

# CHAPTER 3

## What children with a cochlear implant need in school

- Trends in educational services
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### Trends in educational services

Many families pursue cochlear implantation in part because they want their deaf children to attend school with their normal hearing peers. All parents want their children to succeed in school, at work, and in whatever they pursue in life. Parents of deaf children are no different and often view the mainstream school environment as a place for their child to begin the path towards a successful life in the larger world.

In the past, most children with severe-to-profound hearing loss were educated in self-contained classrooms where services could be focused on the special needs of children with significant hearing loss. Now, there is a trend—supported by Federal education law—for all children with disabilities to be placed in the least restrictive environment that serves the child's needs. For a child with a cochlear implant, the goal of a mainstream placement is now both possible and desirable.

Regardless of classroom placement—mainstream, self-contained, or something in between—the majority of children with cochlear implants will still need services and support at some time during their school career. The specific services and frequency of provision will vary by child and may change over time for any individual child. There may be periods when the child does not require any services at all other than a good listening environment and/or a FM system. Nonetheless, it is important to continue to monitor the child with a cochlear implant as his/her needs may change. Even the student who has achieved age-appropriate language may encounter new hurdles as their educational

curriculum becomes more challenging or some other child-specific factor presents a new complication at school. The student with a cochlear implant should be evaluated and monitored continuously to ensure (s)he is receiving the support (s)he requires at the time that (s)he needs it.

## Impact of universal newborn hearing screening programs

With the implementation of newborn hearing screening programs across the United States, many more deaf children are entering early intervention programs within the first months of life. In 2005, 93% of babies born in the United States were screened for hearing loss before they were one month of age.<sup>1</sup> What an extraordinary difference from ten years ago when the average of identification of hearing loss was 30 months! This recent emphasis on identifying hearing loss within days of a child's birth makes it possible for early intervention to begin while the deaf child is still at the optimum age for beginning language development, rather than starting the process after the child has missed many language milestones and is far behind his/her hearing peers. Studies have shown that children who receive appropriate early intervention services prior to six months of age have better language outcomes than those who begin after six months.<sup>2</sup>

For a child who is a candidate, the cochlear implant process can begin immediately following identification of the hearing loss with the fitting of hearing aids and initiation of an auditory therapy

program for the child and his/her family. Some families may choose to use early signs with their deaf child until (s)he is old enough to receive a cochlear implant—12 months for a child with a profound hearing loss. A family's decision to use early signs should not delay the introduction of spoken language approaches (i.e., amplification, auditory therapy) prior to cochlear implantation. When a child receives a cochlear implant at or near 12 months of age (or at 25 months for the appropriate candidate with a severe-to-profound hearing loss), the period of deafness is minimized and the access to the full range of sounds provides enhanced potential for developing spoken language. The time period immediately following implantation provides a special opening to aggressively pursue auditory skill development and maximize the opportunity for the newly implanted child to catch up to his/her hearing peers. An intensive period of therapy should be tailored to the child's age, auditory skill levels, and other elements of his/her unique needs.



1 National Center for Hearing Assessment and Management (NCHCAM). State summary statistics: universal newborn hearing screening. Retrieved May 27, 2006 from <http://www.infantheating.org/status/unhsstate.html>

2 C. Yoshinaga-Itano et al. The language of early- and later-identified children with hearing loss. *Pediatrics* 1998 Nov; 102 (5):1161-71

## Pediatric cochlear implant candidacy criteria

### 12 months to 24 months

- Profound SNHL, bilaterally
- Limited benefit from appropriate binaural hearing aids
- Lack of progress in the development of auditory skills
- No medical contraindications
- High motivation and appropriate expectations from family

### 25 months to 17 years, 11 months

- Severe-to-profound SNHL, bilaterally
- MLNT scores of 30% or less in best-aided condition (children 25 months to 4 yrs., 11 months)
- LNT scores of 30% or less in best-aided condition (children 5 yrs. to 17 yrs., 11 months)
- Lack of progress in the development of auditory skills
- No medical contraindications
- High motivation and appropriate expectations (both child when appropriate and family)

## Early implantation = better outcomes for young deaf children

Early identification of a child's deafness allows the cochlear implant evaluation process to begin at a younger age than ever before. As a result, the average age of implantation (for children under

three years) dropped to 21.5 months in 2005.<sup>3</sup> Studies<sup>4</sup> demonstrate that children who are implanted early develop speech perception and speech production skills closest to those of normally hearing children, a result of the fact that the hearing pathways of the brain respond best when they are stimulated early. Without exposure to the stimulation provided by a cochlear implant, the hearing system begins to lose its ability (or plasticity) to respond to sensory input.<sup>5</sup> The important benefits of early implantation have been documented in a number of studies<sup>6</sup> examining the impact of a child's age at implantation on language outcomes.

Although 3 years was once considered “young” for a pediatric cochlear implant recipient, today researchers consider implantation at an earlier age to be beneficial<sup>7</sup>. Children 12 to 18 months at the time of surgery may have the best results of all.<sup>8</sup> Professionals working with families of young deaf children under early intervention programs have a critical role to play in informing families about cochlear implantation so that parents have the information they need to make decisions about their child's future. If a family decides to pursue the cochlear implant option for their child, they can then do so at the time when the intervention will yield the greatest results.

With children now receiving cochlear implants at a younger age, the time children spend in a special school or program for the deaf is typically shorter. Children may attend special programs for hearing impaired children for several years and then “graduate” to the mainstream. It is also not unusual for an early implanted child who receives

3 Cochlear Americas industry-wide estimate.

4 Hammes, Dianne et al. Early Identification and Implantation: Critical Factors for Spoken Language. *Annals of Otolaryngology, Rhinology, and Laryngology*, Supplement 2003; May: 189:79-4.

5 K. Robinson. Implications of developmental plasticity for the language acquisition of deaf children with cochlear implants. *Int J Ped Otorhinolaryngol* 1998; 46:71-80.

6 Karen Kirk et al. *The Volta Review*, Vol 102(4) (monograph), 127-144.

7 K.I. Kirk et al. Cochlear implantation in young children: effects of age at implantation and communication mode. *Volta Review* 2002. 102(4):127-144.

8 D. Hammes et al. Early identification and implications: critical factors for spoken language development. *Annals Otol Rhin Laryngol Supplement* 2002 May. 180:74-78.

intensive auditory therapy to attend mainstream pre-school programs with his/her normally hearing peers and never attend a special school for hearing impaired children. Regardless of where the child spends his/her preschool years, many cochlear implant children are now ready to begin first grade in the mainstream!

## What educational services will the implanted child need?

The educational services needed to support a child with a cochlear implant will depend upon his/her language development and other needs. An estimated 40% of children with cochlear implants will have other disabilities,<sup>9</sup> apart from their hearing loss, that may also be educationally significant and need to be addressed in the school setting. These may include physical, sensory or cognitive issues, which may be mild or may present even greater challenges than the child's deafness. The need to consider and address these issues, along with the child's hearing loss, is critical to the child's success at school. A multidisciplinary, collaborative approach for addressing a child's needs is beneficial for any child with a cochlear implant, but is particularly important when there are other issues to consider.

A child's language development, social and emotional skills, and other needs should drive the services provided at school. Language outcomes several years post-cochlear implantation are impacted by a number of factors.

## Impacts on language outcomes

- *Age when the child's hearing loss was identified and when early intervention began for the child.* Early identification and provision of intervention services during the window of opportunity when language develops impacts the likelihood that a child will develop language similar to his/her hearing peers.<sup>10</sup> Children who are enrolled in early intervention programs prior to six months of age, on average, have the best language outcomes.<sup>2</sup>
- *Age of the child at the time of cochlear implantation.* Implantation at between 12 and 18 months tends to provide the best outcomes.<sup>7</sup> With early implantation, many children experience no language delay.
- *Optimal surgical and audiological care.* Insertion of at least 8 to 12 electrodes<sup>11</sup> by a skilled cochlear implant surgeon with appropriate follow-up MAPping by an audiologist, trained in this specialty will impact the child's access to the full range of speech sounds. Use of up-to-date technology and/or appropriate speech coding strategies should be considered part of the post-surgical care component overseen by the audiologist at the child's cochlear implant center.
- *Auditory therapy for the child combined with a home environment that encourages the family to take advantage of every possible opportunity to use spoken language is critical to the implanted child's progress.*
- *Classroom communication mode* determines the extent to which a child's educational program emphasizes speech and listening over signed communication. An auditory-oral placement in which the child and his/her peers are using spoken language exclusively has been shown to have a significant impact on the auditory development of a child with a cochlear implant.<sup>12</sup>

9 C. Perigoe and R. Perigoe. Foreword. Multiple Challenges—Multiple Solutions: Children with Hearing Loss and Special Needs. Volta Review 2004, 104(4):211-214.

10 Y.S. Slinger et al. The case for early identification of hearing loss in children: auditory system development, experimental auditory deprivation, and development of speech perception and hearing. Pediatric Clinics of North America 1999, 46:1-14.

11 M. Dorman et al. "Word recognition by children listening to speech processed into a small number of channels: Data from normal hearing children and children with cochlear implants." Ear and Hearing, 2000, 590-596.

12 A. Geers, C. Brenner and L. Davidson. "Factors Associated with Development of Speech Perception Skills in Children Implanted by Age 5." Ear and Hearing, Lippincott Williams & Wilkins, 2003.

A recent survey of parents of children with Nucleus® cochlear implants examined trends in educational needs.<sup>13</sup> The study found that two-thirds of children ages 7 to 13 with cochlear implants attended public or private mainstream schools, although they did not necessarily begin school in a mainstream setting. More than half of the children in this age group who attended mainstream schools at the time of the survey had gone to a school with special support for hearing impaired children, such as a private oral OPTION or public center-based school, prior to moving on to a mainstream school placement.

Many children with cochlear implants do best in a school setting that provides intensive initial support. The objective for some families is to begin their child's education in highly supportive schools to "jumpstart" the child's language learning and help them reach desired language milestones before moving to a mainstream school.

The following school services, listed in order of number of parent mentions (in the above noted survey), are typically provided to children with cochlear implants at some point in their school career. The duration and frequency of service provision varies by child and over time. A discussion of each of the various services and providers (i.e., speech pathologist or audiologist) is included in the following section entitled "Members of a child's team." Acoustical modifications and FM technology are discussed in detail in Chapters 5 and 7, respectively.

### Services typically provided to children with cochlear implants at school

- Speech language pathology
- FM technology
- Deaf education services
- Individual or small group instructional support
- Interpreting (Signed Exact English, ASL, Cued Speech, or Oral)
- Audiology
- Captioning
- CART
- Note taking
- Listening therapy
- Acoustical modifications

### Building a supportive team for the child

A child with a cochlear implant needs a team of people to support his/her needs. That team should include school-based professionals, cochlear implant clinic staff, an auditory therapist (who may be on the clinic staff), parents and family members, the child, and the child's peers at school. Ongoing communication between the various members of the team is critical. For example, school professionals can help the cochlear implant audiologist achieve an optimal MAP by providing information on the child's listening and speech production abilities and how they may have

13 DL Sorkin, T.A. Zwolan, Trends in educational services for children with cochlear implants, Cochlear Implants, Elsevier (2004).

changed since the last MAP. Is the child “stuck” on the development of an auditory skill? Does (s)he have difficulty pronouncing certain sounds? Providing information on how the child’s sound processor is set and how (s)he responds to particular settings may be important information to share with the cochlear implant audiologist. School professionals may find it helpful to come with the family to a MAPping session at the clinic to establish rapport with the clinic staff and better understand the MAPping process. In a similar manner, it is important that clinic staff keep school professionals informed about any changes that may have been made in a child’s MAP. *The Team Tracking Form*<sup>14</sup> provides a helpful framework for encouraging such two-way communication.

## Members of the child’s team

Key team members from the cochlear implant center

**Cochlear Implant Audiologist.** The audiologist conducts an audiological assessment to determine hearing levels and monitors the benefit received from amplification to determine if the child is an appropriate candidate for a cochlear implant. If, after a trial period with hearing aids, candidacy is determined and the family moves forward with cochlear implant surgery for their child, the center audiologist will then work with the child and the family to MAP (or program) the sound processor and track the child’s listening progress. The center audiologist educates the child and his/her family about use and care of the technology and makes recommendations about appropriate follow-up and

habilitation. The audiologist provides ongoing information to others on the implant team, the family, and the school, about the child’s progress and needs.

**Psychologist and/or Social Worker.** Many implant teams include these professionals to discuss expectations and responsibilities pre- and post-surgery to ensure that the family is able to provide the range of support needed for a child to be successful with a cochlear implant. Cochlear implantation is a surgical procedure that requires follow-up and habilitation to provide the desired outcome. If families are unable or unwilling to keep follow-up appointments and provide support at home, their child’s outcomes will be compromised.

**Cochlear Implant Surgeon.** The implant surgeon performs a thorough ear and medical examination and determines medical suitability for implantation. The physician will discuss any concerns (s)he may have with the family, the psychologist or social worker, the audiologist and other members of the team. The surgeon’s interest in the child doesn’t end with the surgery; (s)he remains involved and monitors habilitation for their patients to encourage the best possible result.

**Speech or Auditory Therapist.** Many centers with significant numbers of pediatric patients have an auditory therapist (sometimes a certified Auditory Verbal Therapist or AVT) who is either on the staff or in private practice working with the center. Such individuals will likely have a graduate degree in speech language pathology, audiology, or deaf education, as well as specialized training in auditory

14 Team Tracking Form, The Moog Center for Deaf Education, [www.oraldeafed.org/schools/moog](http://www.oraldeafed.org/schools/moog).



therapy. Even if a young deaf child receives minimal benefit from amplification, it is recommended that the child and his/her family receive listening therapy before cochlear implantation in order to begin the process of learning spoken language as early as possible. Once the child receives the cochlear implant, a program of intensive listening therapy should be initiated to “prime the auditory pump” and provide the basis for continued auditory skill development.

**Educational Consultant.** Many implant center teams include a teacher of the hearing impaired, sometimes called an educational consultant. His/her role is to work with the child's school-based team to jointly develop a program of ongoing habilitation and ensure that needed support services are in place to meet the child's needs. Sometimes a clinic audiologist, speech pathologist, or social worker performs this function.

### Team members at school

**Classroom Teacher.** If the child is in a mainstream school, the teacher may never have had a child with an implant before. Hence, it is important to begin the process of preparing the classroom teacher, well in advance of the start of school.

Parents should ensure that the teacher has the support and training that (s)he needs. It is important that parents communicate with the teacher early and often. Be sure that there are regular check-ups and updates throughout the year. The teacher should be encouraged to find his/her own solutions for meeting the child's needs and not simply be put in the position of following others' lead. Some of the best ideas for effective inclusion have come from sensitive teachers who had no prior experience with a hearing impaired child in their classroom. The teacher will have responsibility for proper classroom seating and checking to ensure that the child understands what is being said in the classroom. This should be done without constantly calling attention to the child's hearing loss. One insightful teacher came up with the idea of a “secret sign” that she asked her student to use when he wasn't following the classroom discussion. That was her signal to go back and paraphrase to allow him the opportunity to catch up. Most teachers find this kind of emphasis of key points actually helps all of the children in the classroom.

Social interactions can be difficult for children with hearing loss; hence this is another area in which the teacher can monitor and assist the child as needed.

**Teacher of Hearing Impaired Children.** In a mainstream environment, this professional will generally be an itinerant teacher, serving a number of schools or even districts. At a center-based school, this teacher serves a number of deaf or hard-of-hearing students under one roof. Also called a teacher of the deaf and hard of hearing, (s)he functions as a liaison between the staff and parents to assist in meeting the child's unique needs. (S)he

carries out training and support for other school professionals, parents, and the student. His/her role includes anything that promotes optimal services for a child with hearing loss, including checking that the FM system is working, providing direct services to the student, supporting the child with social integration issues, and developing or implementing the student's IEP.

**Educational Audiologist.** The educational audiologist monitors the child's hearing in the classroom and is responsible for fitting and troubleshooting the FM system to ensure it is working properly. Other responsibilities include addressing classroom acoustics and training other school staff (and the children) about hearing loss.

**Speech Language Pathologist.** Most children with cochlear implants receive speech services at some point in their school career. This professional often has responsibility for assessing and developing an intervention plan, as well as providing services directly to the student to encourage the development of auditory, speech and spoken language skills. While in the past, speech pathology often focused on speech production, the cochlear implant makes possible a more natural and integrated model for learning language—especially for children implanted early. The more traditional rehabilitative approach may be needed for children who receive a cochlear implant at a later age.

**Interpreter.** While the majority of students with cochlear implants will use spoken language, approximately one-third of children with implants use a Total Communication modality at school and thus will require an interpreter. A smaller number

of students with cochlear implants utilize American Sign Language or Cued Speech and will require those forms of visual support.

A **Notetaker** can be a diligent student in the child's class, or (s)he can be an adult from outside of the class.

**Teaching Assistant.** Some children benefit from a teaching assistant who can perform a variety of tasks that help the student stay abreast of classroom activities. An assistant may focus the student on the speaker, review or summarize content (before or after class), introduce new vocabulary, or monitor FM and/or cochlear implant technology use.

**Other School Specialists.** Other personnel may be deemed necessary to address a student's specific needs. Possible specialists include an occupational therapist, social worker, psychologist, learning or reading specialist.

**The School Administrator** or principal is sometimes overlooked as a team member but (s)he has the unique ability to provide the leadership to solve problems and encourage partnership within the team. The principal also can allocate funds when resources are an issue.

**Captioner.** As the school program becomes more challenging in middle and especially high school, some students who previously relied on listening find it difficult to keep up without visual support. Captioning services have become more commonplace as an IEP accommodation.

**Parents** should be a visible and helpful presence at the school so that they are fully aware of how their child's needs are being met. (Parents are usually the most knowledgeable individuals about their child's needs.) Federal law acknowledges this and puts parents on an equal footing with the professionals who serve the child. Parents should be diligent about providing the school with information about the implant and sound processor, including details of MAPping sessions to help staff understand how to help. Parents should also actively encourage communication between the school and the implant center. At home, parents should monitor homework and cochlear implant technology (daily troubleshooting), ensure a routine, and help the child learn to be in control of his or her hearing loss. Of course, the parents should be full participants in the development of a child's goals and how the IEP will meet those goals.

**The Child** should be considered an important, contributing member of the team and be encouraged to participate in the Individualized Education Plan (IEP) process as soon as (s)he is able to do so. Although IDEA (Federal education law) does not require a child's participation in the IEP until transition planning begins (on/around age 14), this is too long to wait in the opinion of many experts. Being made to feel a part of the team while the child is still in elementary school is desirable, both because the child is often the best person to discuss his/her needs and because such involvement encourages him/her to learn to be proactive about hearing loss.

**Classmates.** The child's classmates are also an essential part of his/her success at school. Acquainting peers with the cochlear implant technology up front and letting them know how they can help their classmate can make a big difference in developing positive attitudes about hearing loss and encouraging support of the deaf child.



Communication among team members is key to success. This is facilitated when team members:

- Maintain open, honest and consistent communication with each other through tools such as a back-and-forth notebook, emails or voice mail messages. Include timely goals, observations, “glows” or areas in which the student has made noticeable progress and “grows” or areas in which continued focus is needed. Be pro-active rather than re-active, so that each team member can work effectively and efficiently.
- Maintain consistency in communication about what needs to be pre-taught, or pre-discussed before it is presented in class, as well as post-taught, or reviewed as enrichment after the topic has been covered in class. Since each team member interacts with the child in different situations, pre-teaching and post-teaching can be very effective for carry-over into various environments.
- Develop clear expectations and roles that are consistent with the areas of expertise of each team member.
- Meet to discuss issues that may be inconsistent with what the team had agreed upon. It is better to get these issues “out on the table” before they build into a potentially difficult situation.
- Appreciate feedback and suggestions that is presented with a constructive and positive tone.

## Other considerations

### Reading and the child with a cochlear implant

Traditionally, children with severe-to-profound hearing loss have graduated from high school reading at a fourth grade level. One of the most positive outcomes of cochlear implantation relates to reading achievement. The auditory access provided by the cochlear implant enables most children to make important gains in spoken language development, which in turn plays a key role in literacy skills. To the extent that we can help children develop age-appropriate vocabulary, as well as the thinking and comprehension skills that accompany the ability to read aloud, we can provide deaf children with the tools they need to develop reading achievement like their normally hearing peers.

Early language development skills that help promote reading should be encouraged by parents and professionals who work with young children via early intervention or preschool programs.<sup>15</sup>

Such skills include:

- Making connections between stories and life experiences
- Getting the main idea through story telling
- Sequencing events by re-telling a story in the proper order
- Predicting the outcome of a new story
- Making inferences by filling in
- Drawing conclusions from incomplete information in a story

15 For details see HOPE Note: Issues in Reading, Cochlear Americas, 2006.

## Children Who Use Sign Language

Although the majority of cochlear implant children use spoken language, about one-third of children ages 7-13 use some form of sign language.<sup>13</sup> Some parents opt to use sign language with their child prior to cochlear implantation and then transition the child to oral communication once the child is implanted. Other parents, particularly those whose children come to cochlear implantation at a later age, continue to use sign language in one of its various forms. Total communication, sometimes called simultaneous communication, involves talking and signing at the same time. It provides the best opportunity for a child using sign with an implant to develop audition and speech. A signing implanted child should be encouraged to<sup>16</sup> :

- Use grammatically complete spoken English
- Transition to more use of spoken language
- Take advantage of opportunities to listen and talk only
- Pursue goals to improve spoken language—both inside and outside of school

- There are high expectations for listening and talking
- The teacher strives to find the right balance of variables—auditory, language, concept familiarity—to ensure success
- The child's utilization of auditory skills promotes new skills that helps him/her meet achievable goals
- There are ample opportunities to listen and talk, as this is the key to progression of the child's auditory skills. The ultimate aim is to integrate listening and talking in a natural way into every segment of the child's school day

## Improving Listening in the Classroom

You can help your student with a cochlear implant maximize his/her auditory learning by providing the best possible listening environment and ensuring that listening is an integral part of the school day. The best way to move from “learning to listen” to “listening to learn” is to ensure that your student is exposed to auditory language in a natural way and not just during therapy sessions. In this way, (s)he learns to integrate listening naturally into the routines of his/her life. The classroom environment should be structured such that<sup>17</sup>:

13 DL Sorkin, T.A. Zwolan, Trends in educational services for children with cochlear implants, Cochlear Implants, Elsevier (2004).

16 For details see HOPE Note: Children Who Sign, Cochlear Americas, 2006.

17 For details see HOPE Online seminar “CLIC IT! Creating Listeners in the Classroom: Ideas for Teaching.”

