

# Should All Deaf Children Learn Sign Language?

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## abstract

Every year, 10 000 infants are born in the United States with sensorineural deafness. Deaf children of hearing (and nonsigning) parents are unique among all children in the world in that they cannot easily or naturally learn the language that their parents speak. These parents face tough choices. Should they seek a cochlear implant for their child? If so, should they also learn to sign? As pediatricians, we need to help parents understand the risks and benefits of different approaches to parent-child communication when the child is deaf. The benefits of learning sign language clearly outweigh the risks. For parents and families who are willing and able, this approach seems clearly preferable to an approach that focuses solely on oral communication.

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Ms Mellon conceptualized the study and drafted the initial manuscript; Dr Niparko drafted the initial manuscript; Drs Scambler, Rathmann, Mathur, Humphries, and Lantos and Ms Handley helped design the study and drafted the initial manuscript; and Dr Napoli conceptualized the study, helped design the study, and drafted the initial manuscript. All authors approved the final manuscript as submitted.

[www.pediatrics.org/cgi/doi/10.1542/peds.2014-1632](http://www.pediatrics.org/cgi/doi/10.1542/peds.2014-1632)

DOI: 10.1542/peds.2014-1632

Accepted for publication Aug 27, 2014

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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**FINANCIAL DISCLOSURE:** The authors have indicated they have no financial relationships relevant to this article to disclose.

**FUNDING:** No external funding.

**POTENTIAL CONFLICT OF INTEREST:** The authors have indicated they have no potential conflicts of interest to disclose.

Every year, 10 000 infants are born in the United States with sensorineural deafness. The incidence of sensorineural deafness is similar in most high-income countries and is higher in some low-income countries.<sup>1</sup> Many more infants become deaf before 2 years of age. In such situations, parents face difficult choices. Should they seek a cochlear implant (CI)? If so, should they also learn to sign and teach their child to do so? What about speech reading? There is no time to wait: Experts agree that a child must be exposed to an accessible language on a regular and frequent basis before 5 years of age to develop full language competence.

Prosthetic approaches to hearing restoration are being applied to younger children at increasing rates; some estimates indicate that more than one-half of US children with early-onset deafness have received a CI.<sup>2,3</sup> Children with CIs require intensive rehabilitation throughout childhood to learn to communicate orally. Even with this training, some children become better oral communicators than others. Some experts suggest that all deaf

children, with or without a CI, should be taught a sign language. Others worry that learning a sign language will interfere with the extensive and intensive rehabilitation that is necessary to reap the most benefit from a CI or that asking parents to learn a new language to communicate with their child is too onerous.

To address these dilemmas, we asked experts in otolaryngology and language development to discuss the pros and cons of teaching sign language in addition to teaching oral language. Our experts included Nancy K. Mellon, founder and head of school at The River School in Washington, DC; John K. Niparko, MD, chair of the Department of Otolaryngology at the University of Southern California; Sascha Scambler, PhD, senior lecturer in Sociology, King's College London; Christian Rathmann, PhD, professor of sign languages and sign interpretation at the University of Hamburg; Gaurav Mathur, PhD, associate professor of linguistics at Gallaudet University; Tom Humphries, PhD, associate professor in the Department of Education Studies at the University of California at San

Diego; and Donna Jo Napoli, PhD, professor of linguistics, and Theresa Handley, both of Swarthmore College. John D. Lantos directs the Children's Mercy Hospital Bioethics Center. None of the authors is a child or adolescent. The views of adolescents can be found in Christiansian's 2014 paper.<sup>3</sup> Three of our experts are deaf professionals. Three of them are parents of profoundly deaf children, 2 of whom have bilateral CIs. In creating this article, these experts reviewed each other's comments and consulted via electronic communication.

### THE CASE

*A newborn is identified as having sensorineural deafness. The parents have normal hearing and no knowledge of sign language. A hearing aid is not medically indicated. They have a few months to decide whether to opt for a CI. In the meantime, should they learn a sign language and begin to communicate with their child by using that sign language? If they eventually opt for a CI, should they continue to sign?*

### NANCY K. MELLON, MS, AND JOHN K. NIPARKO, MD, COMMENTS:

Parents often view the diagnosis of a child's deafness through a prism determined by their own hearing status. Parents who are deaf may view the diagnosis through a cultural lens, welcoming a child who can easily share their language and culture. However, >95% of deaf children are born to hearing parents.<sup>4</sup> Hearing parents typically think of deafness as a disability.<sup>5</sup> Their views are shaped by their desire to share their own language and culture with their child.

A deaf child born to hearing parents and unable to gain meaningful speech recognition from hearing aids will typically meet the criteria for early cochlear implantation. The US Food

and Drug Administration approved the multichannel CI for children in 1990. Almost 100 000 children have used CIs successfully to develop spoken language. However, a CI can enable strong spoken language only when used with intensive auditory-oral exposure in extended, salient, and child-initiated interactions.<sup>6</sup> Without a full linguistic and auditory experience, the effects of deafness-associated deprivation can derail the spoken language learning process before it begins.

The timing of intervention is critical. An infant's nervous system is genetically predisposed to accept only a limited range of potential stimuli to drive the developmental learning of language. Experiences that produce language occur in a "biologically expensive" period in which neural circuits are undecided yet amenable to commitment. During this sensitive period, use of neural circuits generates the impulse traffic that differentiates neural development. If a child misses the needed experiences within an optimal time frame, essential elements in that child's emergent language, either spoken or signed, may be missing.<sup>7</sup>

Should a parent use sign language with a young child who will receive a CI? As reviewed by Geers et al,<sup>8</sup> the case-series reports are mixed on the effects of sign language before implantation. We suggest that early sign language, when used for a short time preimplant as a bridge to spoken language, cannot hurt and may be beneficial. Early experience with sign language may support a child's participation in the kind of bidirectional parent-child interactions that form the foundation of language learning, for example, by enabling joint attention.<sup>9</sup> However, an important caveat should be considered. The use of any residual hearing should be maximized. Data from a prospective, national trial in progress indicate that verbal language learned before cochlear

implantation is associated with accelerated rates of spoken language learning after implantation.<sup>10</sup>

For a child who receives a CI, the timely activation of the device begins a fuller experience with sound. Reliance on sign language over an extended period of time may negatively affect the child's capacity to learn spoken language after cochlear implantation.<sup>11</sup> Prolonged, inadequate auditory input that fails to support spoken language learning at age-appropriate rates is related to gaps in speech and language after cochlear implantation.<sup>10</sup> Importantly, even extensive rehabilitative efforts will not produce the language sophistication that can be achieved by exposure to spoken language during sensitive periods of development.

A child's ability to successfully acquire spoken language requires a framework of rich, bidirectional communication with language mentors and immersion in an oral language environment. Because the CI is designed to equip a child with skills to communicate in a hearing world, we strongly advocate for educational programs that allow children to access the pragmatics of spoken language in interactions with their hearing peers.

Although sign language can promote early parent-child communication, the focus of intervention should immediately shift to highlighting the acoustic properties of speech as consistently as possible after cochlear implantation to optimize a child's ability to talk and listen.

### SASHA SCAMBLER, PHD, COMMENTS:

I write as a hearing parent of a profoundly deaf child. I am also a medical sociologist.

Until the last few decades, there were few choices to be made by hearing parents of deaf children. Today, with CIs and with the successful introduction of newborn hearing screening programs, infants are

diagnosed within the first few weeks of their lives, and they can receive a CI well before their first birthday. If parents decide a CI is the option to pursue, the first few months of the child's life are then occupied with tests, suitability assessments (for both the parents and children), and medical examinations. If the child is found to be a suitable recipient, the parents then face the phenomenally difficult decision about whether to have their child undergo implantation with the knowledge that there is no guarantee that the implant will work or that it will result in clear, intelligible speech. Parents are asked to decide whether to subject their child to a long operation with all of the associated risks and with no guarantee of success.

Parents are also often told that it would be best for their child if they, the parents, would learn a completely new, alien language. Sign language is clearly beneficial for deaf children, but families need time and space to adjust and come to terms with everything that is happening to them and to the reality of being the parents of a deaf child.

As the hearing parent of a profoundly deaf son with bilateral CIs, this issue is close to my heart.<sup>12</sup> My son has had his CIs for 5 years. He has age-appropriate oral/aural language skills and attends a mainstream primary school with support from a specialist teacher for the deaf. Despite his CIs and spoken language skills, he remains deaf and always will be. There are times when my son is unable to wear his implants or is unable to hear because of excessive background noise. CIs have the same limitations as other artificial hearing devices; they work best in close range with little background noise. Given these limitations, it is essential that we have a means of communicating with him, and he with us, when hearing is not an option. Research suggests that speech reading (lip reading plus facial expression) can be

a useful additional tool but will only result, at best, in 60% accuracy with English language.<sup>13</sup> An alternative form of communication is therefore needed.

Sign language is a useful tool for the family of a deaf child regardless of whether the child is able to make full use of CIs. Learning sign language as a hearing family is not without problems, however. Once the child has had his or her CI activated, the family will be surrounded by professionals giving advice on language development, listening skills, ways to provide a language-rich environment, and methods of maximizing the potential of the technology the child has been provided with. Fitting signing into an already full schedule is difficult. This additional responsibility is before meeting the needs of other children within the family as well as one's own professional and career obligations.

Another important factor is that the level of signing support available to families depends on the area in which they live. Sign language lessons can be expensive if no subsidies are available. Signing clubs can also be intimidating places for hearing families. Some people in the deaf community are overtly hostile to CI users.

We, as a family, are in the process of learning sign language. We use it in conjunction with spoken English. We chose this approach because we need it when our son is not wearing his implants or is unable to hear sufficiently because of background noise. We also believe that it is important that he has access to sign language as a deaf person.

We have adopted the approach advocated by Perier who suggested that deaf children be given access to both oral/aural and signed language to enable them to make their own choice when old enough to do so.<sup>14</sup> This stance seems entirely reasonable, maximizing the

opportunities available. It would, therefore, seem reasonable to encourage the family of a deaf child to sign with their child. It is essential that these families are given the support they need to do so, however. This support includes time and space to psychologically adjust to the new world in which they find themselves as well as practical and/or financial assistance.

We are well aware that CIs do not give our son normal hearing. We are also aware that he works considerably harder than his hearing peers to access sound and communicate by using oral/aural language. Ultimately, he will have to choose whether to continue with oral/aural language, to use sign language, or to use a combination of the 2 approaches. We have tried to give him the best foundations with which to make that decision.

#### **CHRISTIAN RATHMANN, PHD, AND GAURAV MATHUR, PHD, COMMENTS:**

There are 3 strong reasons to learn both signed and written/spoken language. First, a speech-only approach risks linguistic deprivation at a crucial period of development. The risk arises because of the variability in the spoken language development of deaf children who have CIs.<sup>15</sup> In contrast, both sign language and early reading are visually accessible to the deaf child. This bilingual approach virtually guarantees that the child will develop linguistic competence.

Second, bilingualism is beneficial. Bilingual children display better mental flexibility and cognitive control as well as more creative thinking, especially in problem solving.<sup>16,17</sup> These benefits extend to social and academic settings.

Third, sign language development correlates positively with written<sup>18-21</sup> and spoken<sup>22</sup> language development. No evidence has been found that the use of a visual

language affects the outcome of cochlear implantation.<sup>23</sup> In fact, children with CIs with early exposure to and, importantly, continued use of a sign language outperform children with only CIs on a variety of standardized language measures of English, even when both groups have the same age of implantation and the same years of CI use. It seems that early and continued exposure to sign language “may provide a ‘framework’ for early spoken language development”<sup>24</sup> in deaf children within hearing families as well as within deaf families.<sup>25</sup>

#### **TOM HUMPHRIES, PHD, COMMENTS:**

The most important advice anyone can give parents of deaf children is to immediately join an active signing community of both parents and children. This first step is vital in achieving the type of language, cognitive, and social development that deaf children will need for school.

From birth to 3 years of age, a deaf child needs to be part of a language and cognitive ecosystem in which unambiguous linguistic input and rich interaction with print prepare the child for both the acquisition of basic interpersonal communication skills and for academic language development. By acquiring sign language early, the child can develop theory of mind<sup>26</sup> and achieve the requisite domestication of vision (eg, eye tracking for reading)<sup>27</sup> to be ready for schooling.

Academic language development is what we expect of children in school, the language that children must both access and demonstrate knowledge in. Being able to communicate in sign language with the teacher and with classroom peers affords the deaf child the socially and intellectually engaged interaction that comprises so much of the school day.

This social development is critical to students’ ability to learn and to their

moral and emotional development. As the deaf child grows, the family is not enough, and a large amount of the child’s time is spent away from home. With sign language, the deaf child is able to travel through various social situations and communities without difficulty and not be confined to communicating only with family and friends, as is often the case for deaf children who have no knowledge of sign language.

#### **DONNA JO NAPOLI, PHD, AND THERESA HANDLEY COMMENTS:**

All deaf children should be taught a sign language as soon as their hearing status is determined, in conjunction with training in spoken language (for as long as they show progress and interest); their chances of developing a firm linguistic foundation are thus maximized.

Simply put, late language learners have a range of problems, particularly with literacy,<sup>28,29</sup> whereas signing deaf children, with or without a CI, perform better on literacy and those cognitive skills that require a firm language foundation, regardless of whether their parents are hearing<sup>17–20</sup> or deaf.<sup>30</sup> They experience overall benefit with no drawbacks if they continue to sign while oral training is still in progress.<sup>17,31</sup> Sign and speech facilitate each other, rather than one hindering the other.<sup>32</sup> The misperception that signing interferes with speech is based on what some call *neuropolitics* on the part of both the medical profession and the community of parents of children with CIs.<sup>33,34</sup> In this common scenario, the medical profession puts the burden of success with a CI not on the technology but on the rehabilitative training the child receives, which amounts to putting that burden primarily on the parents. Parents, in turn, tend to be proud if their children make progress and take the blame if they do not; these parents shame each other and even

hide from each other the fact that they sign sometimes with their children. All of these actions are misguided because there are no reliable predictors of which children (among those who receive training) will succeed and which will not. The fact is, acquiring a firm foundation in a sign language gives the child the base upon which to build skills in reading and, sometimes, speaking a second language; it is impossible, however, to learn to read without first having a firm foundation in some language.<sup>35</sup>

Raising a deaf child requires great effort no matter what language choice the parents make.<sup>36</sup> Raising a deaf child with a sign language as well as spoken language requires learning a sign language. But raising a deaf child strictly orally requires daily training in vocalization and speech-reading throughout childhood, which certainly demands as much effort as learning to sign and could still have no positive effects on language development because it is impossible to predict which children will succeed with a CI.<sup>15</sup>

Deaf infants need exposure to good signing models (ie, people using a sign language with all of its grammatical richness), not just to good speakers. Various combinations of speech, gestures, and rudimentary signing can help in family communication, and such systems often have some structural similarities to natural language.<sup>37,38</sup> However, these systems are no substitute for *bona fide* language, nor do they allow the child to communicate with others outside the family.<sup>39–42</sup> If families permit their deaf children to interact with signing deaf adults, these deaf adults will serve as the resource that allows first language acquisition to develop naturally. Deaf children also need to interact with other deaf children who sign. One can find these language and social opportunities through community support groups such as

deaf advocacy groups, local deaf and hard-of-hearing community centers, and local and/or state deaf services bureaus.

The family can begin sign language classes as soon as the diagnosis of deafness is confirmed. Some family members may become fluent signers, while others may always feel awkward at signing; the quality of the family's signing is far less important, however, than the fact that the family communicates with the child. Deaf children who sign with their hearing mothers exhibit early language expressiveness similar to hearing children of the same age<sup>43</sup> despite variability in the mothers' signing abilities.

Even families who become expert signers need to bring their deaf children to events where they can interact with a signing community because the proper development of language in all its complexity involves its use within a community.

Furthermore, there are many things that deaf adults who sign tend to do with deaf children that hearing parents are unlikely to do without specific training. Deaf adults often use "child-directed signing,"<sup>44–46</sup> in which their eye gaze, methods of attention getting, rate and size of signing, and ways of making both signs and objects more visually accessible support the child's language development. Deaf adults often sign on objects, or on the child's body, or move objects into the child's line of vision, all spontaneously and with benefit to the child language learner.<sup>47–49</sup> This behavior allows the adult and child to interact in a more sophisticated way; deaf children of deaf parents quickly learn to alternate their gaze between a parent and a book or object, thus enhancing comprehension.<sup>50</sup> All deaf children could benefit from learning this technique because sign language skills are essential in successful use of interpreters in school. Furthermore, although there are many "ways" of being deaf, the deaf person who gains

a positive attitude toward being deaf is on the road to establishing a healthy identity; interacting comfortably with other deaf people via a sign language may be a strong aid.<sup>51</sup>

#### JOHN D. LANTOS, MD, COMMENTS:

For more than a century, physicians, parents, educators, and others have debated how best to raise children who are deaf. Newborn screening for hearing loss and the development of CIs are the latest technological twists in this debate. However, they do not alter the fundamental ethical issue: Children need to learn language. They must learn it from parents, teachers, and their community. The more languages they learn, the better these children will be able to communicate. All children would be better off if their parents all spoke 5 languages and taught all 5 to their children; unfortunately, many parents do not speak 5 languages. Deaf children of hearing (and nonsigning) parents are unique among all children in the world in that they cannot easily or naturally learn the language that their parents speak. Hearing (and nonsigning) parents of deaf children are unique in that they are asked to learn, at least in a rudimentary way, a new and foreign language to communicate with their children. Some parents eagerly and willingly take on this challenge; others do not or cannot. As pediatricians, we need to keep up-to-date on the latest research, translate that research into language that parents can understand, and help them make choices that are best for their child, their family, and themselves. There are no risks to learning sign language along with spoken language, but there are well-defined benefits. For parents and families who are willing and able, this approach seems to be clearly preferable to an approach that focuses solely on oral communication.

#### ACKNOWLEDGMENTS

We thank Poorna Kushalnager, PhD, of the Rochester Institute of Technology, and Scott Smith, MD, MPH, of the University of Rochester Medical Center for consulting on this research and reviewing drafts.

#### ABBREVIATION

CI: cochlear implant

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**HOW LONG DOES TWO MINUTES LAST?:** *The NCAA Men's Basketball tournament, otherwise known as "March Madness", recently concluded. Many of my friends commented on what an exciting tournament it had been and how much they enjoyed watching the games. While I enjoy college athletics, I do not enjoy watching basketball as much as other sports. One reason is that the games seem to stretch on for such a long time. Perhaps I feel this way because I like to watch soccer. Each half lasts 45 minutes, and I have a pretty good idea when the game will end. That is not the case with college basketball.*

*As reported in The Wall Street Journal (Life: March 24, 2015), the last two minutes of a basketball game usually last much longer than that. In the first 52 games of the 2015 tournament, on average the last two minutes of the games took just over nine minutes to complete. In games in which the teams were separated by less than 10 points with two minutes to play, the last two minutes took on average 10.5 minutes to complete. Amazingly, in one game the last two minutes lasted 18.5 minutes. The games stretch on for several reasons, but chiefly because of intentional fouling and timeouts. A foul results in a stoppage of play of approximately 50 seconds. If a player fouls out, coaches are given an additional 20 seconds to make a substitution. Coaches can reserve timeouts. As there are many television timeouts during a tournament game, coaches may have several 30 second and even a 60 second timeout at their disposal late in the game. In one game, five timeouts were called in the last two minutes. Three were called with only two seconds remaining in the game.*

*So, while March Madness can be a lot of fun, the way the last two minutes of the game can stretch on for such a long time seems not much fun at all.*

*Noted by WVR, MD*

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