Foundations of Cochlear Implants:
Expectations, Rehabilitation and Monitoring Performance

Learning Goals

After participating in this session, professionals should be able to:

- List common concerns expressed by cochlear implant candidates and identify counseling techniques that may be used to address these concerns
- List factors which influence success with a cochlear implant and apply these factors to cases to predict possible outcome with a cochlear implant
- Identify resources to support candidates through the candidacy journey and support rehabilitation of cochlear implant recipients
- List common speech perception tests used for monitoring performance and explain the importance of monitoring performance in cochlear implant recipients
Cochlear’s Mission

We help people hear and be heard.

We **empower** people to connect with others and live a full life.

We **transform** the way people understand and treat hearing loss.

We **innovate** and bring to market a range of implantable hearing solutions that deliver a lifetime of hearing outcomes.

Adult Expectations
Managing Expectations

Dear Mary,

I’ve had some time to think about the cochlear implant you recommended and I have some questions. What will it sound like for me? Will I be able to hear on the phone and hear my grandchildren? Will surgery be very painful?

Common Candidate Questions

• Wouldn’t a stronger hearing aid be a better choice?
• Am I too old for a cochlear implant?
• My hearing aids are at least doing something for me – why would I give that up for a cochlear implant?
• I don’t think surgery is necessary – isn’t it better to just wait?
• What would a cochlear implant do for me?
• What if I lose my hearing?
## Types of Counseling

<table>
<thead>
<tr>
<th>Informational</th>
<th>Emotional</th>
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</thead>
<tbody>
<tr>
<td>• Providing information to the patient</td>
<td></td>
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<tr>
<td>• Knowledge dissemination</td>
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<tr>
<td>• Clear, relevant information</td>
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<tr>
<td>• Addressing patient concerns</td>
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<tr>
<td>• How the patient feels about the disorder and/or treatment</td>
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“Knowledge does not change behavior”

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### Person-Centered Care

- Find common ground with the patient and create a co-shared plan for treatment
- An interpretive model, not informative model
- Requires sharing of information and the possibility of each side influencing the other

Goal Setting with COSI

- The Client-Oriented Scale of Improvement (COSI) can be used as a formal goal-setting process with your patients
- Available at no charge from National Acoustic Laboratory (www.nal.gov.au)
- Patient lists the 4 or 5 most challenging situations and picks 2 to focus on; develops expectations along with the Aud about how much improvement is expected

Factors Influencing Performance

Lazard et al (2012)\(^1\)

- Pure tone average of the better ear and the implanted ear
- Preservation of residual hearing after implantation
- Hearing Aid use prior to implantation
- Duration of hearing loss
- Percentage of active electrodes

Clinician’s Guide to Managing Expectations

- Provides a roadmap of expected outcomes for different types of recipients
- Lists ideas for aural rehabilitation and practice
- Gives suggestions about possible emotional reactions a recipient may have
- Can be used by the clinician and recipient together
- Available on myCochlear Clinic

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Adult Expectations

- **Post-lingual**
  - Short Duration (with or without residual hearing)
  - Medium-Long Duration (with residual hearing)
  - Medium-Long Duration (poor residual hearing)

- **Pre-lingual**
  - Short Duration Auditory-Oral History
  - Medium-Long Duration (with or without residual hearing)
Adult Expectations

Post-lingual/Short Duration/with or without residual hearing

Activation

Month 3

Long Term

• Speech may sound familiar but unrecognizable
• May detect sounds across the speech range
• May recognize common phrases
• May hear environmental sounds
• May feel disappointed or nervous by the initial sound quality of the device
• Suggest practicing every day for at least 15 minutes


Adult Expectations

Post-lingual/Short Duration/with or without residual hearing

Activation

Month 3

Long Term

• May feel the quality of the sound is good enough to listen to music
• May participate in conversations in quiet on unknown topics without lipreading
• May comprehend weather or familiar news on radio
• May feel confident to experience activities once too difficult to contemplate
• Recommend experiencing lots of different environments

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<thead>
<tr>
<th>Post-lingual/Short Duration/with or without residual hearing</th>
<th>Activation</th>
<th>Month 3</th>
<th>Long Term</th>
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<tbody>
<tr>
<td>• May feel sound quality is as good as before the hearing loss began</td>
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<tr>
<td>• May achieve near 100% on speech perception testing in quiet</td>
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<td>• May be able to use the phone whenever necessary</td>
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<td>• May feel some disappointment that some communication environments remain difficult and some information is missed</td>
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<table>
<thead>
<tr>
<th>Post-lingual/Medium-Long Duration/with residual hearing</th>
<th>Activation</th>
<th>Month 3</th>
<th>Long Term</th>
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<tbody>
<tr>
<td>• Speech may not sound familiar but rather like static, distorted unrecognizable sounds, high pitched squeals</td>
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<tr>
<td>• Input may seem too loud, especially high-pitched sounds</td>
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<tr>
<td>• May discriminate phrases based on length (ie, “hello” vs “how are you”)</td>
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<tr>
<td>• May not feel comfortable wearing the device all day</td>
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<tr>
<td>• May feel frustrated or depressed at inability to make sense of the sound</td>
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• Signal may be more normal or familiar, now, more speech-like than noise
• May recognize common words and phrases from a familiar speaker
• May hear name called in noisy environments even when not expecting it
• May begin to feel slightly more independent in daily life
• Suggest continued listening practice


• May feel the sound through the implant is clear and sounds “normal”
• May show marked improvement in speech perception scores
• May have successful phone calls and follow the conversation when initiated and controlled
• May have greater independence in all aspects of daily life
• May feel surprised that more practice and guidance is needed to continue to improve after a year of implant use

**Adult Expectations**

**Post-lingual/Medium-Long Duration/without residual hearing**

- May only hear static, squeaks, noise, beeps from signal
- May detect sounds of speech across the various pitches
- May recognize their own name when called
- May be disappointed in the quality of the sound provided by the implant
- May not tolerate wearing the implant for more than a few hours at a time


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**Adult Expectations**

**Post-lingual/Medium-Long Duration/without residual hearing**

- CI signal may sound clarer and more normal
- May show improvement in speech discrimination scores, up to 100% in quiet
- May comprehend books on tape, GPS instructions in car, talk radio, etc
- May have improved communication with lip-reading but still require lip-reading and captions
- May feel grateful for new abilities to live life much as before the hearing loss

Factors influencing success in children

- Using a spoken-language communication approach¹
- Absence of additional disabilities¹,⁴
- Greater non-verbal intelligence²,³
- Age at implantation³,⁴
- Higher socioeconomic status²
- Higher maternal education⁴
- Maternal sensitivity to communication needs⁵

Pediatric Expectations

- Approximately 80% of parents reported their expectations were met\(^1\).
- More than two thirds of parents reported their children were able to participate easily in a regular class\(^1\).
- Parents assigned positive ratings to health-related quality of life, especially in the communication domain\(^2\).


Rehabilitation
Rehabilitation

Therapy
Guided practice
Self-paced program
Self-practice
Device use in speech
Full-time device use

Device Use

Datalogging
Hearing Tracker

Available for recipients with a Nucleus® 6 device and later
Available for the Nucleus® 7 with a compatible iOS device
Self Practice

- Audio Books/Books on Tape
- Podcasts
- News Broadcasts
- Sports Broadcasts
- English as a Second Language (ESL) materials

Self-Paced Program
Guided Practice: Communication Corner

Communication Corner (cont.)

- Age-based programs
  - Young Children and Families
  - School age Children
  - Tweens and Teens
  - Adults
  - Spanish Speakers
- Program descriptions
- Program samples
- Assessments on How to Get Started
Communication Corner (cont.)

- Young Children
  - Sound Foundation for Babies (English & Spanish)
  - Sound Foundation for Toddlers (English & Spanish)

- School Age
  - Sound Foundation for Children
  - LEAPing on with Language

- Tweens/Teens and Adults
  - Communication Strategies
    - Analytic, Synthetic, Communication Skills
  - Telephone with Confidence (English & Spanish!)
  - Music – HOPE Notes

Resources to improve listening, encourage conversations, and instill confidence so that you can achieve your best.
School-Age Children
LEAPing on with Language Program

When your child begins school, they begin a new life that broadens their horizons, meeting new teachers and making new friends. That is why so much of their social and scholastic success depends on their hearing ability. Using practical, yet powerful lessons and techniques, our program will take your child’s speaking and comprehension skills to the next level. They will not only advance―they will LEAP ahead―into a great future.

View Program Description

Program Description

LEAPing On with Language is a fun and innovative program that supports parents with a child attending school, who want to enhance their child’s language skills. Whether your child wears hearing aids, cochlear implants or other assistive devices, we provide practical strategies to accelerate your child’s speech development. This program moves beyond simple sentences to more complex and abstract language, while harnessing those skills to develop independence and self-esteem. LEAPing on with Language provides fun activities, games, and resources to allow you and your child to continue development in four core areas: Listen, Extend, Achieve, and Promote – LEAPing on with Language.

Where to get started:

We encourage you to try the sample activity. If this seems like the kind of program that interests you and your child, let’s start with a short assessment, to point you in the right direction, and get your child working on the skills you would like to improve.

Program Sample

Want to try it out? Here’s a sample of the LEAPing on with Language program. The first activity is called the Family Conversation Game. Click here to download the Resources Card, then cut out the cards to play the game.

Activity: Family Conversation Game

Place prompt question cards on the table during snack or meal time. Use the same prompt question for each person to answer (easier) or take turns using a different prompt card per person (harder). Some questions take more thought than others. Next, make up your own prompt questions.

Remember: My child wants to have a conversation with me. How can I best encourage and extend these conversations?

Our activities and resources are designed to help you anywhere, anytime—whether at school, the library, a café, or another setting. We are confident you will find they address many of your daily communication challenges.

GET STARTED HERE
Get Started Here

- Each program is broken into sections
- Initial self-assessments provide guidance as to where to start

Connected and Convenient

Following the self-assessment, each person will receive:

- An email with “Where to start” and the first suggested lesson
- One week later, they will get the second suggested lesson and a link to the entire program.
- Once they have signed up for one program, they have access to all programs.
Telephone with Confidence

• Program and instructions are available from the Communication Corner
• 1-800-458-4999
• Daily word lists and passages are available online so recipient can follow along or "test" themselves
• Available in Spanish and English
• Gain confidence

Monitoring Performance
Why Measure Performance?

- To measure outcomes
- Can use to counsel recipients
- Records baseline performance
- Objectively assess reported difficulty

Adult Minimum Speech Test Battery

- The Minimum Speech Test Battery (MSTB) for adults was created by an independent working group
- The revised edition was released in July 2011
- Includes test materials and instructions for testing
- Available from Cochlear (FUZ318)
- Score sheets are at www.auditorypotential.com

Minimum Speech Test Battery for Children

Follow-up: Adults

- **Initial Activation** (4-6 weeks post-op)
- **2 week follow up**
  - Counseling
  - Re-programming
- **1 month visit**
  - Counseling/review of DataLogging
  - Re-programming
- **3 month visit**
  - Counseling/review of DataLogging
  - Re-programming (as needed)
  - Speech Perception Testing
- **Annual/Bi-annual visit**
  - Re-programming
  - Speech Perception Testing

Minimum Speech Test Battery for Children

Recommended Testing Parameters:

1. Stimulus presentation via recorded testing materials
2. Assessment of speech at conversational loudness (60 dBA)
3. Assessment of soft speech (45 dBA)
4. Assessment of speech in noise (10 Hz, four-talker babble) at +5 dB signal-to-noise ratio, unless otherwise specified in the manual
Follow-up: Pediatrics

- **Initial Activation** (4-6 weeks post-op)
- **1 week follow up**
  - Counseling
  - Re-programming
- **Monthly/bi-weekly** (as needed and dependent on age)
  - Counseling/review of DataLogging
  - Re-programming
- **3 month visit**
  - Counseling/review of DataLogging
  - Re-programming (as needed)
- **Annual visit**
  - Re-programming
  - Speech Perception Testing

Case Examples
Case Example: Adult

- 86 year old who has had an implant for 7 years
- Reports a sudden decrease in performance
- His family notices he does not respond when spoken to and does not seem to understand them
- Family reports a fall in which he may have hit his head
- External equipment changed with no difference

<table>
<thead>
<tr>
<th></th>
<th>Pre-op</th>
<th>5 yr</th>
<th>Now</th>
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<tbody>
<tr>
<td>HINT</td>
<td>5%</td>
<td>98%</td>
<td>97%</td>
</tr>
<tr>
<td>CNC</td>
<td>0%</td>
<td>54%</td>
<td>52%</td>
</tr>
<tr>
<td>AzBio (+5 SNR)</td>
<td>DNT</td>
<td>76%</td>
<td>64%</td>
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Case Outcome

- On further questioning, family reports some difficulty in other areas, including memory concerns
- Mini Mental Status Exam completed and recipient referred for further evaluation of cognitive status
- Recipient continued using the implant successfully

TIP: Speech perception testing before the complaint was just as critical as testing after the complaint.
Case Example: Pediatric

- Three-year-old little girl who is 18 months post-activation
- Bilateral recipient at 18 months of age
- Receiving services through local school district
- Parents are concerned about her progress with her implant
- She is wearing her device full-time but they feel like she only uses a few words and her speech is “garbled”

<table>
<thead>
<tr>
<th></th>
<th>6 month post-op</th>
<th>1 yr post-op</th>
<th>Today</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSI</td>
<td>CNT 76%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>ESP Spondee</td>
<td>CNT 25%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Oral Receptive Vocabulary (PPVT)</td>
<td>DNT 10 mo (age eq)</td>
<td>24 mo (age eq)</td>
<td></td>
</tr>
<tr>
<td>Oral Expressive Vocabulary (PPVT)</td>
<td>DNT 8 Mo (age eq)</td>
<td>20 mo (age eq)</td>
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</table>

Case Outcome

- Results of testing were shared with the family and school
- Family is bilingual; SLP felt vocabulary progress was on target given her use of two languages and time with implant
- SLP suggested continued focus on full time device use and time in speech

TIP: Pediatric monitoring should include speech and language progress in addition to speech perception testing
Summary

- Expectations should be addressed by setting specific goals with candidates and discussing their likelihood of reaching those goals with an implant
- Monitoring performance is beneficial to not only establish performance with the implant but to provide a baseline for future success
- Rehabilitation tools are available to help your patients achieve their best