



AuSpLan (Auditory Speech Language)

Summary of a guide to expectations and auditory, speech, and language goals for a child with a cochlear implant

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The following is an introduction to our communication therapy program, the AuSpLan, which was developed to ensure a child's successful use of a cochlear implant. We believe that communication development is a multi-faceted entity, and our program addresses not just auditory skills but speech and language skills as well.

AuSpLan has three components. The first component addresses pre-implant candidacy and the prediction of realistic outcomes. The second component relates to expected educational placement and support services for the implanted child. The third component encompasses specific auditory, speech, and language goals.

Using a hierarchal approach, children develop skills in a sequential manner along a continuum of development. At each level or stage, we have identified low and high milestone markers to determine a child's progress. *When this therapy approach is added to the natural language of the classroom and home, children have been successful at realizing the full potential benefit from their cochlear implants.*

I. Cochlear Implant Candidacy

Some children derive more benefit from a cochlear implant than other children do. During the candidacy process, parents should be counseled regarding potential outcomes pertaining to their child's development of auditory verbal/oral communication. At Children's Hospital Cochlear Implant Center, team members assess the abilities, motivation and level of involvement of the family and child, including whether the family has a realistic view of the child's potential to benefit from a cochlear implant.

Each team member rates a child's candidacy. The collective group rating is calculated and a child is assigned to a Candidacy Level of A, B, or C, or Category D. Candidacy levels are essentially predicted outcomes that are based both upon pre-implant characteristics and the team's experience with a large number of implant children.

Listed below are the four post-outcome prediction levels used by the team.

- Level:** **Long-term predicted outcome after implantation**
- A** **Auditory verbal/oral communicator**
 - B** **Both, auditory verbal/oral communicator with visual assist**
 - C** **Complementary, auditory verbal/oral skills assist primary visual communication**
 - D** **Does not benefit from implant**

Parents are counseled about the team’s impressions of realistic outcome benefit for their child. Based on the information provided by the team, parents can make a more informed decision regarding communication and educational choices.

At our center, we conducted a study of children’s auditory, speech and language progress after cochlear implantation. There were 80 children followed in the study who were between two and five years of age at the time of implantation at Children’s Hospital in Oakland, California. All were congenitally deaf or deafened pre-linguistically. All met the criteria of profound deafness with minimal, if any, benefit from amplification. Each child received a team rating prior to implantation. Progress was documented over three years of therapy and compared to the child’s pre-implant rating. Within the areas of auditory, speech and language, we identified levels and stages based on a hierarchy of development. By documenting the acquisition of marked goals within each of the levels and stages for A, B, and C candidates, we were able to determine a general timeline of expected acquisition for each candidacy level. This became a measurement tool for monitoring progress.

Candidacy Level A

Of the children rated by our team, 25% were placed at Candidacy Level A. Three years post-implant, 87% of this group was performing with expected Level A auditory-linguistic competency. Another 13% had more difficulty than projected and performed like Candidacy Level B children. None of the A candidates performed at Candidacy Level C. The A candidates were children generally implanted under the age of three years. They developed awareness of sound within the first few weeks of implant, association of sound with events by three months, single word use with understanding and emerging phrases by one year post-implant, and use of spoken intelligible language to express needs and feelings by 24 months post-implant. These children became auditory verbal/oral communicators and learners within 3 years of implantation and generally entered the mainstream for education with continued speech/language support services.

Candidacy Level B

Forty-six percent of candidates evaluated pre-implant were placed at Candidacy Level B. After three years of implant use, 85% performed with expected Level B auditory linguistic competency. Another 5% performed at Candidacy Level A expectations, and 10% performed similar to the Candidacy Level C group. The B candidates encountered difficulty developing auditory and verbal/oral skills. They were slower than the A candidates in acquiring these skills. To develop these skills, the B candidates required intensive speech/language therapy and auditory training. Like the A candidates, they developed awareness of sound within the first few weeks. However, association of sound with events did not develop until six to 10 months. Single-word use with understanding and emerging phrases developed by 12 to 18 months post-implant, and use of spoken intelligible language to express needs and feelings developed by 36 months post-implant. These children

became auditory verbal/oral communicators but required considerable visual assistance for learning such as speech reading but not necessarily sign language. They manifested subtle to moderate difficulties with speech and/or language development, making additional therapy necessary. They entered a modified mainstream for education.

Candidacy Level C

Of the children rated by our team, 29% were placed at Candidacy Level C pre-implant. After three years of device use, 70% maintained performance at the projected slower language development. Many of these children peaked in their performance at a key word-acquisition stage and could use stereotypical phrases. Another 15% performed at low Candidacy Level B expectations. An additional 15% became non-users or very poor users of the device due to reasons that included central language difficulties, poor educational expectations for listening, and/or failed parental follow-through. Of the C group, none of these children became A candidates. The Candidacy Level C group achieved awareness of sound within four months, developed association of sound with events within six to 14 months post-implant, developed single-word use around 24 months, and developed understanding and emerging phrases around three years-plus post-implant. Many Candidate Level C children plateaued at this level of skill.

However, a few children benefited from continued therapy, showing some acquisition of higher level skills within a limited vocabulary set. These Candidacy Level C children represent deaf children who can obtain some benefit from a cochlear implant but will always require a visual learning system as the primary learning modality. These children were rated at a C level due to significant concerns in language acquisition skills in all modalities. The auditory input will provide for stereotypical phrase use and understanding but will not develop to a point for dependency for auditory learning. The cochlear implant provides an added quality to their lives for stereotypical to casual speech exchange. The Candidacy Level C children are generally not appropriate for mainstream education. They benefit best from classes that specialize in deaf education with sign language as the primary mode of communication.

Category D

Some deaf children who are referred for cochlear implants are not candidates. These children, while deaf, are usually manifesting other factors as their primary impediment to learning. If given an implant, they may experience interference with their visual learning time while they struggle to make sense of the auditory input. In counseling parents of these children, they should be advised to weigh risk versus benefit prior to embarking on implant. It is important that, if such children are implanted, the visual learning system be used as the primary teaching method.

Impact of Pre-implant Counseling and Outcome Predictions

The team assessment and sharing of findings has become a crucial element in the pre-implant process. It provides a mechanism to better serve the child and to assist the family and the educators with setting realistic expectations and choosing an educational placement appropriate to the child's needs, the team recommendation is shared with families, providing them with information with which to make an informed decision regarding implantation's risks and benefits. The results of our study indicated that our pre-implant rating was a viable tool to measure a child's potential to benefit from implant. Note that such ratings help predict the likelihood of a child's future performance, but can never predict exact outcome. Each child must always be viewed as a unique individual.

II. Expected Educational Outcomes and Support Services

Mainstream education is a regular education classroom placement using regular curricula. Successful mainstreaming means that the child is able to function at the level of his/her peers, academically, socially, and communicatively. For many parents, the goal of implantation is to have him or her eventually attend the mainstream class along with his or her peers without dependence on an interpreter. However, many B candidates may require intense support services for academic support.

Mainstreaming is most effective when a child demonstrates comprehension and verbal communication sufficient to follow along with classroom instruction and communicate with peers. This generally means that implanted children will require special education classes to prepare them for the mainstream. Transition to mainstream needs support services and a transition team in order to be effective.

It is appropriate to recommend mainstreaming when children have reached a level of auditory and verbal communication where they are able to comprehend information for learning purposes and express needs and thoughts to adults and peers. Initially many of the implanted children will not be at the level of their peers in terms of communication, but will be able to keep up with their peers academically. We have found that children at an auditory level of solid 5A on the Auditory Skills Pyramid are better able to integrate into the mainstream. It is important that these children have reached a stage of intelligibility and ability to formulate their thoughts and needs into intelligible verbal utterances. These verbal communications may not be as complex or rapid as those used by their peers.

However, if the child is able to communicate effectively, he or she is ready for mainstream. We have generally found that the mainstream can be considered two–three years post-implant. Mainstream provides language immersion at a more sophisticated level than the self-contained classroom. In our experience, mainstream has worked most effectively when it occurs before second grade, with kindergarten being the most ideal time. As children receive cochlear implants at an earlier age, mainstream into kindergarten can be a realistic goal.

At our center, the Candidacy ratings establish expected educational programs and services that are needed to best serve the individual child. Children coming to our center may be utilizing auditory verbal/oral communication or total communication. Expectations are set based on Candidacy Level rating regardless of the child's current mode of communication. Below are listed the expectations for educational outcomes and support services required to meet these outcomes. The expectation for each Candidacy Level is the same. Children may achieve these outcomes through different routes.

Expected Educational Outcomes Relative to Candidacy Level and Pre-implant Communication Mode

Candidacy Level A

Auditory Verbal/Oral: Within 3 years of implantation, the child should be fully mainstreamed. Transition to the mainstream may include some partial mainstreaming prior to full inclusion. Services in the mainstream should include moderate to intensive speech/language therapy based on the individual child's needs. The child should also receive services from a mainstream consultant, generally a teacher of the deaf, to address specific needs in the classroom. Auditory training at this point is generally not needed as an individual service, as the children have developed high levels of discrimination skills. Focus is placed on developing speech and language skills commensurate to the child's peers.

Total Communication: Within 3 years of implantation, the child should be fully mainstreamed. Transition to the mainstream may include continuation in a total communication classroom up to the first year after implantation, then placement in an oral program progressing to mainstream. Transition may include continuation in the total communication program with strong emphasis on auditory verbal/oral skills to partial mainstream to full mainstream. As the child's auditory verbal/oral skills develop, sign language is reduced/eliminated. By the time a child enters the mainstream, the primary mode of communication is auditory verbal/oral. Support services should include moderate to intensive speech/language therapy and mainstream consultation services.

Candidacy Level B

Auditory Verbal/Oral: Within 3 years of implantation, the child should be placed into modified mainstream. For B Candidates to function in the mainstream, they require additional and intensive services to compete with their peers communicatively and academically. Transition to the mainstream may include partial mainstream to full mainstream inclusion. Support services required may include intensive speech/language therapy, intensive auditory training, resource and/or reading specialist services, mainstream consultation services, and/or a classroom aide. It is essential to prioritize goals and coordinate support services for B candidates.

Total Communication: Within 3 years of implantation, the child should be placed into modified mainstream. The visual mode is used as a basis for associative learning. Transition from the TC program to modified mainstream may include TC program to oral program to partial and then full modified mainstream, or TC program to partial and then modified mainstream. Continued TC programming may be required for one or two years post-implant. Support services required should include intensive speech/language therapy, intensive auditory training, resource and/or reading specialist services, mainstream consultation services, and/or sign interpreter to act as an assist to the child's communication and not as a primary provider of input. Coordination of support services and setting goal priorities will maximize the efforts of professionals. Many to most B Candidates become auditory verbal/oral communicators who eliminate use of sign language and therefore require a classroom aide versus a sign language interpreter.

Candidacy Level C

Auditory Verbal/Oral: Mainstream education is not an option for this child. Due to significant difficulties in language-learning abilities, it is felt that the C Candidate is best served in a self-contained class that uses sign language as the primary means of communication. C Candidates who continue to use auditory verbal/oral communication will not develop adequate language skills for learning or communicative purposes. As with all children, the primary goal is to develop functional communication skills. For these candidates, this will be sign language. Support services should include moderate speech/language therapy and auditory training services. Sign language tutoring may also be beneficial for this child.

Total Communication: Mainstream education is not an option for this child. Continued inclusion in a self-contained class that uses sign language as the primary means of communication and emphasizes audition and verbal skills as an assist to communication is the appropriate program. Support services should include moderate speech/language therapy and auditory training services. Sign language tutoring may also be beneficial for this child.

Summary of Expected Educational Placements and Support Services

A Auditory learner

- Educational Placement: Mainstream by 3 years post-implant.
- Support Services: Moderate to intensive speech/language therapy, mainstream consultant.

B Both visual and auditory dependent

- Educational Placement: Modified mainstream by 3 years post-implant.
- Support Services: Intensive speech/language therapy and auditory training, mainstream consultant, resource and/or reading specialist, classroom aide.

C Complementary audition to visual communication

- Educational Placement: Immediate placement in self-contained deaf/hearing impaired total communication program.
- Support Services: Moderate speech/language therapy and auditory training, sign language tutoring.

A child is best served when the family, the implant team and those involved in education work together to determine the required services to make mainstreaming successful. Each child and program should be individualized. Planning is different for each child, and programs must be tailored to fit the individual child's needs. (PL 94-142)

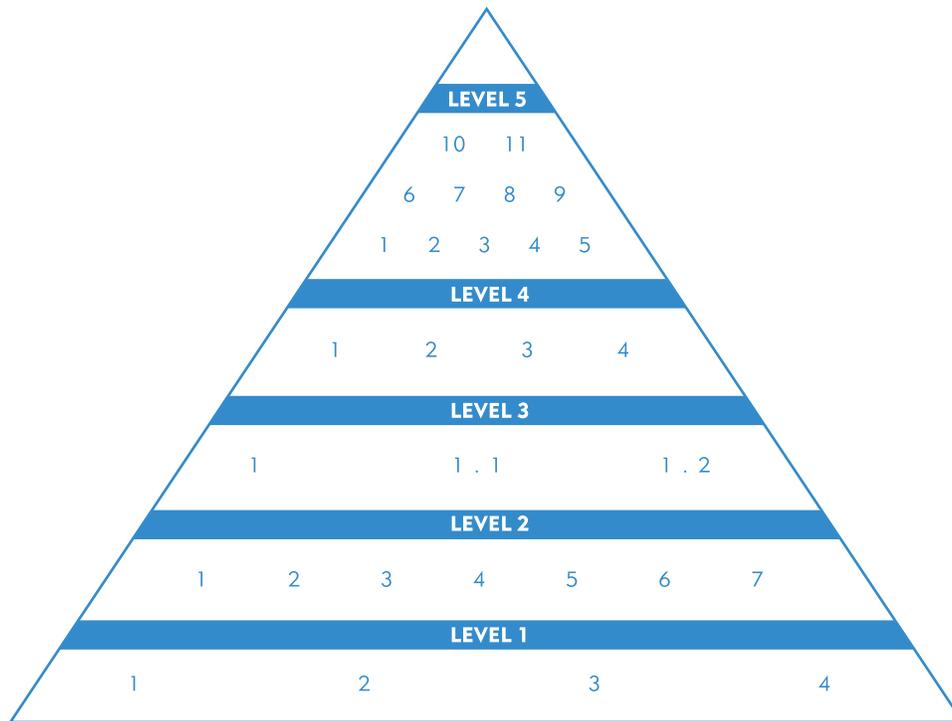
Common goals are addressed in the classroom; individual goals are addressed in therapy. Determining the degree of support required is important. A child requires a balance allowing him/her time in the classroom and also allowing support services that are essential to building the necessary language and speech skills required for the child to be successful. IEP goals should be amenable to change as the team continues to review the child.

III. Auditory, Speech, and Language

Our comprehensive program includes sections for auditory, speech and language goals, all of which are critical for communicative competence in implanted children. Note that these are listed as separate sections. It is recognized, though, that communication develops not in separate sections, but in an integrated and interdependent fashion.

Auditory Goals

Deaf children require similar but more intense auditory stimulation in the same order of development as normal-hearing children. This order is not dependent on chronological age but on listening age. We identified five hierarchical levels with therapeutic goals at each level to develop auditory skills. These levels are: 1) awareness, 2) suprasegmental: discrimination/association, 3) segmental: association/identification, 4) identification, and 5) processing comprehension. These levels are presented as a pyramid, showing that a strong foundation is required for building higher level skills.



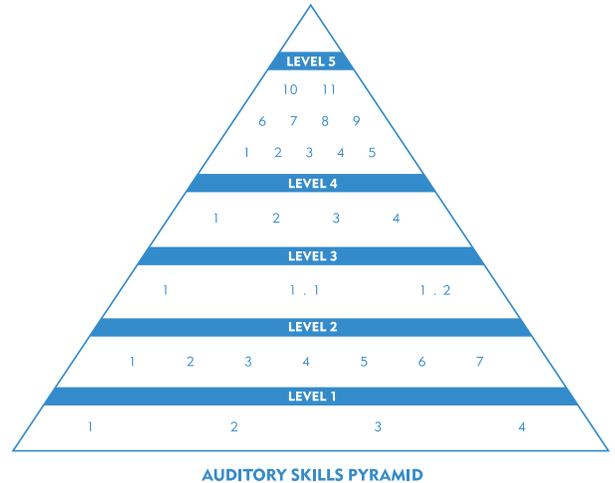
AUDITORY SKILLS PYRAMID

Level 1: Awareness, 1–4 weeks post-implant

- 1: Awareness of voice in voice
- 2: Awareness of environmental sounds
- 3: Awareness of Ling Six sounds
- 4: Distraction

Level 2: Suprasegmental-Discrimination/Association, 2–5 months post-implant

- 1: Vocal length
- 2: Onomatopoeic content
- 3: Word length
- 4: Sentence length
- 5: Intensity pitch
- 6: Oral/nasal resonance rhythm
- 7: Prosody/stress difference intonation



Level 3: Segmental-Association/Identification, 6–9 months post-implant

- 1: Consonant and vowel difference in monosyllable/trochee/three-syllable words
- 1.1: Vowel-only difference
- 1.2: Consonant only

Level 4: Identification, 9–12 months post-implant

- 1: One key word in context with/without suprasegmentals
- 2: Two key words in context
- 3: Three key words in context
- 4: Four-plus key words in context

Level 5: Processing/Comprehension, 15+ months post-implant

- 1: Advanced vocabulary development
- 2: Increase auditory word-play association
- 3: Answer simple questions
- 4: Understand increasingly complex sentences containing three or more key elements
- 5: Listen to short paragraph and answer simple questions
- 6: Answer complex questions with/without visual support
- 7: Listen to longer paragraphs and answer complex questions
- 8: Sequence
- 9: Increase cognitive language skills
- 10: Follow conversation ending with familiar topic
- 11: Follow open conversation

Therapy goals were developed to parallel natural auditory developmental stages. The therapy situation allows for more focused auditory stimulation at each level. Using therapy to guide the emerging skills for mastery, the natural language approach of the classroom and the home can be used to incorporate newly learned skills.

Within the five levels of the Auditory Pyramid, specific goals have been identified. To acquaint the reader with this program, we offer selected examples from Level 1 and Level 5A. The working time frame is listed for Candidacy Levels A, B, and C.

Level 1: Auditory Awareness

Timeframe: A Candidates: 1–4 weeks
 B Candidates: 1–4 weeks
 C Candidates: 1–12 weeks

Under this level are four main goals.

- Goal 1 Awareness of voice/name in a listening posture.
- Goal 2 Awareness of environmental sounds. We expect awareness of voicing and environmental sounds occurring within the first few weeks of implant mapping. We expect the child to be aware that voicing is different from environmental sounds.
- Goal 3 Awareness of Ling Six sounds. This begins at time of mapping to ensure awareness along the speech frequency range.
- Goal 4 Voice in distraction. We need to develop awareness of voicing when the situation is not structured and the child is not in a listening posture.

Level 5A: Processing/Comprehension

Timeframe: A Candidates: 12–26 months
 B Candidates: 14–33 months
 C Candidates: Not achieved

This level requires both receptive and expressive language skills and contains 5 main goals.

- Goal 1 Advanced vocabulary development. This should include knowledge of age-appropriate grammatical structures, linguistic concepts and age-appropriate vocabulary.
- Goal 2 Auditory wordplay association. This goal teaches word associations through identification by category, identification by function, identification by attribute, rhyming, synonyms, antonym, analogies, things that go together.
- Goal 3 Answer simple who, what-doing, where, yes/no questions with/without picture cue.
- Goal 4 Understand increasingly complex sentences containing 3 or more key elements. These should include inclusion/exclusion statements, reverse positioning, embedding, passive sentence structures, clauses, and conjunctions. The language is no longer concrete, as in Level 4. Processing of language is now required.
- Goal 5 Listen to a short paragraph and answer simple questions with/without picture cue. Paragraphs should contain concrete/direct information. This will also build the child's ability to listen to and retain and recall larger chunks of information.

Measurement Tool: Auditory Low and High Milestones

Specific skills within each of the levels of the Auditory Skills Pyramid were targeted as milestone markers. At the conclusion of our study, we were able to identify a timeline of expected acquisition of skills for A, B, and C Candidates. The timelines have provided us with a monitoring tool to determine if a child is developing auditory skills at an appropriate rate. At each level on the Auditory Skills Pyramid, low and high milestones have been identified, reflecting minimum acceptable progress and good progress, respectively. If a child fails to meet these targeted goals within the expected timeframe, a red flag is identified and review of the child's therapeutic, mapping, and educational status, learning capabilities, and family involvement is indicated. Obviously, greater concerns arise when a child has not met low milestones within the working timeframe.

Auditory Low and High Milestones

Level 1: Awareness

Low: Child able to sit in "listening posture" and responds to voice 80% of the time.

Expected timeframe for: A Candidates: 1 week
 B Candidates: 1 week
 C Candidates: 1–6 weeks

High: Child able to sit in listening posture and respond to ALL Ling Six sounds.

Expected timeframe for: A Candidates: 1 week
 B Candidates: 1 week
 C Candidates: 1–12 weeks

Level 5A: Processing/Comprehension

Low: The child is able to identify one of six objects/pictures when presented with description or function, four out of six times. For example: Find something that flies (airplane), find something that is round (ball), etc.

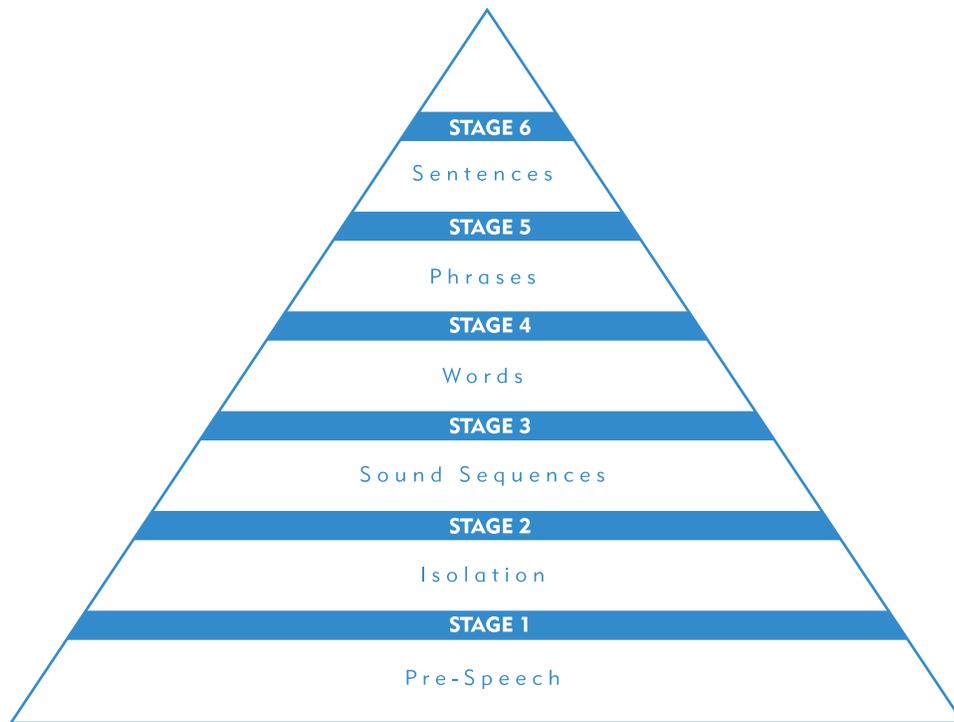
Expected timeframe for: A Candidates: 12–16 months
 B Candidates: 14–20 months
 C Candidates: Not before 36 months, and many do not achieve

High: The child is able to answer simple who, where, and what-doing questions when presented with a five-sentence paragraph about a picture. For example, the child is shown a picture of a girl riding on a bike and told: *The girl is at the park. She is riding her new bike. Her mommy and daddy are sitting on the grass. They are watching her. It is a sunny day.* The child is then asked, *Who is riding on the bike? Where is the girl? Where are mommy and daddy sitting? What is the girl doing? What are mommy and daddy doing? Who is watching the girl?*

Expected timeframe for: A Candidates: 14–26 months
 B Candidates: 16–33 months
 C Candidates: Not achieved

Speech Goals

The approach that we have selected in developing speech skills is based on two elements: sound acquisition and sequence development. The Hierarchy of Speech Intelligibility Stages reflects the complexity of the child’s speech output along a continuum from sounds in isolation to producing intelligible speech at the sentence level. Speech goals for the implanted child are written for these six speech intelligibility stages. Speech Levels 1 through 4 reflect order of acquisition for speech sounds and progress in eliminating phonological processes. Sounds and processes from the speech levels are integrated into goals at the six stages.



HIERARCHY OF SPEECH INTELLIGENCE

Description of Speech Intelligibility Stages

Stage 1: Pre-Speech. Vocal control: voice on demand-on/off and length imitation. At this level the child is learning to turn his/her voice on and off volitionally. The child is also learning to imitate different lengths of open vowels sounds. This is the beginning of breath control and voicing.

Stage 2: Isolation. Child learns placement of the sound.

Stage 3: Sound Sequences. The child learns to blend two or more sounds together (e.g., CV, VC, CVCV, VCV, CVC). For sibilants, the sequences would be VC because the sibilant is easier to produce in final position. Examples: CV=b-ah, VV=oo-ee, VC= oh-sh. The goal is sound flow and not separation of sounds.

Stage 4: Words. The child first imitates, then spontaneously produces words that contain the targeted Speech Level Sounds. Phonological processes that have not yet been extinguished should continue to be addressed.

Stage 5: Phrases. For our purposes, a phrase is defined as a two-to-four-word utterance that does not necessarily conform to grammatical rules. Examples are: *open the door, time to go, I want more, go bye-bye.* Intelligibility is the goal. The child first imitates, then spontaneously produces phrases using targeted Speech Level Sounds. Phonological processes that have not yet been extinguished should continue to be addressed.

Stage 6: Sentences. For our purposes, a sentence is defined as any utterance five words or more in length, regardless of grammar. Maintaining intelligibility is the goal. The child first imitates, then spontaneously produces single sentences, progressing to connected sentences using the targeted Speech Level Sounds.

Speech Levels

There is a general hierarchy to the order in which sounds are targeted. This order approximates normal sound acquisition. Level 1 sounds were selected so that the child would be exposed to manner, voice and place characteristics. Beginning phonological processes are targeted for elimination. Additional levels and phonological processes can be varied in accordance with normal acquisition, child's age, and the child's stimulability for sounds.

We have identified four speech levels for phonemes and phonological processes. These levels loosely coincide with levels from the Auditory Skills Pyramid. For example, Speech Level 1 sounds generally coincide with Auditory Levels 1 and 2, and so on. As an example, we present only Speech Level 1 below.

Speech Level 1

Vowels: ah, oh, ow, ee, oo

Consonants: b, m, w, n, d, sh, (s is age dependent)

Phonological Processes: 1) syllable deletion—a syllable from a multisyllabic word is deleted (i.e., bu for bunny); 2) reduplication—a phoneme or syllable is repeated (i.e., tato for table, mah-mah for monkey); and 3) assimilation—a phoneme that is more like another phoneme in the word is substituted for another sound (i.e., pabo for table).

At this level vocal shaping is introduced. The goal is for the child to begin to develop a speech sound repertoire. As the child develops the ability to produce these sounds, they are then practiced in the sound sequence level. When a child reaches the CVCV same consonant same vowel, the phonological process of syllable deletion should be targeted. When a child reaches CVCV different consonant same vowel, reduplication and assimilation should be targeted.

Therapy goals for speech have been developed to coincide with the six stages of the speech intelligibility hierarchy. To acquaint the reader, examples are given below from Stage 1 and Stage 5, with working timeframes listed for Candidacy Levels A, B, and C.

Stage 1: Pre-Speech

Timeframe: A Candidates: 1 week
 B Candidates: 1 week
 C Candidates: 1–4 weeks

Goal 1. Voice on/off.

Goal 2. Length imitation. The child should be able to imitate long, short, and intermittent vowel production.

Stage 5: Phrases

Timeframe: A Candidates: 7–12 months
 B Candidates: 9–15 months
 C Candidates: 34+ months and many do not achieve

Goal 1. Imitate two-to-four-word phrases using Speech Level ___ Sounds ___.

Goal 2. Spontaneous two-to-four-word phrases using Speech Level ___ Sounds ___.

Goal 3. Imitate two-to-four-word phrases without using the phonological processes of _____.

Goal 4. Spontaneous two-to-four-word phrases without using the phonological processes of _____.

Measurement Tool: Speech Low and High Milestones

Specific goals within each stage were targeted as milestone markers. If a child fails to meet the targeted goals within the timeframe, this is an indicator of difficulties with speech development. The milestone markers can be used to monitor goals so that areas of weakness may be addressed.

Speech Low and High Milestones

Stage 1: Pre-Speech

Low: The child is able to produce voicing of any vowel on demand.

Expected timeframe for: A Candidates: 1 week
 B Candidates: 1 week
 C Candidates: 1–4 weeks

High: The child is able to imitate at least two different vocal lengths of a vowel sound.

Expected timeframe for: A Candidates: 1 week
 B Candidates: 1 week
 C Candidates: 1–4 weeks

Stage 5: Phrases

Low: The child is able imitate at least three different two-to-three-word phrases, with 80% intelligibility.

Expected timeframe for: A Candidates 7–11 months
 B Candidates: 9–12 months
 C Candidates: 34+ months

High: The child is able to spontaneously produce at least three different three-to-four-word phrases, with 80% intelligibility.

Expected timeframe for: A Candidates 9–12 months
 B Candidates: 10–15 months
 C Candidates: not achieved by 36 months

If the child is unable to achieve these goals, therapy should target increasing speech sound repertoire, increasing sound sequencing abilities, and decreasing use of phonological processes.

Language Goals

For our purposes, language is defined as verbal expression. We acknowledge that visual language can express cognitive function. However, this will not be addressed here. Our purpose is to facilitate development of verbal expressive skills in relation to using the cochlear implant. In the approach to developing verbal expression, we follow normal, natural acquisition of language skills. The speech language pathologist and teacher will work closely together to facilitate language development. As children develop language, *not all aspects will require remediation. Determining what a child has not learned naturally or through vicarious learning becomes an important role for the therapist.* These are the areas that will then be targeted in therapy.

This article does not provide the venue to pursue language development in great depth. We have, however, endeavored to highlight a general hierarchy to follow. Once a child is implanted, he/she will generally follow along the lines of this normal development. However, the newly implanted deaf child's language acquisition rate will differ from normal development. A child will bring cognitive development and life experience that can be used to his/her advantage.

This is particularly evident in the child who has already established a language system such as signing, which is then more readily transferred into the auditory-verbal system. For example, a child implanted at three years of age has developed cognitive skills and therefore eight months post-implant cannot be compared to having developed the skills of an eight-month-old hearing infant. Because of developed cognitive skills, we can anticipate that language development in the initial post-implant period will be at a faster rate than that of the infant. Our goal is to use this accelerated pace to bring the child closer to a level of language competency of his /her hearing peers three to five years post-implant.

We use a hierarchy of language development divided into six levels. Each level roughly corresponds to the timelines of auditory levels and speech stages in post-implanted children. *Vocabulary growth is an ongoing goal that should be targeted at each level.*

Description of the six language levels:

Word approximation: Vocal intent and vocalization for meaning. The child is learning to use his/her voice to gain attention. The child is also learning that vocalization is associated with meaning. At this level, speech sound shaping is in imitation. The child learns that vocal utterances are actually vocal patterns/words that have different meaning.

Word production: Spontaneous true word productions. At this level, the child is learning to spontaneously use true words to convey meaning. True words may not be phonemically intact but are verbal utterances consistently used to express the same label. This level is single word production.

Connected utterances that includes phrases and basic sentences: This level consists of connected words and basic sentences that do not contain grammatical markers. This level encompasses utterances two to four words in length.

Simple sentences that includes grammatical structure development: At this level, the child is learning to use simple grammatical markers. Sentences are generally four to six words in length.

Expanded sentences that includes interrogatives and expanded sentences: At this level, the child is learning to use question formats and sentences that contain appropriate word order and grammatical structures. Sentences are generally at least six words in length.

Complex sentences that includes conjoining, complex sentences, and discourse: At this level, the child is learning to use advanced sentence structures appropriate to his/her peer group. This includes using such elements as embedded information, clauses, and advanced vocabulary. The child is also learning to exchange ideas verbally using intricate language. This is an ongoing level of language learning that extends from childhood through adulthood.

Language Goals

Within the six levels of the language hierarchy, specific goals have been identified. Due to space limitations, we offer selected examples only from Level 2 and Level 4.

Level 2: Word Production

Timeframe: A Candidates: 1–5 months
 B Candidates: 1–6 months
 C Candidates: 4–28 months

Goal 1. Spontaneously produce 5–10 word approximations.

Goal 2. Spontaneously produce 30–50 word approximations.

Level 4: Simple Sentences

Grammatical structure development following Brown’s early morphemes

Timeframe: A Candidates: 9–18 months
 B Candidates: 12–32 months
 C Candidates: 36+ months and many do not achieve

Goal 1. Spontaneously produce /is/ in a simple sentence.

Goal 2. Spontaneously produce /verb + ing/ in a simple sentences.

Goal 3. Spontaneously use age-appropriate grammatical structure in simple sentences.



Measurement Tool: Language Low and High Milestones

Specific goals within each level were targeted as milestone markers. If a child fails to meet the targeted goals within the timeframe, this is an indicator of difficulties with language development. The milestone markers can be used to monitor goals so that areas of weakness may be addressed.

Language Low and High Milestones

Level 2: Word Production

Low: The child is able to produce 5 true words. True words are correct productions or approximations of a word that the child uses consistently to name something.

Time Frame: A Candidates: 1–3 months
B Candidates: 1–3 months
C Candidates: 4–18 months

High: The child is able to produce 30 to 50 true words. Developmentally, children combine words after they have acquired their first 30 to 50 words.

Time Frame: A Candidates: 2–5 months
B Candidates: 4–6 months
C Candidates: 8–28 months

Level 4: Simple Sentences

At this level, use of simple grammatical structures is now addressed in short utterances.

Low: The child is able to produce at least five simple sentences containing the sentence structure noun + is + verbing + noun. Beginning grammatical markers are expected, more advance markers such as /the/ are not expected. For example: Dog is eating bone.

Time Frame: A Candidates: 9–12 months
B Candidates: 12–28 months
C Candidates: 36+ months and many do not achieve

High: The child is able to produce at least five simple sentences containing the sentence structures noun + is + prepositional phrase. For example: Dog is under table.

Time Frame: A Candidates: 12–18 months
B Candidates: 16–32 months
C Candidates: 36+ months and many do not achieve

If you are interested in further information on the AuSpPlan you may contact the author, Mary Kay Therres at therres@email.chop.edu.