Using Speech, Language, and Auditory Milestones to Set Goals, Monitor Progress, and Plan Therapy for Very Young Children with Cochlear Implants

TOOLS for TODDLERS

Helping Babies and Toddlers get a **Strong Start**

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Why should we use Milestones?

Children who are deaf and use cochlear implants have the potential to develop age appropriate speech, language, and auditory skills. Developmental milestones can serve as a guide for setting expectations and assist in determining what speech and language skills a child should have at a particular age. Knowing the milestones for different ages enables you to determine goals, identify if a child with hearing loss is progressing appropriately, and aids in the development of a comprehensive therapy plan.

What are Speech and Language Milestones?

Speech and Language milestones can be better understood as the age typical children respond to sound, begin to understand what is being said, and start to talk. The milestones are different for each age range and change as children develop and grow. Two tables have been provided below which can be used to set goals, measure progress, and plan therapy for young children with cochlear implants.

Hearing and Understanding[1]	Talking
0–3 Months	**0–3 Months**
• Startles to loud sounds • Quiets or smiles when spoken to • Seems to recognize your voice and quiets if crying • Increases or decreases sucking behavior in response to sound	• Makes pleasure sounds (cooing, gooing) • Cries differently for different needs • Smiles when sees you
4–6 Months	**4–6 Months**
• Moves eyes in direction of sounds • Responds to changes in tone of your voice • Notices toys that make sounds • Pays attention to music	• Babbling sounds more speech-like with many different sounds, including p, b and m • Vocalizes excitement and displeasure • Makes gurgling sounds when left alone and when playing with you

Hearing and Understanding	Talking
7 Months–1 Year	**7 Months–1 Year**
• Enjoys games like peek-a-boo and pat-a-cake • Turns and looks in the direction of sounds • Listens when spoken to • Recognizes words for common items like "cup", "shoe," "book" or "juice" • Begins to respond to requests ("Come here," "Want more?")	• Babbling has both long and short groups of sounds such as "tata upup bibibibi" • Uses speech or non-crying sounds to get and keep attention • Uses gestures to communicate (waving, holding arms to be picked up) • Imitates different speech sounds • Has 1 or 2 words (dada, mama) around first birthday, although the sounds may not be clear
1–2 Years	**1–2 Years**
• Points to a few body parts when asked • Follows simple commands and understands simple questions ("Roll the ball," "Kiss the baby," "Where's your shoe?") • Listens to simple stories, songs, and rhymes • Points to pictures in a book when named	• Says more words every month • Uses some 1-2 word questions ("Where kitty?" "Go bye-bye?" "What's that?") • Puts 2 words together ("more cookie," "no juice," "mommy book") • Uses many different consonant sounds at the beginning of words
2–3 Years	**2–3 Years**
• Understands difference in meaning ("go-stop," "in-on," "big-little," "up-down") • Follows two requests ("Get the book and put it on the table") • Listens to and enjoys hearing stories for longer periods of time	• Has a word for almost everything • Uses two- or three- words to talk about and ask for things • Uses k, g, f, t, d, and n sounds • Speech is understood by familiar listeners most of the time • Often asks for or directs attention to objects by naming them • Asks "Why?" • May stutter on words or sounds

Rate of Vocabulary Acquisition[2,3]	
12 months	First spoken word appears
18 months	20–100 words
24 months	300 words
36 months	900 words
48 months	1,500 words
60 months	2,500 words

How can we use Speech and Language Milestones to set Appropriate Goals and Monitor Progress?

In order to use milestones to establish goals and monitor progress, you must begin by determining the child's hearing age.

Establish a child's hearing age[4]

A child's hearing age must be established to set goals. When a child's cochlear implant is activated he or she celebrates a hearing birthday. Hearing age is used to indicate the child's length of time with the cochlear implant. For example, if a child received a cochlear implant at age 1 and is now 2 the child has a hearing age of 1 year. Once a child's hearing age is established, we can use it as a starting point for therapy goals. Let's use the case above of the child who is 2 years old with a hearing age of 1. Goals would target skills that a typical hearing 1 year old should acquire in the first year. For example: Child will demonstrate recognition of words for common items like "cup", "shoe", "book", or "juice" after 1 year of CI use.

Compare skills to children of the same hearing age

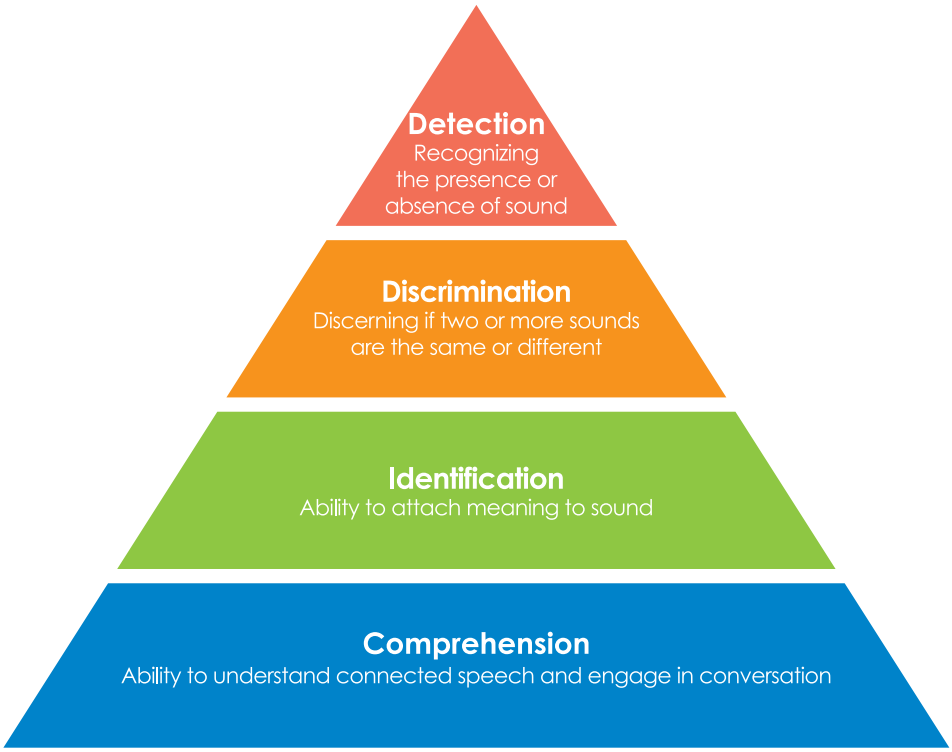
Establishing a child's hearing age is also important because it enables us to monitor a child's progress. We can use the child's hearing age to compare a child's rate of language learning to children of the same hearing age. Let's use the example above to demonstrate this concept. If this child's language abilities are equal to a 1 year old with typical hearing after 1 year of hearing experience, we would consider this child's language learning progress over the past year as good. This child has achieved the speech and language milestones of a 1 year old after hearing for 1 year. If this child's language abilities are at the level of a 6 month old after 1 year of hearing, we would note that there is a gap in skills, and therapy goals would be set to help the child "close the gap."

Close the gap with hearing peers

The ultimate objective for therapy is for this child to achieve language skills that are equal to his typical 2 year old hearing peers. So, although this child has reached the language skill level of a hearing 1 year old, to reach the language levels of his 2 year old peers, this child will need to develop language at a faster rate than children with normal hearing. Therapists will need to carefully plan intervention to reach this goal.

How do Auditory Skills Develop?

According to Erber,[5] there is a four step process, or order, for auditory skill development called the Auditory Hierarchy. The triangle on the next page illustrates the four steps. A chart has also been provided which illustrates examples of how a very young child would respond to music activities at different levels of the Auditory Hierarchy.



Music Activities

Detection: Child quiets, pays attention, or moves when music is heard

Discrimination: Child discriminates between fast and slow music by shaking a maraca fast to fast music and slow to slow music

Identification: Child identifies musical instruments by reaching for a drum when a drum is played

Comprehension: Child follows a direction, "March your feet" or "Clap your hands" when instructed during activity

How can we use the Auditory Hierarchy to help plan therapy?

A very young child who has just received a cochlear implant is suddenly experiencing a world of sound. These sounds are most likely perceived by the child as strange and meaningless. The child's parents and therapist have the job of transforming these meaningless sounds into an understandable language. One of the tools therapists use to do this is the Auditory Hierarchy.

The Auditory Hierarchy will help make the complicated task of teaching a child how to listen and process language easier by breaking the process into smaller steps. A child who is just learning to listen can begin with detection tasks and then progress through discrimination, identification, and comprehension. As the child progresses, he or she may be working on skills that overlap between levels. If the child becomes frustrated, bored, or plateaus, you may be working at an inappropriate level. Below are examples of how to use the hierarchy in a child's everyday routine.

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Auditory Skill Level	Activity Example
Detection	**Recognize when sound is present** • Play, "I hear that" games around the house and in the community. To download a free "I hear that" activity visit ***https://thelisteningroom.com/en/lessons/view/24.*** **Use the Learning to Listen Sounds throughout the day** • For example when it is feeding time say: "mmmmmmm , time to eat!" To download a free Learning to Listen Sounds handout visit ***https://thelisteningroom.com/en/lessons/view/21.*** **Practice Conditioned Play** • Make a game out of dropping a toy in a bucket each time a sound is heard. To download free instructions on how to train young children to do conditioned play visit ***www.advancedbionics.com/tft*** and download the Tools for Toddlers **Ling 6 Sound Check Instructions** under the "Tools for Parents tab."
Discrimination	**Use different types of contrasting sounds (long, short, and repeating sounds)** • During a feeding routine while stirring baby cereal, say "we have to stir stir stir the cereal (repeating sounds); then when feeding your child say, "open" (short sound), and then while the baby is eating the cereal say, "mmmmmm" (long sound), mmmm that's good!" **Differentiate between different pitches** • Sing songs together for things you are doing in an everyday routine. For example, when walking up the stairs make your voice go from low pitch to high pitch as you sing, "we are going up, up, up, up, up the stairs."
Identification	**Recognize male, female, and children's voices** • Help your child recognize familiar voices. Have mommy, daddy, and sister each ask for a kiss from the child. **Recognize familiar expressions** • Provide your child with opportunities to learn familiar phrases you say at home during every day routines like, "give a kiss," "night-night," "go to sleep," "bye-bye Grandma."
Comprehension	**Follow a sequence of directions** • Provide opportunities for your child to respond to verbal directions such as "put on your shoes and go to the door." **Evaluate responses to who, what, where questions** • Ask simple questions about familiar objects, people, or pictures: "Where is the ball?", "What is the boy doing?"

Putting it all Together

The therapy lesson below provides an example of how to use speech, language, and auditory milestones to determine goals and plan therapy. For this example the child is a 16 month old girl whose cochlear implant was activated at 12 months. Her hearing age is 4 months.

Activity

We will use an activity called the Stair Tube Game in combination with the Learning to Listen Sounds for our session. You can download information about each for FREE from the website The Listening Room (thelisteningroom.com). Review each activity so you can follow along with our therapy session below.

Stair Tube Game

https://thelisteningroom.com/en/lessons/view/25 (exercise 3)

The Learning to Listen Sounds

thelisteningroom.com/en/lessons/view/21 (exercise 2)

The Learning to Listen Sounds introduce children to the sounds of language and help children associate these sounds with specific objects. They are easy to hear and follow normal language development by incorporating beginning sounds and phrases that are typically used with children at this stage of development. For this activity you will need a mailing tube a few feet long as well as small toys that represent sounds. It is fun to tape the tube to a stair rail and send toys down the tube while saying the sound associated with the toy. We have chosen the following 5 Learning to Listen Sounds for our activity.

Word/Toy	Associated Sound
Sheep	baaaa
Ice Cream	mmmm
Car	beep beep
Airplane	ahhhhh
Rabbit	hop hop hop

The Listening Room™

provides families and professionals with interactive and uniquely designed practice activities to support the development of speech, language, and listening skills in babies, toddlers, and children. Activities can be practiced independently, with others, or with a teacher or therapist. Visit *TheListeningRoom.com* to explore and download the many FREE resources available.

Goals

Goals for this child were determined using the milestone information for 4 month olds provided in the charts above.

Speech and Language

GOAL 1

Hearing and Understanding: Child will respond to changes in tone of voice by turning towards the speaker, searching for a sound, changing facial expressions, and/or making sounds in response to sounds.

How to use the Activity: Watch how this child reacts as you hold up the different objects and make the associated sounds and send the toy down the tube. Highlight the differences in your tone of voice by using various intonations and lots of animation to make it easier for the child to differentiate between the sounds.

GOAL 2

Talking: Child will vocalize excitement and babble using speech like sounds that contain early consonant sounds (p,b,m) paired with vowel sounds either spontaneously or in imitation.

How to Use Activity: Listen for vocalizations as the child gets excited as well as any attempts made at repeating the sounds. Observe if she is experimenting with making different sounds, trying to vary pitch, or attempting to copy your sounds. Encourage her to repeat the sounds you are making for each object. This child will get experience using speech-like sounds and practice controlling her own pitch, loudness, breath support, and voice quality as she attempts to make the sounds you are making.

Auditory Skill Level

GOAL 3

Detection task: Child will recognize when sound is present vs. absent and associate the sound with the object

How to use the Activity: Observe the child to see if she is attending when you make sounds. Does she look at you or vocalize in response to sounds? This demonstrates that she is aware of the difference between the presence and absence of sound. Also observe if she is paying attention to the communication that is happening between you as you play. After several repetitions of sending each toy down the tube and saying the associated sound, stay quiet, hold up the toy, and see if she will attempt to make a sound. Additionally, see if she is able to make the correct sound for each object. This indicates she is beginning to figure out which sound goes with which object.

Therapy Tips

Advances in cochlear implant technology have made it possible for children with hearing loss to achieve the speech, language, and auditory skills of their hearing peers.* Use of developmental milestones, hearing age, and the Auditory Hierarchy will assist in setting goals, monitoring progress, and planning therapy. It is important for parents and professionals to work together as a team. Below are some general tips to ensure children maximize their hearing potential.

*Many factors influence performance outcomes with a cochlear implant. Some of the main factors that determine success are age at onset of deafness, age at implantation, consistency of device use, learning environment, family support, etiology, and additional health issues.

For Professionals

- Set high expectations for the child from the beginning.
- Ask parents questions before each session begins to get a sense of how well the child has mastered and generalized skills from previous therapy sessions.
- Therapy should be fun and functional.
- Goals for the session should be created jointly with the parent(s).[6]
- Suggest parents bring a toy from home to use during therapy so parents can repeat the activity at home and reinforce concepts learned during the session.[6]
- Whenever possible, let parents lead the session and provide coaching. This will help parents build confidence and assist them in carrying over activities at home.[6]
- Write very specific short-term goals. Example: "Given auditory input, child will learn 10 new words per week. Child will demonstrate comprehension of 2–3 critical elements in a message through audition alone."
- Therapy sessions are diagnostic, so stay one step ahead of the child's skills (or two!) and be prepared to adjust the activity to the child's challenge level as needed.
- Be prepared for the unexpected! When therapy "falls apart" have a bag of tricks to engage the child, such as a hand puppet or a pop-up toy, to get the session going.

For Parents

- Have fun.
- View yourself and not the therapist as the primary language teacher.
- Be a participant and not just an observer.
- Ensure your child is using their cochlear implants full time, during all waking hours.
- Attend therapy sessions on a consistent basis.
- Carry over concepts learned in therapy to everyday situations at home. Ask your therapist for ideas.
- Share examples of how your child has demonstrated that he or she has mastered a particular speech and language skill.
- Share examples of why you think your child still needs assistance with a particular speech and language skill.
- Let your therapist know if your child is not hearing well because of a possible equipment problem, health reason, or other issue.

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Looking for an easy way to track progress and make sure a child is achieving goals?

Visit *www.AdvancedBionics.com/tfs* and download the Tracking Auditory Progress flyer under the Assessment Tools link in the Education Support section.

Tracking Auditory Progress in CI Children

Note: Child is credited only for skills in listening-alone conditions. "Spontaneous" means without prompting or modeling and when not in a listening set.

Time post-implant child should demonstrate the skill

Group 1: Children implanted in the preschool years (age four or earlier).

Group 2: Children implanted at age five or later who have some residual hearing/speech perception skills, have consistently worn hearing aids, and communicate primarily through speech.

Group 3: Children implanted at age five or later who have little or no residual hearing/speech perception skills and are highly dependent on sign language and other visual cues for language learning.

Table 1 — Group 1 • Children implanted at **age four years or earlier**

Skill	1 mo.	3 mos.	6 mos.	9 mos.	12 mos.
1. Full-time use of CI	■				
2. Changes in spontaneous vocalizations with CI use		■			
3. Spontaneously responds to name 25% of time		■			
4. Spontaneously responds to name 50% of time			■		
5. Spontaneously alerts to a few environmental sounds			■		
6. Performance in audio booth consistent with what is reported at home				■	
7. Evidence of deriving meaning from many speech and environmental sounds					■
8. Major improvement in language					■

Additional Resources

Explore these resources to learn more about using milestones to set goals and connect with other therapists and parents.

Connect to a Mentor
Connect with other cochlear implant recipients, parents, or caregivers who will provide one-on-one support on navigating the process of choosing and living with cochlear implants.
hearingJourney.com

Access Free Resources
The Listening room supports the development of language and listening skills for all ages and environments. Activities can be practiced independently, with others, at school, or with a listening coach.
thelisteningroom.com

Download a Developmental Milestones Chart
firstyears.org/miles/chart.htm

Find Support
Through advocacy, education, research and financial aid, AG Bell helps to ensure that every child and adult with hearing loss has the opportunity to listen, talk and thrive in mainstream society.
agbell.org

Hearing First, is an educational endeavor of the Oberkotter Foundation and is dedicated to ensuring that children who are deaf or hard of hearing have opportunities to reach their full potential.
hearingfirst.org

Hands & Voices is a non-profit, parent-driven organization dedicated to supporting families of children who are deaf or hard of hearing.
Handsandvoices.org

Advanced Bionics
For questions or additional information: **Toll Free** 866.844.HEAR **TTY** 1.800.678.3575 Monday through Friday, 5am to 5pm PST
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