67.32597	69.13483	71.88824	72.56209
Reynell-Expressive	64.8661	67.44199	67.99438	70.15294	72.78431
Family Stress Scale	2.05448	1.883745	1.894693	1.889619	1.784041
SPISE- Self-Efficacy	5.57098	5.990595	6.111798	6.221345	6.271098
SPISE-Parental Involvement	6.0181	6.282289	6.369989	6.270994	6.235583

All changed significantly over time ($p<.05$) except parental involvement

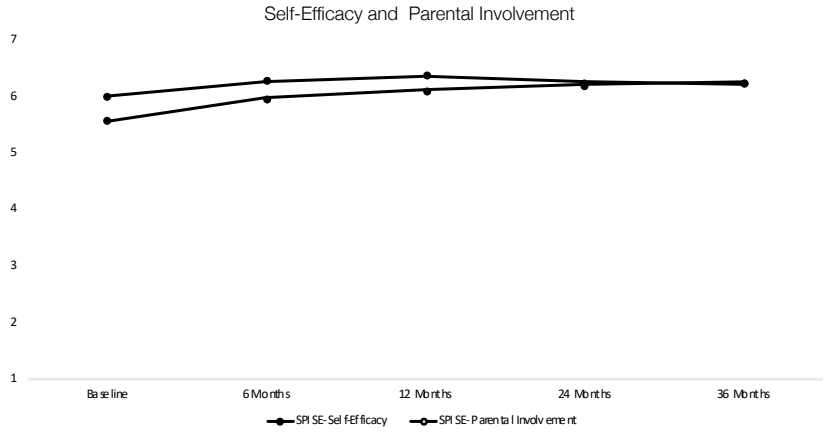
16



Most Common Reported Stressors (Quittner et al., 2010)

1. Communication (understanding you, speaking)
2. Finances
3. Educational concerns
4. Safety (crossing the street)
5. Keeping the hearing aids/cochlear implants on and working

17



18

	fss0	fss12	fss24	fss36	psef0	psef12	psef24	psef36	pinv0	pinv12	pinv24	pinv36
fss0	1											
fss12	0.45	1										
fss24	0.34	0.53	1									
fss36	0.46	0.56	0.56	1								
psef0	-0.34	-0.27	-0.18	-0.17	1							
psef12	-0.28	-0.44	-0.32	-0.34	0.46	1						
psef24	-0.37	-0.39	-0.40	-0.41	0.45	0.68	1					
psef36	-0.22	-0.25	-0.30	-0.46	0.37	0.62	0.65	1				
pinv0	-0.39	-0.35	-0.19	-0.10	0.47	0.42	0.44	0.27	1			
pinv12	-0.27	-0.33	-0.34	-0.13	0.33	0.61	0.46	0.26	0.45	1		
pinv24	-0.28	-0.33	-0.45	-0.33	0.26	0.48	0.63	0.41	0.38	0.61	1	
pinv36	-0.16	-0.23	-0.28	-0.33	0.30	0.44	0.42	0.57	0.25	0.44	0.53	1

Key:	ns	<0.05	<0.01	<0.001	<0.0001

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Results

- Higher stress scores on the FSS were significantly associated with worse parental involvement (r= -.33, p < .0001), self-efficacy (r- -.46, p < .0001), and spoken language (r= -.24 , p < .01)
- Self-efficacy was positively correlated with spoken language (r=.34, p < .0001)
- Correlation between parental involvement and language was not significant (r= .34, p < .08)

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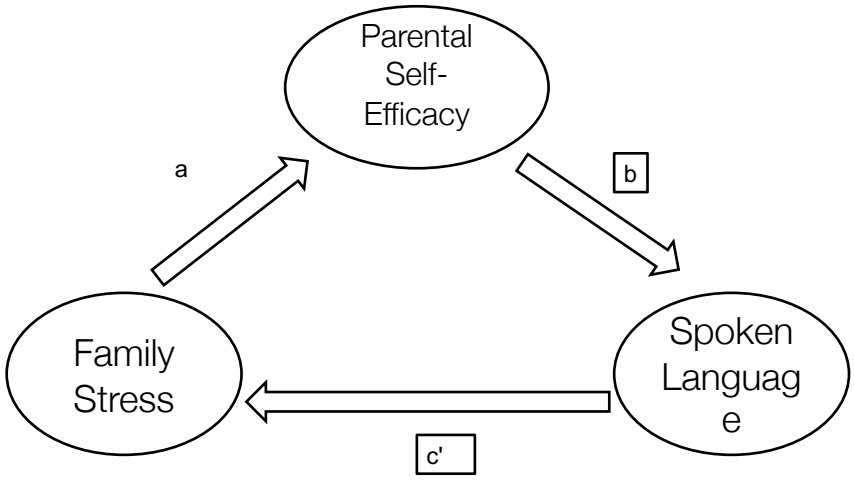

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Results: Self Efficacy as a Mediator

- Statistically significant associations among all variables with strong mediating effects
- Direct effect of parenting stress on language outcomes was -6.84, accounting for 18% of the variance (R2 =.18, p<001)
  - This was significantly reduced with the addition of parental self-efficacy as a mediator
- Higher parenting stress was associated with worse self-efficacy, which then predicted worse language outcomes

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Clinical Implications

- When working with children with cochlear implants, it is important to address how the parent is coping and feeling in addition to the child
- Parenting stress and self efficacy are associated with children's language outcomes 3 years post-implantation and should be targeted for appropriate clinical interventions

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How to help your families

- Decrease parenting stress
  - Help parent feel confident in their decisions (decision to get their child a cochlear implant, device selection, educational placement, etc.)
  - More knowledge and skills = less stress
  - Encourage parent to take time for themselves to recharge
  - Help parent locate support systems
- Refer when needed
  - If parent is continually reporting feeling stressed, refer him/her to counselling or a psychology consultation

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Improving parent self-efficacy & involvement

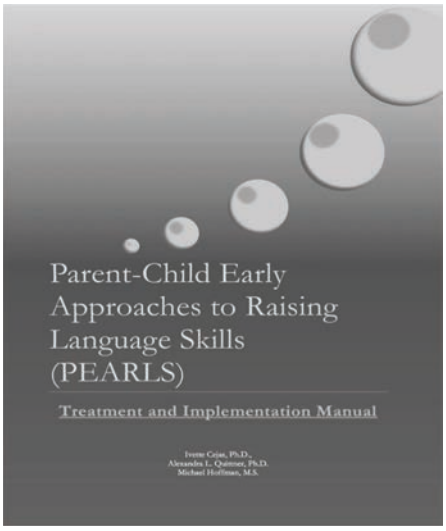
Strategies

- Look to the past
- Encourage and praise successes
- Discuss and learn from less successful attempts
- Look at ways to improve where the parent is less confident
- If path is not clear, use brainstorming or problem solving
- Look at what is realistic
- Involve support system in consultation
- Set simple attainable goals
- Look at the bigger picture
- Reframe obstacles

26

PEARLS

- 10 session intervention
- Focus on coaching parents on improving
  - Maternal Sensitivity
  - Facilitative Language Techniques
- Incorporated in weekly auditory-verbal therapy
- Tailored to each family and incorporates practice at home
- Available in English & Spanish
- Sample Session: Parental Sensitivity
  - Stepping Forward
  - Stepping Back
  - Staying Warm and Positive
- For more information about PEARLS please send email to icejas@med.miami.edu



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CONTINUED
ACI ALLIANCE
AMERICAN COCHLEAR IMPLANT ALLIANCE
CI2020
ONLINE
Thank
U
28

Character Strengths, science and practice

an essential approach to coach and empower parental caregivers

Joanne Travers

Founder/Executive Director, Partners for A Greater Voice, Inc.

Author, *Coaching and Empowering Caregivers of Children with Hearing Loss, an approach to foster well-being*

www.greatervoice.com / 978.312.1200 / ACI202 Convention / booth #

Background

- Parent of two aural deaf and hard of hearing children raised in mainstream schools (*2 with ushers, 1 w/learning disability*)
- Worked at college in international economic development
- Started 2 non-profits:
  1) Parent Support Group
  2) PGV: International training and education projects in low resource communities (~20 yrs)
- Author, *Coaching and Empowering Caregivers of Children with Hearing Loss, an approach to Foster Well-being (2019)*

Intention for Today's Presentation

- To prioritize caregiver's psychological well-being
- To offer innovative health delivery that enables parents
- To encourage a positive psychology approach
- To introduce the science and practice of Character Strengths Intervention

Global Movement in Health Systems Delivery

- Culture-shifting ideas and actions that accelerate a mindset for new and generative thinking
- International Program Design that builds connections and drives action in innovative ways
- Increase in a programmatic focus on holistic practices, such as mindfulness and meditation
- Momentum for achieving Sustainable Development Goals (SDGs) and Millennial goals

Evidence Based or Value Driven?

- In the pursuit of a rich, meaningful life, there is a growing body of science suggesting that our greatest values guide our behavior.

Beliefs:

- Assumptions we hold to be true.

Values:

- Principles that motivate us in making decisions when we are aligned with our potential and capabilities.

Why focus on caregiver well-being?

- Caregiver psychological well-being is essential in child development (social, emotional, cognitive).
- *The well-being of our children is often dependent on their environment, including the nurturing care they receive from their family, mothers, guardians, teachers, medical practitioners.*

- (Knitzer, 2000; Luthar and Sexton, 2007; Rahman et al., 2013); Jones and Prinz, 2005; Parenting Matters, NASEM, 2016; Luthar et al., 2015; Domitrovich et al., 2017; Modecki et al., 2017; Morris et al., 2017; Smith et al., 2017)

Caregiver Well-being is essential

- According to many development psychologists, caregivers have the most influence on children's social, emotional, physical, and cognitive development when they have good self-perception, emotional health, economical stability, and skills to nurture children successfully.

Caregiver Well-being remains a challenge

- ~75% say they experience degrees of stress (41% high or extremely high).
- >50% say they experience stress frequently, daily.
- >50% rely on medical professionals and early childhood assistance for supports and information
- Audiologists, teachers, parents remain the key players in a caregiver's journey to learn and feel empowered.

Partners for A Greater Voice: Parent Education survey, 2016

Pillars of Psychological Capitol

- Hope
- Efficacy
- Resilience
- Optimism

(Fred Luthans, et al., 2007)

PGV's Model and Focus on Caregiver Well-being

Field of Positive Psychology

- Positive Psychology has been defined as the study of the strengths and virtues (Peterson/Seligman).
- *Martin Seligman* had a vision 20 years ago that Positive Psychology would help people evolve toward their highest potential.
- Scientific tool to measure the best thinking on positive human qualities

To visit VIA Character Institute, go to www.viacharacter.org

Classification of Virtues Associated with 24 Character Strengths

WISDOM	COURAGE	HUMANITY
Creativity	Bravery	Love
Curiosity	Perseverance	Kindness
Judgment	Honesty	Social Intelligence
Love of Learning	Zest	
Perspective		
JUSTICE	**TEMPERANCE**	**TRANSCENDENCE**
Teamwork	Forgiveness	Appreciation of Beauty & Excellence
Fairness	Humility	Gratitude
Leadership	Prudence	Hope
	Self-Regulation	Humor
		Spirituality

Seligman and Peterson, Character Strengths and Virtues, (Oxford, 2004)

Character Strengths Research

- Buffers against stress
- Improves relationships
- Helps people overcome problems
- Enhances health and well-being

(Ryan Niemiec, Character Strengths Intervention, 2017)

India

mumbai

san pedro de macoris

pune

ahmedabad

mumbai

Character Strengths Benefits

- Resilience
- Energy
- Achievement
- Positivity/Self-love
- Happiness
- Gives voice to inner coach

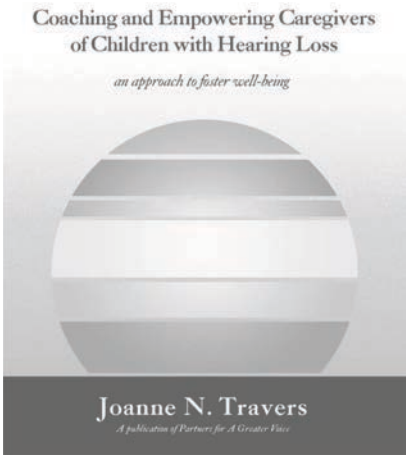
PGV Essential Programs to Coach and Empower, 2017 Travers, Joanne.

The Practice of Character Strengths

- Awareness
  - Identify strengths, learn to appreciate signature strengths
- Exploration
  - Make caregiver aware of these strengths through observation and mindful practices;
- Practice
  - Coach caregivers how to put strengths into daily use

Attend to the mental health of caregivers

- Explore parental values and beliefs
- Empathic listening (active and reflective)
- Be unbiased about communication opportunities
- Ask open ended questions
- Recognize parenting behaviors
- Encourage self-reflection (assessing resilience, personal/capitol resources, parenting capabilities)
- Let parents lead, build partnerships that benefit child's communication and cognitive development



www.greatervoice.com

" I do not believe you should devote much effort to correct your weakness. Rather, I believe the highest success in living and the highest emotional satisfaction comes from building and using our signature strengths."

– Dr. Martin Seligman

Partners for A Greater Voice
www.greatervoice.com
Joanne Travers:
info@greatervoice.com
978.312.1200

Reliability and Efficiency of Smart Phone Remote Assessment of Sound Detection and Speech Perception

Holly FB Teagle, AuD & Team
Auckland, New Zealand

Northern Cochlear Implant Programme

NCIP

THE HEARING HOUSE

1

The Hearing House

Service provider to The Northern Cochlear Implant Programme

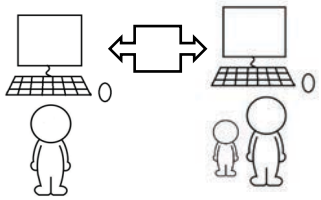
900 clients with CI
- 350 paediatric (< 19)
- 550 adult

- 6.2 FTE Audiologists

2

Client Care Models at The Hearing House

In Clinic



Telemapping with support

Remote Clinics

Current status…

- There is global need for improved access and efficiency in hearing health care.
- Number of CI recipients continues to grow, providers must meet the needs of individual clients, some who reside distances from clinical centres.
- Health care models that promote self-care have been advocated because they empower consumers and reduce costs.
- Applying these technologies in the area of cochlear implant care can bring efficiencies and patient satisfaction if their use is proven to be a reliable reflection of the in-clinic experience.

Smart Phone Apps…

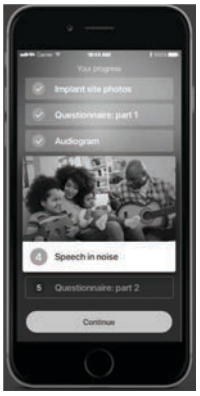
- Are being utilized to as a means of delivering telemedicine services in many domains of healthcare (Majumder & Deen, 2019)
  - cardiovascular activity
  - eye health
  - respiratory and lung health
  - skin health
  - daily activity and fall prevention
  - cognitive function and mental health

- In Audiology
  - Hearing screening
  - Word recognition
  - Reliable, representative of performance and results obtained In typical in-person clinical encounters

Mahomed-Asmail, 2016; Potgieter et al., 2016; Swanepoel et al., 2014; Sandström et al., 2016; Yousuf-Hussein et al. 2016

Remote Check – A New Tool

- A new tool within the Nucleus Smart App
- Allows the client to check their hearing at home (audio and digits in noise test)
- Client questionnaires about concerns and needs
- Results sent to clinician → decides on appropriate follow up
  - E.g. clinic visit, ENT referral, follow up in 1 year etc.

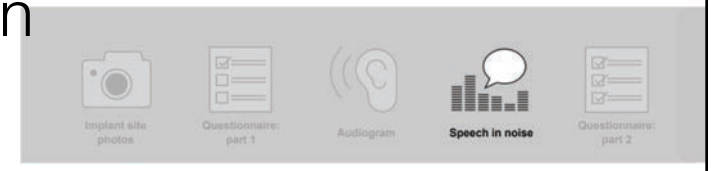


Implant site photos

Audiogram

- CI thresholds for 0.25 – 6 kHz
- Tones are streamed directly to processor
- Client swipes right or left to indicate if they did or didn't hear the sound

Speech in Noise



- Digit Triplet Test in adaptive noise
- Client types numbers in keypad
- Finds threshold SNR

Cochlear Implants International
An Interdisciplinary Journal

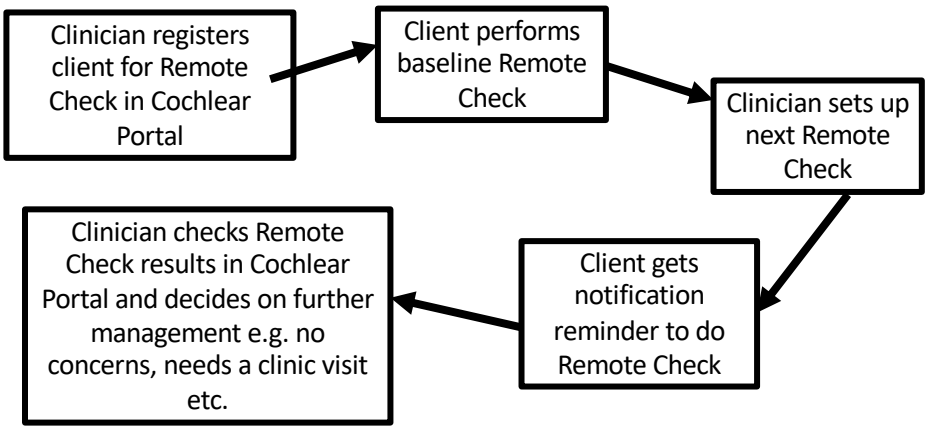
ISSN: 1467-0100 (Print) 1754-7628 (Online) Journal homepage: https://www.tandfonline.com/loi/ycii20

Is the digit triplet test an effective and acceptable way to assess speech recognition in adults using cochlear implants in a home environment?

H. E. Cullington & Talat Aidi

- 85% of participants were able to be tested; no floor or ceiling effects
- DTT SRT highly correlated with clinic BKB sentence scores in quiet and adaptive noise, positive response from users

Remote Check Process



THH Adult Clinic Experience

Characteristics of a Good Candidate

- Computer savvy
- Phone savvy
- Eager to try new technology
- Has support person

Characteristics of a Questionable Candidate

- No iPhone access
- Anxious about technology
- Dexterity issues
- Vision issues
- Literacy issues
- Tinnitus
- No support person

Remote Check Study with Adolescents

- How do Remote Check results compare to results obtained at a normal clinic visit?
  - Audiogram and SIN test
- What do clients and their families think of Remote Check?

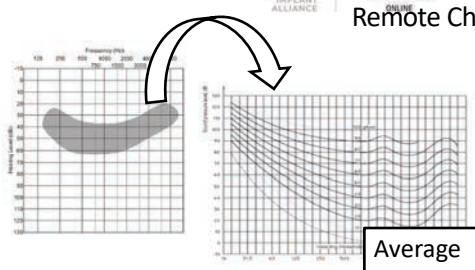
→ How can we incorporate Remote Check into our clinical practice?

Remote Check Study

- Clients
  - Aged: 10-19 (N=16)
  - All with at least 6 months CI experience
- Clinic visit
  - Aided audiogram
  - BKB-SIN
  - Baseline Remote Check completed
- Remote Check completed at home 1 week later
  - Remote Check
  - Questionnaire

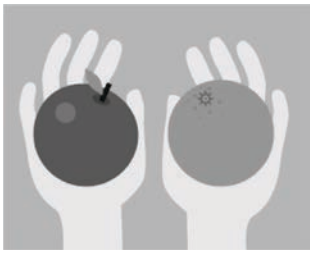
Remote Check results: Audiogram

Remote Check Study : Audio



500 Hz	1K Hz	2K Hz	4K Hz	6K Hz
+18 dB	+15 dB	+11 dB	+11 dB	+23 dB

Average difference from clinic HL to Remote Check baseline SPL



However, <1 dB difference from Remote Check baseline
to 1 week Remote Check recheck

Remote Check Study: Speech in Noise

Clinic (BKB-SIN) vs Baseline RC vs 1 week RC

- Correlation between BKB-SIN & Digit Triplet Test
  Digit Triplet Test easier than clinic BKB SIN
  Sensitivity to change in performance questioned
- However, performance was stable from Baseline RC to subsequent RC tests

Looking forward

Strengths

- Innovative
- Potential efficiencies
  - Time
  - Expenses
- Impedances/Data logging
- Peace of mind
- Better than no contact
- Expansion of services without overhead costs
- Opens access to candidates who might otherwise be deterred

Opportunities

- Learning curve
  - Staff
  - Clients
- Infrastructure support
  - Technology challenges
- For select population only
- Potential for over-use or over-reliance
- Revenue model

KiaOra!

Audiologists
Holly Teagle
Caroline Selvaratnam
Ellen Giles
Derek Hadfield
Rene Orams
Dianne Rafter
Denice Bos
Robyn Moriarty
Laura Le Roux

Habilitationists
Aaron Henley
Victoria Holgate
Aishwarya Suresh Kumar
Amy Waite

Northern Cochlear Implant Programme Surgeons
Michel Neeff
Collin Brown
Bill Baber
Melanie Collins
David Flint

Administration & Staff Support
Claire Green
Jacqui Grout
Rosemary Such
Akshaya Arun
Gillian Doyle
Dawn Thompson
Silvia Rosioru
Megan Levi
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Northern Cochlear Implant Programme NCIP

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Increasing CI Market Penetration and Practice Management

Presenters:

William H. Shapiro, AuD

Jacob Hunter, MD

Donna L. Sorkin, MA

Meredith Holcomb, AuD, CCC-A

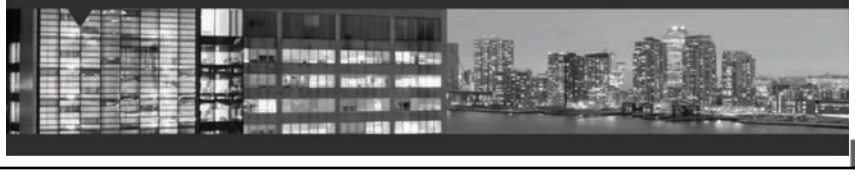
NYU Langone Health

COVID-19, 2020

NYU School of Medicine

INCREASING ACCESS TO COCHLEAR IMPLANTS IN THE COMMUNITY: A NOVEL APPROACH

William H Shapiro, Au.D.



1

Incidence of Hearing Loss

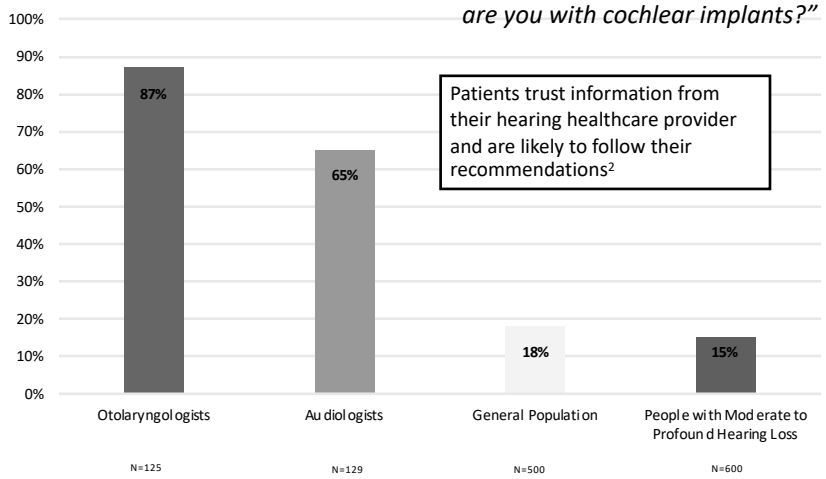
- 360 million people worldwide with disabling hearing loss[1]
  - 32 million of these are children
- Untreated hearing loss costs 750 Billion international dollars* each year[1]
- Hearing loss in the US affects 14% of adults aged 20-69 and 39% of adults aged 60-69[2]

*International Dollars are a unit of measure from the World Bank – 1 International Dollar buys comparable amount that a US dollar would buy in the US

1 – World Health Organization (2017) Deafness and hearing loss fact sheet, retrieved from www.who.int on October 3, 2017
2 – National Institute on Deafness and Other Communication Disorders (2016) Quick statistics about hearing, retrieved from www.nidcd.nih.gov on October 3, 2017

Informing Candidates

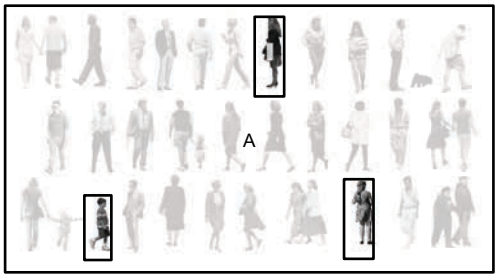
2015 Market Survey[1]: *"How familiar are you with cochlear implants?"*



Patients trust information from their hearing healthcare provider and are likely to follow their recommendations[2]

1 - Internal Cochlear Market Study, June 2015. Data on file.
2 – Abrams & Kihm (2015) An introduction to MarkeTrak IX: A new baseline for the hearing aid market. The Hearing Review, 22(6):16.

The Challenge



Less than 5% of people who could benefit from implantable hearing solutions receive them[1,2]

[1] Blanchfield, B.B., et. Al. (2001). The severely to profoundly hearing-impaired population in the United States: Prevalence estimates and demographics. JAAA. 12, 183-189.
[2] Cochlear internal estimate, recipients data.

The Why

- Education
  - Poor job of getting the message out
- Finances
  - Can a more sophisticated hearing aid make a difference?
  - Fear of losing patient
  - Poor reimbursement for programming
- "Tools in the tool bag"
  - This is what I have and therefore what I can offer you
- Fear
  - Surgery, loss of hearing , etc.

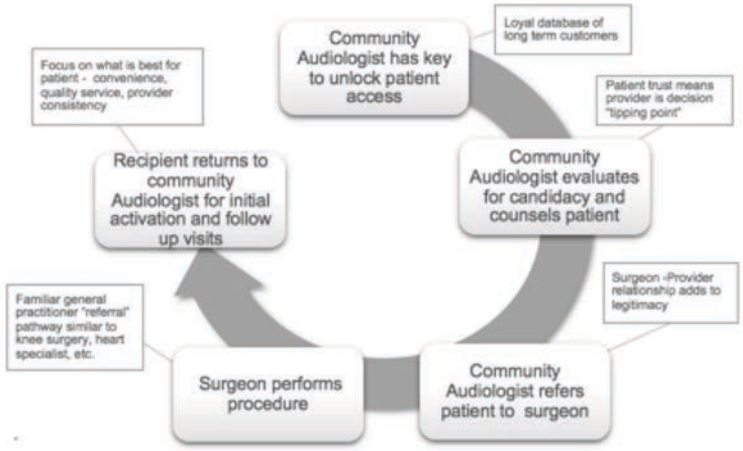
NYU Protocol

- Numerous presentations
  - Private practice buying groups
  - Old contacts- colleagues around tristate area
  - Auditory-Oral Hearing Impaired Programs (HIP)
    - Otologist and audiologist
      - Otologist presence at presentation was crucial, e.g. LA
  - Spring of 2019
    - Met with Reps from Cochlear Corporation-
      - Cochlear Provider Network
      - Several ongoing relationships across the country

Cochlear Provider Network Mission

- The Cochlear Provider Network (CPN) connects dispensing audiologists with surgeons.
- These CPN providers are interested in offering those who could benefit from implantable hearing solutions an option for the best possible hearing health.

How Does it Work?



Implant Audiologist Profile

- Interested in revenue streams other than hearing aids
- Desires to be known as the community hearing health care expert
- Wants to offer all hearing solutions
- Established practice (> 5 years)
- Loyal patients who want to stay
- Licensed audiologist
- Bills private insurance and Medicare
- Has a strong physician referral base
- Comfortable partnering with physicians

Implant Surgeon Profile

- Ready and willing to grow implant practice
- Willing to have back-and-forth referral relationships
- Willing to treat independent practices as satellites to their office
- Willing to trust an independent audiologist's diagnostic capabilities
- Supportive audiology team
- Open to a phone call/face-to-face meeting with potential private practice audiologist

Keys to a Successful Partnership

- Frequent and easy communication between providers
  - Gauge motivation of the private practitioner
    - NYU identified 2 practices
      - Staten Island, Long Island
    - Cochlear contacted them
    - Set up meeting
    - Shadow audiologist at NYU
- Confidence trust in each other's abilities and judgement
  - Need to judge level of 'buy-in" of provider
    - Initial counselling only
    - Full "buy-in" -short of surgery
    - Our staff will have certain level of involvement

Keys to a Successful Partnership

- Agreement on protocol
  - Test measures
  - Candidacy criteria
  - Visit schedule
  - NYU audiologist intervention
- Single point of contact at each office
- And again…..frequent and easy communication between providers
  - Follow-up is crucial!!!
  - If follow up is poor, this partnership will not succeed
    - Visit the practice
    - Go through charts

Building Your Network

- Marketing
  - Create physician's packets with information about your practice, CI candidacy criteria, and information about co-morbidities such as fall risk, cognitive decline, etc.
  - Offer to provide Lunch and Learns at community physician's offices
  - Send your CI patients back to their general physician to show them the outcomes
- Events
  - Speak at local organization meetings – Rotary Club, Lion's Club
  - Set up a table at local health fairs
- Other
  - Include cochlear implants on your website
    - Relationship with NYU
  - Use social media to highlight successful patients

Summary- center prospective

- Choose wisely
  - Pick one or two practices to start
  - Goal is to expand catchment area
    - Implant more patients
- Incentivize community audiologist
  - Academic title
  - Increase caseload
- Need for constant communication

Conclusion

- Novel approach has demonstrated the ability to increase access for individuals who could benefit from implantable hearing solutions

NYU Cochlear Implant Program

- **Co-Directors**
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  - **Susan B. Waltzman, PhD**
- **Surgeons**
  - **J. Thomas Roland Jr., MD**
  - **David Friedmann, MD**
  - **Daniel Jethanamest, MD**
  - **Sean McMenomey, MD**
  - **Nicholas Deep, MD-Fellow**
- **Cochlear Implant Audiologists**
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  - **Nathalie Chouery, AuD**
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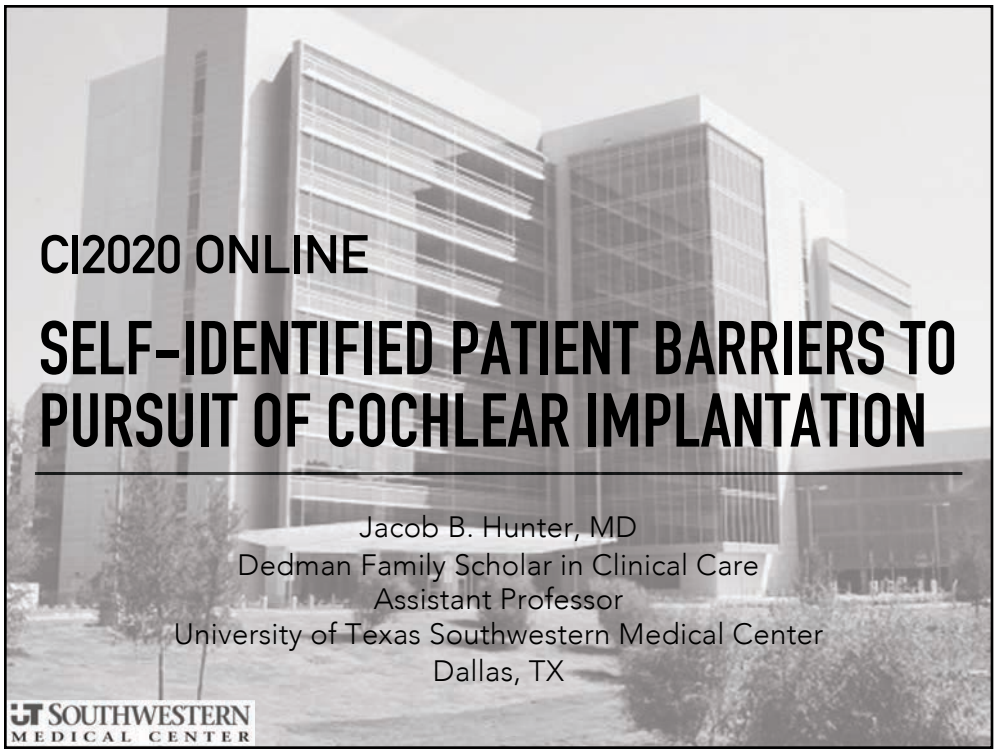
- **Laboratory For Translational Auditory Research**
  - **Mario Svirsky, PhD**
  - **Elad Sagi, PhD**
  - **Mahan Azadpour, PhD**
  - **Ariel Hight, PhD**
  - **Jonathan Neukam, AuD**
  - **Nicole Capach, AuD**
- **EAR Laboratory**
  - **David Landsberger, PhD**
  - **Natalia Stupak, AuD**
  - **Roozbeh Soleymani, PhD**
  - **David Friedmann, MD**
  - **Emily Spitzer, AuD**

Self-identified Patient Barriers To Pursuit Of Cochlear Implantation

Jacob B. Hunter, MD

1



DISCLOSURES

- Travel reimbursement from MED-EL and Oticon
- Research grants from Advanced Bionics and MED-EL

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SELF-IDENTIFIED PATIENT BARRIERS TO PURSUIT OF COCHLEAR IMPLANTATION

INTRODUCTION: CI BARRIERS

- Hearing care provider
  - 41% of hearing care professionals had not referred a patient in the past 6 months
  - Lack of knowledge regarding CI, fear of lost clinical-patient continuity, and reimbursement issues
- Low HA utilization
  - 28% of adults have never had their hearing tested
  - 32% of adults who report hearing problems have never seen a clinician for their hearing problems
  - HA non-users perceived their hearing loss to be less severe than HA users, also reporting cost and social stigma as barriers to HA use

Huart and Sammeth (2009)
Bierbaum et al. (2019)
Mahboubi et al. (2018)
Tahden et al. (2018)
Barnett et al. (2017)
Jenstad and Moon (2011)

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SELF-IDENTIFIED PATIENT BARRIERS TO PURSUIT OF COCHLEAR IMPLANTATION

INTRODUCTION: CI BARRIERS

- CI candidates
  - Personal disinterest
  - Fear of losing residual hearing
  - Fear of balance issues
  - Uncertainty about hearing outcomes
  - Lack of provider or social support
  - Concerns about cost and lost work-days
- Sought to explore self-identified patient barriers, in patients who underwent CI evaluation and qualified for surgery, but elected not to proceed with surgery

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Looi et al (2009)
Bierbaum et al. (2019)

SELF-IDENTIFIED PATIENT BARRIERS TO PURSUIT OF COCHLEAR IMPLANTATION

METHODS

- Retrospective chart review
  - CI evaluation and met candidacy between 2010 and 2018
  - Elected not to proceed with surgery at the time of their evaluation
  - 181 English-speaking adults were identified
- We developed a 21-question survey, administered via email or telephone
- 32 responses (17.7% response rate), 10 of which had surgery eventually

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SELF-IDENTIFIED PATIENT BARRIERS TO PURSUIT OF COCHLEAR IMPLANTATION

METHODS: SURVEY

- Aimed at identifying their concerns regarding CI, including perceptions of surgical risks, recovery, adaptation, monetary costs, time commitment, loss of residual hearing, and lack of benefit
- For those patients who proceeded with surgery, we assessed motivators for surgery, including family support, effects of job performance, and deterioration of hearing
- Asked about hearing aid usage, familiarity with other CI users, CI surgery, residual hearing, and follow-up

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SELF-IDENTIFIED PATIENT BARRIERS TO PURSUIT OF COCHLEAR IMPLANTATION

RESULTS

- Average age of those patients who did not undergo surgery
  - 69.3 years, 68.2% male, and 72.3% were white
- Average age of those patients who proceeded with surgery
  - 63.1 years, 70% male, and 60% were white
- CI patients reported a 67.7 satisfaction score with their CI, compared to a 41.0 satisfaction score from patients who did not undergo surgery with their HAs (p=0.003)

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SELF-IDENTIFIED PATIENT BARRIERS TO PURSUIT OF COCHLEAR IMPLANTATION

RESULTS

- 80% of patients who underwent surgery knew someone with a CI
  - 27.3% of those who did not undergo surgery knew someone with a CI (p=0.005)
- 20% of patients who did not undergo surgery were familiar with residual hearing
  - 68.2% of patients who proceeded with surgery (p=0.011)
- Patients in both groups were equally likely to be concerned about peri- and post-operative complications, cost, and follow-up

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SELF-IDEI ON

RESULT

	Patients who underwent surgery (n=10)		Patients who did not undergo surgery (n=22)		p-value
	Yes	No	Yes	No	
Do you know someone with a CI?	8	2	6	16	0.005
Do you know someone that is not happy with their CI?	1	7	2	4	0.340
Were you concerned about surgical complications?	5	5	11	10	0.901
Were you concerned about anesthetic complications?	4	6	4	17	0.213
Have you had surgery requiring a general anesthetic in the past year?	3	7	11	11	0.290
Were you concerned about the period of adjustment with the cochlear implant?	6	4	11	11	0.599
Were you worried about dizziness?	5	5	7	13	0.429
Do you know what residual hearing is?	8	2	7	15	0.011
If you have residual hearing and are aware of it, were you concerned that you would lose your residual hearing?	3	7	5	14	0.833
Were you concerned about the number of visits that are required after implantation?	2	8	6	16	0.660
Were you concerned about the costs of undergoing CI surgery?	7	3	9	11	0.196
Did insurance play a role in your decision to pursue a CI?	4	6	9	11	0.794
Have you ever not followed up an appointment with a physician due to an inability to afford the appointment?	1	9	1	21	0.555
Have you ever been unable to get time off from work in order to attend a doctor's appointment?	0	10	1	21	

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SELF-IDENTIFIED PATIENT BARRIERS TO PURSUIT OF COCHLEAR IMPLANTATION

RESULTS

- Which of the following reasons most closely matched your decision to not pursue CI surgery?

I was concerned about the cost of surgery and related services, such as out-of-pocket expenses and deductibles.	67.6
I was concerned about the risks of anesthesia.	69.4
I was concerned about the risks of surgery.	42.3
I was concerned that a cochlear implant would not significantly improve my ability to communicate.	33.1
I was concerned about the post-operative recovery process, including the adaptive period to adjust to the CI.	40.9
My current hearing aids are satisfactory for my needs	58.4
I did not want to risk losing my appreciation for music.	55.5

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SELF-IDENTIFIED PATIENT BARRIERS TO PURSUIT OF COCHLEAR IMPLANTATION

RESULTS: FREE TEXT

- "I was told that I could lose hearing in my bad ear."
- "I virtually have no hearing in one ear. The doctor proposed putting the implant in my only good ear, and thus I was concerned that surgery could cause complete loss of hearing."
- "I felt that my hearing aids could get me by enough. I also want the technology to advance in the cochlear implant field."
- "I found other hearing aids that helped with the volume loss and slightly improved clarity, but not much. I decided to give them a try, but wish I had gone ahead with a cochlear implant. Thought if I could get a few more years I might get newer technology in the cochlear implants."
- "I was not entirely certain of the decision yet, wondering on the ability of insurance to cover surgery."

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SELF-IDENTIFIED PATIENT BARRIERS TO PURSUIT OF COCHLEAR IMPLANTATION

RESULTS: FREE TEXT

- "I was told by the physician that my hearing loss was not to the level that I was approved for the procedure. My hearing has declined since, but I'd have to consider the cost as well."
- "I was concerned that implantation may worsen my ongoing issues with vertigo."
- "I have severe tinnitus. There is no guarantee this implant would fix the tinnitus."
- "My hearing began to regenerate as an answer to prayer."
- "It's scary, and I think I haven't come to terms with the fact that I might need one in the near future. I haven't met anyone with a cochlear implant so I don't know success stores in situations like mine."
- "I was concerned that I would be in the minority of patients who the surgery does not help, and that I did not want to risk losing any residual hearing that I had."

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SELF-IDENTIFIED PATIENT BARRIERS TO PURSUIT OF COCHLEAR IMPLANTATION

RESULTS: FREE TEXT

- "I play piano by ear and thoroughly enjoy deciphering chord progressions of songs without music which I do not read… It's my understanding that the cochlear implant doesn't always cover the total spectrum in pitch frequencies… My other concern is that should I be disappointed in this regard, then I would not be able to return to the hearing I had before the cochlear implant."

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SELF-IDENTIFIED PATIENT BARRIERS TO PURSUIT OF COCHLEAR IMPLANTATION

RESULTS

- If you delayed CI surgery, what prompted you to eventually undergo surgery?
  - My family encouraged me to pursue surgery. 24.9
  - I believes by job performance was impacted by my hearing status. 14.4
  - My personal health changed. 32.6
  - I met at least one person who had a cochlear implant and they had a good outcome. 39.4
  - My hearing deteriorated further. 16.6

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SELF-IDENTIFIED PATIENT BARRIERS TO PURSUIT OF COCHLEAR IMPLANTATION

CONCLUSION

- Barriers to CI utilization are complex
- Patient barriers span the spectrum of social issues, health concerns, and patients' negative perception of CI
- Careful consideration should be given to promoting these facilitators and identifying and addressing the barriers when counseling patients

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US Cochlear Implant Utilization: 2020 Update

Donna Sorkin
Executive Director,
American Cochlear Implant Alliance

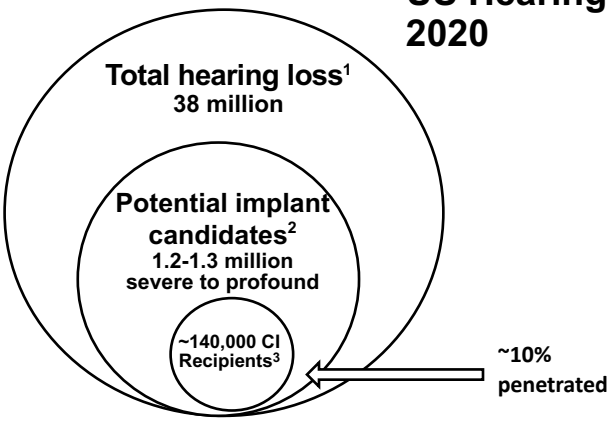
1

Hearing Healthcare is elective

- Not consistently considered “healthcare”
- Little attention given as part of primary care practice (for both children and adults)
- Screening of any sort for adults is rare
- Most babies are screened within first month of life
- Health insurance covers cochlear implants and (usually osseointegrated devices)
- Hearing aids sometimes covered but most often, not

2

US Hearing Loss 2020



Data Sources:

[1] *34.52M MarkeTrak VIII:25 Year Trends in the Hearing Health Market, 2009, ~ 36 M American adults report some degree of hearing loss, NIDCD website June 16, 2010. Other sources use 40 million. Epidemiology of hearing loss is poor*

[2] *iData Research 2010 Report US Market for Hearing Aids and Audiology Devices in 2009 there were approximately 1.2M patients who could benefit from a CI*

[3] *96K, (58k adults and 38k children) received CIs in the U.S, NIDCD website Dec. 2012 extrapolated to present.*

3

Is utilization the same for adults and children?

- Pediatric CI utilization in the US is ~ 55-60% vs 90+% in Western Europe & Australia
- Adult utilization in the US (and in Europe/Australia) remains low at ~10% or less
- But hearing aid utilization is low also, right?
- 70-90% of adults with severe-profound hearing loss are using hearing aids

4

What is a “standard of care”?

- Term used in various disciplines: law, employment, business medicine
- Refers to watchfulness and caution that a reasonable person would utilize
- In a legal sense, standards of behavior protect against unreasonable risk of harm to another individual
- In a medical setting, refers to formal diagnostic and treatment processes followed when an individual has symptoms or a specific disease
  - What is an expected treatment, regardless of ability to pay or type of health insurance

5

Common Standard of Care Practices

- Testing and treatment for diabetes
- Screening protocols for certain types of cancer
- Heart disease screening
- All above well known among medical and patient communities due to public awareness campaigns
- Consistent follow through by primary care physicians

6

Is cochlear implantation approached as the best clinical practice for deafness?

- Are parents of deaf babies routinely told about cochlear implantation?
- Are adults or children with progressive hearing loss (who have moved into the severe to profound level) told about the relative benefit that a cochlear implant could provide over hearing aids?
- Do primary care physicians (i.e., pediatricians, internists, gerontologists) normally refer patients with indications to cochlear implant specialists?
- Is a specific treatment plan accepted and utilized by those who advise families of deaf children and deaf adults?

7

1 General Awareness

- Awareness in the general population is low
- Follows attitudes and awareness about hearing loss generally as compared with other health issues

8

2 Referral Networks

- Primary care doctors see people more regularly than specialists
  - Hearing screenings by primary care physicians remains low—14.6% (2009)[1]
- Hearing care professionals often unaware of the positive outcomes with cochlear implants and do not consistently refer appropriate patients
  - *May not know WHEN to refer*
- Early intervention referrals vary by state and by individuals within states
- Physicians have minimal medical school training on hearing loss and often nothing on cochlear implantation

1 Kochkin S, MarkeTrak 25-Year Trends in the Hearing Health Market 10/09.

9

2 Confusion on When to Refer

- New referral guideline may help
- 60/60 Guideline (discussed by Terry Zwolan in another online conference talk under "Expanding Candidacy")
- Most patients who meet CI candidacy criteria meet the suggested 60/60 Guideline
  - Best ear unaided monosyllabic word score < 60% correct
  - Unaided pure tone average in better ear > 60 dB HL

10

3 No Widely Accepted Clinical Practice Guidelines

- Variability in the way CI clinics and clinicians evaluate candidacy
- Results in confusion and variability
- Savvy patients know to try another center if they feel they are CI candidates
- Two upcoming papers (adults, children) lay out what ACI Alliance presents as best practice
- Still need to be used to address this barrier but it's a start

11

4 US Healthcare

- Most diverse healthcare system in the world
- Six major types of health insurance
- Health insurance not mandatory/not universal
- **Largest insurance type**: Employer provided
- May overlap (with Medicare, Medicaid if pediatric CI)

12

4 Perception that Insurance Doesn't Cover CI

- Perception ≠ the reality
- Lack of understanding of how the process of CI is addressed by insurance
- Primary care physicians often think CI isn't covered by insurance (hearing aids generally are not)
- Most insurance types cover CI but coverage varies
- Process is confusing
- Most common question that comes into ACIA

13

5 Political Complexities of Deafness

- Opposition to cochlear implantation remains among many in the Deaf community
- Parents are exposed to it during early intervention advisement process
- Inserts uncertainty into decision-making especially for parents deciding on best path forward
- May result in delays in pediatric CI to avoid what is sometimes wrongly characterized as "brain surgery"
- Spills over into CI more generally/inserts controversy

14

6 Quality of Life Outcomes Not Recognized

- Focus tends to be on speech perception benefits
- Research on QOL demonstrates that hearing specific measures like word and sentence recognition in quiet and noise do not correlate well with QOL
- Adults (and children) experience important quality of life benefits
- Variety of outcomes reported by recipients are also important and under-recognized
- McRackan's research underlines these outcomes

15

7 Why Adults May Not Move Forward

- Perception that insurance doesn't cover
- I don't want to lose the residual hearing I have
- I still benefit from my hearing aids
- New over the counter technologies may help me
- I'm afraid of surgery
- I'm waiting for something better (than CI)

16

How does US adult utilization compare to that in other countries?

- Adult utilization rates are similar to Europe & Australia
- Major impediments are similar
  - Lack of general awareness
  - Referral networks not referring
  - Hearing aid dispensers not knowing when to refer
  - Lack of recognition of QOL benefits

17

How does US pediatric utilization compare to that in other countries?

- Pediatric CI utilization
  - European countries (Austria, Sweden, UK): 90%+
  - Germany: 65%
  - Australia: 98%
  - US: 55-60%
- All have newborn hearing screening
- Major reason for discrepancies: Early intervention referrals consistently provide info to families to aid decision-making
  - US & Germany: Referrals vary by location and by individual provider
- Political complexity of deafness in US largely absent elsewhere

18

CI as Standard of Care

- To change utilization, need to consider cochlear implantation as the standard of care for moderate to profound hearing loss
- 20 Consensus Statements of the International Delphi Panel discussed by Meredith Holcomb

19

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20

STANDARD OF CARE

For adults with severe to profound sensorineural hearing loss

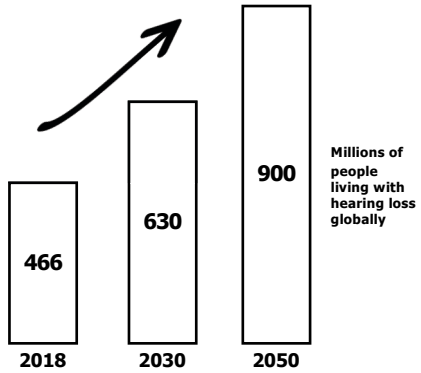
Consensus for cochlear implantation

CI2020 International Online Conference
April 8, 2020

Meredith A. Holcomb, AuD, CCC-A
Delphi Consensus Panel Member
Chair, Board of Directors
American Cochlear Implant Alliance
Assistant Professor
Director, Cochlear Implant Program
University of Miami

Global burden of hearing loss

- Hearing loss is one of the leading causes of overall disability worldwide.
- Globally, approximately **466 million** adults and children **(6%)** have a disabling hearing loss.
- This is projected to rise to **630 million** by 2030 and to **over 900 million** by 2050.
- Hearing loss has a substantial impact on people's lives (e.g. communication difficulties and reduced well-being[1]).

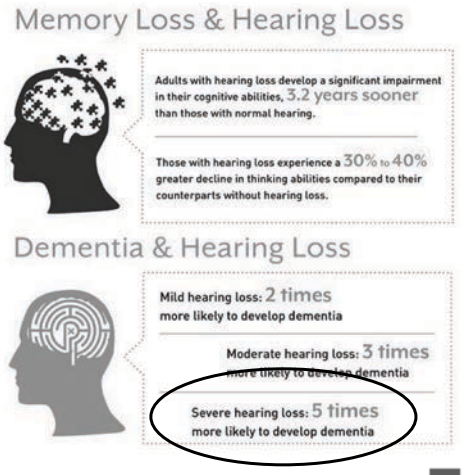


1. World Health Organization. Addressing the rising prevalence of hearing loss. 2018. Available from: http://apps.who.int/iris/bitstream/10665/260336/1/9789241550260-eng.pdf (Accessed June 2019)

2

Hearing loss and dementia

- The risk of dementia and Alzheimer's disease increases with hearing loss severity[1]
- Hearing loss is the single largest modifiable risk factor for dementia[2]
- Dementia incidence could be reduced with the treatment of hearing loss[2]



1. *Lin FR et al. Arch Neurol 2011;68(2):* **2.** *Livingston G et al. Lancet 2017;390(10113):2673–734*

Cochlear implant utilization

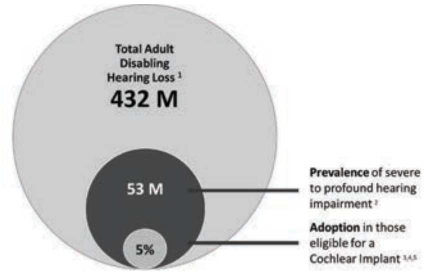
- Cochlear implantation has now been available for more than 30 years in many countries.
- Cochlear implants (CIs) are the **standard of care** for **newborns** with severe to profound sensorineural hearing loss (SNHL) in many developed countries. In children, penetration of CIs is high.
- In **adults**, cochlear implantation is often only considered when there is no benefit from hearing aids.
- Many adults who could benefit from CIs do not receive them.
- As in children, CI use in adults has potential to become the **standard of care.**

1. World Health Organization. Deafness and hearing loss. Available from: https://www.who.int/news-room/fact-sheets/detail/deafness-and-hearing-loss (Accessed July 2019)
CI, cochlear implant; SNHL, sensorineural hearing loss

What do we know?

Benefits have been demonstrated but adoption is low

- CI adult users **experience improvements** compared with hearing aid only or no treatment, in terms of:
  - **speech perception**[6,7]
  - **educational**[8] and **employment**[9] opportunities
  - **quality of life**[6,10]
- CIs have been shown to be **cost effective**[11]
- However, penetration of CIs in eligible adults is as low as 5%



Global adult hearing loss (2018)

*Eligibility for CIs varies according to country-specific guidelines
1. World Health Organization. Deafness and hearing loss. Available from: https://www.who.int/news-room/fact-sheets/detail/deafness-and-hearing-loss (Accessed June 2019); **2.** Global Burden of Disease Hearing Loss Expert Group. *Eur J Public Health* 2013;23:146–52; **3.** Sorkin D. *Cochlear Implants Int* 2013;14(Suppl 1):S1; **4.** De Raeve L. *Eur Ann Otorhinolaryngol Head Neck Dis* 2016;133(Suppl 1):S57–60; **5.** Raine C. *Cochlear Implants Int* 2013;14(Suppl 1):S32–7; **6.** Lenarz T *et al*. *Audiol Neurootol* 2017;22:61–73; **7.** Bassim MK *et al*. *Laryngoscope* 2005;115:1568–73; **8.** Shield B. Evaluation of the social and economic costs of hearing impairment. A report for Hear-it. 2006. Available from: https://www.hear-it.org/sites/default/files/multimedia/documents/Hear_It_Report_October_2006.pdf (Accessed June 2019); **9.** Woodcock K, Pole JD. *Int J Rehabil Res* 2008;31:297–304; **10.** Sanchez-Cuadrado I *et al*. *Ann Otol Rhinol Laryngol* 2013;122:222–8; **11.** Bond M *et al*. *Health Technol Assess* 2009;13:1–330
CI, cochlear implant; M, millions

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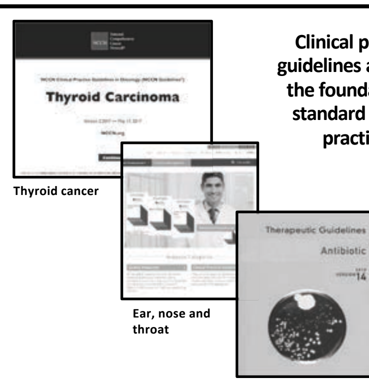
Need for a Standard of Care

- **From a medical perspective,** it describes which treatment is appropriate, based on scientific evidence and collaboration between professionals
  - It is typically the process a clinician should follow for a certain type of patient, illness or clinical circumstance
- **From a legal perspective,** standard of care is the degree of prudence and caution required of an individual who is under a duty of care



Thyroid cancer

Ear, nose and throat

Antibiotics

Clinical practice guidelines are often the foundation of standard of care practices

6

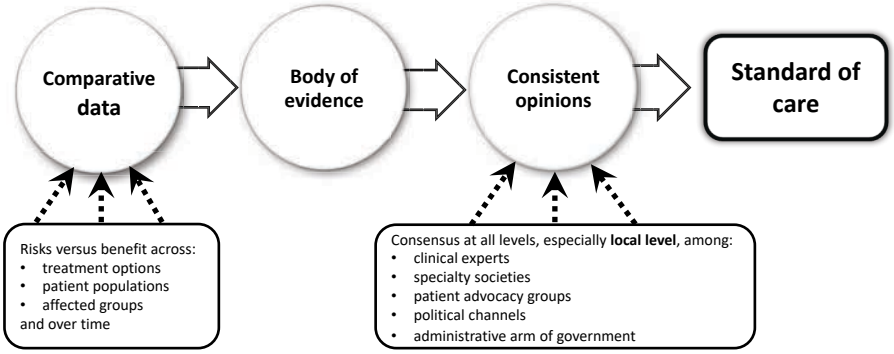
What does standard of care mean for the patient?

From the patient's perspective, achieving standard of care can lead to:

- More **consistent medical diagnosis, referral** and **treatment guidelines**
- Better access to CI treatment and **aftercare**
- Improvements in **quality of life** and health, through **optimizing hearing function**, social participation and engagement

Standard of care will raise **awareness**, making the care pathway more transparent and educating a wider audience about the effectiveness of CI treatment

Consensus to achieve standard of care in CI treatment for adults



Consensus statements and clinical practice guidelines

- Consensus statements should provide a **stepping stone** towards establishing clear, consistent, international clinical guidelines and best practice for patients.

9

SYSTEMATIC REVIEW AND CONSENSUS:

Unilateral cochlear implants for bilateral severe, profound, or moderate sloping to profound sensorineural hearing loss[1]

[1] ***Delphi Consensus Group on Cochlear Implantation in Adults***; *Craig A Buchman, René H Gifford, David Haynes, Thomas Lenarz, Gerard O'Donoghue, Oliver Adunka, Allison Biever, Robert Briggs, Matthew L Carlson, Pu Dai, Colin Driscoll, Howard W Francis, Bruce Gantz, Richard K Gurgel, Marlan Hansen, Meredith Holcomb, Eva Karltorp, Milind Kirtane, Jannine Larky, Emmanuel Mylanus, J Thomas Roland Jr, Shakeel R Saeed, Henryk Skarzynski, Piotr H Skarzynski, Mark Syms, Holly Teagle, Paul Van de Heyning, Christophe Vincent, Hao Wu, Tatsuya Yamasoba, Terry Zwolan*

What is a Delphi consensus process?

An **established consensus-based technique** that allows for the collection and aggregation of informed judgements from a **group of experts**

- Uses several rounds of questionnaires to seek anonymous responses, which are then aggregated
- Seeks to reach the correct response through consensus
- The result is a series of consensus statements about a clinical area that have been agreed on by experts in the field

Delphi consensus process: achieving standard of care

The Delphi consensus process outcomes will provide a summary of clinical evidence and expert opinion on cochlear implantation in adults.

Findings from the Delphi process have the potential to:

- help establish CIs as the **standard of care** for adults with severe to profound SNHL
- raise **awareness** of CI as a treatment option and when it should be considered
- achieve **appropriate improved access** to CIs for patients who would benefit
- help **optimize patient pathways**, leading to treatment that improves the individual's hearing function and quality of life

CI, cochlear implant; SNHL, sensorineural hearing loss

Overview of the Delphi process

1. **Recruit steering committee and panel** and design the process

2. Conduct **literature searches** and draft report

3. **Draft** up to **25 consensus statements**, reflecting the available evidence

4. Obtain input via **three rounds of Delphi voting** and steering committee

5. Create peer-reviewed **publication** of consensus statements and **submit**

- The process has been facilitated by Oxford PharmaGenesis (https://www.pharmagenesis.com), an independent HealthScience communications consultancy providing services to the healthcare industry, professional societies and patient groups through specialist practices

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Steering committee

An independent **steering committee** was formed to manage the consensus process

The steering committee was responsible for finalizing the Delphi consensus protocol

The steering committee was chaired by **Professor Craig Buchman** (Washington University School of Medicine, USA) and consists of four members:

- **Professor René Gifford** (Vanderbilt University, Nashville, USA)
- **Dr. David Haynes** (Vanderbilt University, Nashville, USA)
- **Professor Thomas Lenarz** (Medical University of Hannover, Germany)
- **Professor Gerard O'Donoghue** (University of Nottingham, UK)

Prof. Craig Buchman

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Delphi panel

- **Delphi panel** was formed to take part in the consensus process
- The **role** of the panel members was to review the draft consensus statements and supporting evidence and take part in the voting of the Delphi consensus process

The Delphi panel included **clinical experts** in the field of cochlear implantation

- The panel included the four members of the steering committee

Additional candidates for the Delphi panel were identified by the steering committee and were approved by the Chair and steering committee

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Delphi Panel:
Global experience across audiology and cochlear implantation

Dr Oliver Adunka, Ohio State University, Columbus, OH, USA

Dr Allison Biever, AuD, Rocky Mountain Ear Center, Englewood, CO, USA

Professor Robert Briggs, The University of Melbourne; Royal Victorian Eye and Ear Hospital; Royal Melbourne Hospital, Australia

Dr Matthew Carlson, Mayo Clinic School of Medicine, Rochester, MN, USA

Dr Pu Dai, PLA General Hospital, Beijing, China

Dr Colin Driscoll, Mayo Clinic School of Medicine, Rochester, MN, USA

Dr Howard Francis, Duke University School of Medicine, Durham, NC, USA

Dr Bruce Gantz, University of Iowa Health Care, Iowa City, IA, USA

Dr Richard Gurgel, University of Utah Hospitals and Clinics, Salt Lake City, UT, USA

Dr Marlan Hansen, The University of Iowa, Iowa City, IA, USA

Associate Professor Meredith Holcomb, Medical University of South Carolina, Charleston, SC, USA and University of Miami, FL, USA

Dr Eva Karltorp, Karolinska University Hospital, Stockholm, Sweden

Dr Milind Kirtane, Seth GS Medical College and KEM Hospital, Parel, Mumbai, India

Ms Jan Larky, Stanford University School of Medicine, Stanford, CA, USA

Professor Emmanual Mylanus, Radboud University Medical Center, Nijmegen, Netherlands

Dr Thomas Roland, New York University School of Medicine, New York, NY, USA

Professor Shakeel Saeed, University College Hospital; National Hospital for Neurology and Neurosurgery; Royal National Throat, Nose and Ear Hospital, London, UK

Professor Henryk Skarzynski,* Institute of Physiology and Pathology of Hearing, Warsaw, Poland

Professor Piotr Skarzynski,* Department of Teleaudiology and Screening, World Hearing Center, Institute of Physiology and Pathology of Hearing, Warsaw/Kajetany; Department of Heart Failure and Cardiac Rehabilitation, Medical University of Warsaw; Institute of Sensory Organs, Kajetany, Poland

Dr Mark Syms, Arizona Hearing Center, Phoenix, AZ, USA

Associate Professor Holly Teagle, University of Auckland, New Zealand

Professor Paul Van De Heyning, Antwerp University Hospital, University of Antwerp, Edegem, Belgium

Professor Christophe Vincent, Centre Hospitalier Regional, Universitaire de Lille, France

Professor Hao Wu, 9th People's Hospital, Jiao Tong University School of Medicine, Shanghai, China

Professor Tatsuya Yamasoba, The University of Tokyo Hospital, Tokyo, Japan

Dr Terry Zwolan, University of Michigan, Ann Arbor, MI, USA

*Note, these panel members shared a voting role so are counted as only one voting member

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Geographic spread of panel members

The Delphi panel and steering committee bring together clinical experts, ear nose and throat specialists and audiologists from around the globe

- **Chair**
- **30 Delphi panel members**
- **13 countries represented**

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Consumer and Professional Advocacy Committee (CAPAC)

Ms Barbara Kelley (co-Chair)
Executive Director of Hearing Loss Association of America (HLAA)

Dr Harald Seidler (co-Chair)
CI User, representative of the International Federation of Hard of Hearing People and immediate past President of the German Association of the Hard of Hearing (1996- 2019)

Dr Leo De Raeve
European Association of Cochlear Implant Users (EURO-CIU)

Professor Bernard Fraysse
International Federation of Otorhino Laryngological Societies (IFOS)

Ms Darja Pajk
European Federation of Hard of Hearing People (EFHOH) and CI user

Ms Donna Sorkin
American Cochlear Implant (ACI) Alliance and CI user

Professor George Tavartkiladze
International Society of Audiology (ISA)

CI, cochlear implant

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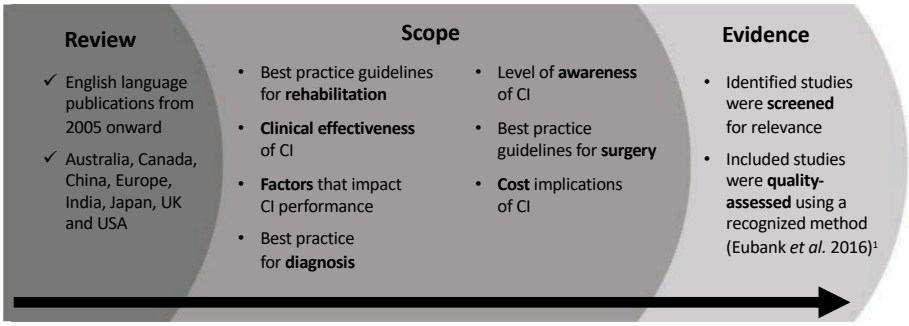
Literature review to inform statements

A systematic literature review was conducted to obtain evidence relevant to adults with bilateral severe, profound, or moderate sloping to profound sensorineural hearing loss, and unilateral CIs
Searches were conducted in MEDLINE, Embase and Cochrane Library on July 18, 2018



1. Eubank BH et al. BMC Med Res Methodol 2016;16:56
CI, cochlear implant; Embase, Excerpta Medica Database; MEDLINE, Medical Literature Analysis and Retrieval System Online

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Delphi voting process

- Using the findings of the literature review, 21 consensus statements were drafted
- These statements, and all supporting evidence from the literature (including quality assessment), were presented to the panel during three anonymous voting rounds
- At each voting round, the panel marked their level of agreement/disagreement with each statement, using a 6-point Likert scale

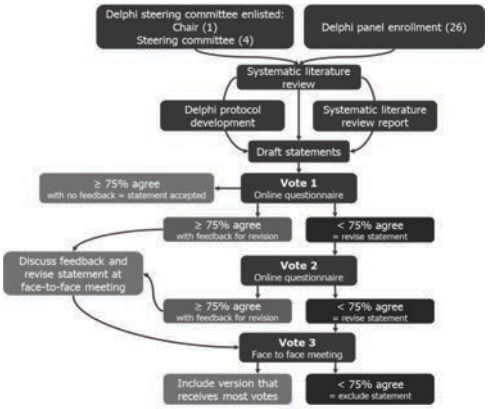
Voting round 1: online questionnaire ⇨ **Voting round 2: online questionnaire** ⇨ **Voting round 3: face-to-face meeting**

Delphi voting process

The action for each statement for the subsequent round was determined by: the **75% agreement threshold**, and/or provision of **feedback** from the panel members

A statement which reached the agreement threshold could still be revised if feedback was able to improve the statement

Following voting round 3, statements that reached at least 75% consensus were included in the **final published statements**



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Consensus Statement Categories

1. **Level of awareness of CIs**
2. **Best practice clinical pathway for diagnosis**
3. **Best practice guidelines for surgery**
4. **Clinical effectiveness of CIs**
5. **Factors associated with post-implantation outcomes**
6. **The relationship between hearing loss and depression, cognition, and dementia**
7. **Cost implications of CIs**

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Category 1:
Level of awareness of CIs

Consensus Statement:

1. Awareness of cochlear implants among primary and hearing healthcare providers is inadequate, leading to under-identification of eligible candidates. Clearer referral and candidacy pathways would help increase access to cochlear implants.

Delphi Consensus Group on Cochlear Implantation in Adults

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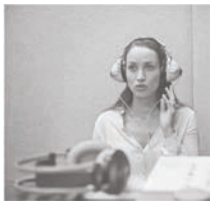
Category 2:
Best Practice Clinical Pathway for Diagnosis

Consensus Statements:

2. Detection of hearing loss in adults is important; pure tone audiometry screening methods are considered the most effective. The addition of a questionnaire or interview to the screening can improve the detection of sensorineural hearing loss.[1]

3. Preferred aided speech recognition tests for cochlear implant candidacy in adults include monosyllabic word tests and sentence tests, conducted in quiet and noise. Further standardisation of speech recognition tests is needed to facilitate comparison of outcomes across studies and countries.[1]



1. Delphi Consensus Group on Cochlear Implantation in Adults

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Category 2:
Best Practice Clinical Pathway for Diagnosis

Consensus Statements:

4. Age alone should not be a limiting factor to cochlear implant candidacy, as positive speech recognition and quality of life outcomes are experienced by older adults as well as younger adults.[1]

1. Delphi Consensus Group on Cochlear Implantation in Adults

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Category 3:
Best Practice Guidelines for Surgery

Consensus Statements:

5. Both curved (perimodiolar) and straight electrodes are clinically effective for cochlear implantation, with a low rate of complications.

6. When possible, hearing preservation surgery can be beneficial in individuals with substantial residual hearing.[1]

1. Delphi Consensus Group on Cochlear Implantation in Adults

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Category 4: Clinical Effectiveness of CIs

Consensus Statements:

7. Cochlear implants significantly improve speech recognition in both quiet and moderate noise in adults with bilateral severe, profound, or moderate sloping to profound sensorineural hearing loss; these gains in speech recognition are likely to remain stable over time[1]
8. Both word and sentence recognition tests should be used to evaluate speech recognition performance following cochlear implantation[1]

1. Delphi Consensus Group on Cochlear Implantation in Adults

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Category 4: Clinical Effectiveness of CIs

Consensus Statements:

9. Cochlear implants significantly improve overall and hearing-specific quality of life in adults with bilateral severe, profound, or moderate sloping to profound sensorineural hearing loss[1]

10. Adults who are eligible for cochlear implants should receive the implant as soon as possible to maximize post-implantation speech recognition[1]

1. Delphi Consensus Group on Cochlear Implantation in Adults

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Category 5:
Factors associated with post-implantation outcomes

Consensus Statements:

11. Where appropriate, individuals should use hearing aids with their cochlear implant in order to achieve bilateral benefits and the best possible speech recognition and quality of life outcomes.[1]
12. Many factors impact cochlear implant outcomes; further research is needed to understand the magnitude of the effects.[1]

1. Delphi Consensus Group on Cochlear Implantation in Adults

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Category 5:
Factors associated with post-implantation outcomes

Consensus Statements:

13. Long durations of unaided hearing loss do not rule out potential benefit of cochlear implants: individuals who receive an implant in an ear that was previously unaided for more than 15 years have been shown to experience improvements in speech recognition.[1]
14. Adults who have undergone cochlear implantation should receive programming sessions, as needed, to optimize outcomes.[1]

1. Delphi Consensus Group on Cochlear Implantation in Adults

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Category 6:
The Relationship Between Hearing Loss and Depression, Cognition, and Dementia

Consensus Statements:

15. Adults with hearing loss can be substantially affected by social isolation, loneliness, and depression; evidence suggests that treatment with cochlear implants can lead to improvement in these aspects of well-being and mental health. Longitudinal studies are needed to obtain further knowledge in this area.[1]

16. There is an association between age-related hearing loss and cognitive/memory impairment.[1]

1. Delphi Consensus Group on Cochlear Implantation in Adults

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Category 6:
The Relationship Between Hearing Loss and Depression, Cognition, and Dementia

Consensus Statements:

17. Further research is required to confirm the nature of cognitive impairment in individuals with hearing loss, and its potential reversibility with treatment.[1]

18. The use of cochlear implants may improve cognition in older adults with bilateral severe to profound sensorineural hearing loss.[1]

19. Hearing loss is not a symptom of dementia; however, treatment of hearing loss may reduce the risk of dementia. [1]

1. Delphi Consensus Group on Cochlear Implantation in Adults

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Category 7:
Cost Implications of CIs

Consensus Statements:

20. Unilateral cochlear implantation in adults is cost-effective when compared with no implant or no intervention at all and is associated with increased employment and income.[1]

1. Delphi Consensus Group on Cochlear Implantation in Adults

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What will the Consensus Statements lead to?

- Raise awareness of the benefits of cochlear implantation in adults and in improving how potential CI candidates are identified and treated.

- **Ultimate goal:**
  - **to improve hearing and QoL in adults with SNHL who are eligible for unilateral cochlear implantation.**

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Maximizing the impact of the Delphi process

- An international consensus paper has been submitted to a **high-impact** journal.
- **Dissemination and promotion is key** to influence awareness and referral behaviour.

Engagement of professionals and community

Adoption of clinical practice guidelines

Development of country-specific clinical practice guidelines through national medical academies

Policy advocacy to positively influence decision-making for payers and policy makers

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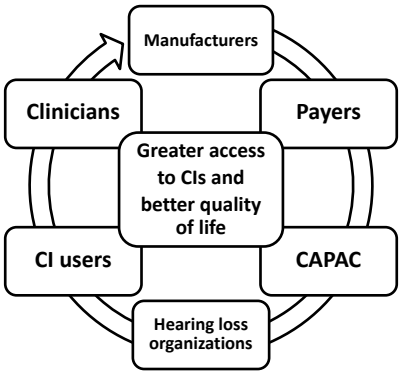
Working together towards the same goal!



CAPAC, Consumer and Professional Advocacy Committee; CI, cochlear implant

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THANK

Meredith.Holcomb@med.miami.edu

Closer to Hearing for Every Individual with MED-EL

Handouts for this course will not be provided