

Cochlear Implants: Growing Pains

Simon C. Parisier, MD

Objectives/Hypothesis: The objective was to make familiar the problems faced in the application of cochlear implants to the half-million to a million severe to profoundly deaf individuals who are potential beneficiaries of this technology. **Study Design:** Observations accumulated during 23 years as Medical Director of the Manhattan Eye Ear Throat Hospital Cochlear Implant Center. **Methods:** The author reviewed insights gained while directing the Cochlear Implant Center since the early 1980s at Manhattan Eye, Ear and Throat Hospital (New York, NY). **Results:** The rapid application of cochlear implant technology for patients with severe to profound hearing losses is creating critical problems. It is being hampered by inadequate reimbursement. There is a critical shortage of cochlear implant-trained audiologists, who are an essential keystone in the application of this technology. These audiologists are required to provide lifelong audiological services to patients who have received cochlear implants. At the same time, they must evaluate the exponentially growing number of new candidates. **Conclusion:** The restoration of hearing with cochlear implants provides an enormous educational and societal benefit. However, the existing health care delivery system limits the application of cochlear implant technology. University audiological training programs must expand their curricula to include cochlear implant-related courses. The existing rehabilitation audiologist delivery system could be applied to provide long-term, community-based cochlear implant services. **Key Words:** Cochlear implant reimbursement, profound deafness, deaf education.

Laryngoscope, 113:1470-1472, 2003

During my otological career, cochlear implants were invented and developed. Being able to provide hearing to profoundly deaf children with the cochlear implant has been my most gratifying professional achievement. Receiving implants at 1 year of age, with hearing restored,

deaf children develop fluent speech and language capabilities. In a mainstream educational setting, they achieve on a par with their normal-hearing peers. Socially, they can overcome their disability and are not disadvantaged. Deaf adults with hearing losses who could not benefit from hearing aids can have their hearing restored, thereby improving the quality of their lives and their economic productivity. Cochlear implants have gained broad acceptance and implantations are being performed in increasing numbers.

Severe to profound deafness has a devastating effect on educational achievement. Forty-four percent of the profoundly deaf do not graduate high school.¹ Indeed, the average graduates of a deaf high school have third-grade reading and fourth-grade computation ability. The financial burdens produced by a hearing disability are great. Hearing-impaired persons with severe to profound hearing losses require specialized education, social services, and other resources. A study of the economic burden of hearing impairment to society indicated that the cost for a severely to profoundly deafened individual would be \$297,000 over his or her lifetime, and the cost for individuals with prelingual onset of deafness exceeded \$1 million.¹ Unlike many clinical conditions, severe to profound hearing loss largely impacts the social welfare system rather than the medical care system. Being educational underachievers with limited speech intelligibility, profoundly deaf individuals are the lowest wage earners of all handicapped people. Fifteen percent of these individuals earn less than \$10,000 and 53% earn less than \$25,000 per year.

At the onset, in the 1980s, there were a few select co-investigator teams who participated in U.S. Food and Drug Administration trials of various cochlear implant designs. There was a small number of patients, and their selection was governed by strict protocols. The surgeons who were involved were uniformly skilled and experienced. The teams included audiologists who performed both the preoperative assessment and the postoperative programming of the device, speech pathologists, and deaf educators. In the beginning, the small number of professionals involved could cope with the limited number of cases.

Cochlear implants were a dramatic, newsworthy "medical miracle." Centers involved generated favorable publicity that was greatly advantageous to their medical

Presented as an Invited Paper in Section Masters of Otolaryngology at the Eastern Section Meeting of the Triological Society, Boston, MA, January 25, 2003.

From the Department of Otolaryngology—Head and Neck Surgery, Manhattan Eye, Ear and Throat Hospital, New York, New York, U.S.A.

Supported by The Children's Hearing Institute, Inc.

Editor's Note: This Manuscript was accepted for publication May 28, 2003.

Send Correspondence to Simon C. Parisier, MD, 210 East 64th Street, New York, NY 10021, U.S.A. E-mail: sparsier@aol.com

facility. Financially, the cost of a program was relatively small. The resulting glowing, heart-warming, positive press coverage was considered a promotional bargain relative to the cost of an implant program. In addition, not-for-profit fundraising helped defray some of the non-reimbursable costs.

The first generation of single-channel cochlear implants provided limited benefits. The early technology was restricted to the profoundly deaf individuals who had no hearing even with the most powerful hearing aids. In the early 1980s, it was estimated that there were only 25,000 people who were potential candidates.

Today, enhanced technology is providing superior auditory benefits and cochlear implant use is rapidly increasing. Infants identified neonatally as being hearing impaired are receiving implants at 12 months of age. Patients with residual hearing who in the best-aided condition have discrimination scores of less than 60% are receiving implants. The benefits of bilateral cochlear implants are being assessed. At present, in 2003, approximately 50,000 implants have been performed worldwide. However, it has been estimated that there are a half-million to a million severe to profoundly deaf persons who are potential candidates in the United States.²

The rapidly expanding application of this technology has created critical growth pains. There is a serious shortage of rehabilitation audiologists, and reimbursement is inadequate. The health care delivery system is not keeping up with the technological advances. In the 1960 and 1970s, there were many university undergraduate and graduate audiology programs that were graduating an abundance of audiologists. Before the mid 1970s, the American Speech and Hearing Association (ASHA) prohibited members from dispensing hearing aids for profit, an activity that was considered to be commercial and unethical.

Since the early 1970s, faced with cost constraints, universities have eliminated many audiology undergraduate and graduate programs. This has resulted in a diminishing number of audiologists in the workforce. In addition, ASHA has reversed its policy and has promoted audiologists as the appropriate professionals to dispense hearing aids. Today, many audiologists are attracted into lucrative private practices rather than medical facilities.

An acute, critical shortage of specialized cochlear implant audiologists has developed. An active cochlear implant center accrues an ever-enlarging number of patients, a process that creates more time demands for the audiological staff. Audiologists involved with cochlear implant programs require special skills. University audiology programs in general have not yet incorporated cochlear implants into their syllabus. As a consequence, these skills are not acquired in graduate schools but while on the job. Training these novices requires an initial time commitment by an experienced colleague. Evaluations of infants and adults referred as potential candidates are time-consuming. Patients who have received cochlear implants require lifelong services. Periodically, reprogramming is required. The need to replace external parts is ongoing. Centers that retain patients need a greater number of experienced cochlear implant audiologists to pro-

vide services for their increasing number of patients with implants. However, diminishing reimbursement for audiological services frequently makes this a deficit operation. As a consequence, audiological staffing is not expanded but remains fixed or, in hard economic times, is reduced.

Large-volume cochlear implant centers require a clerical support staff to support the audiologists and to perform efficient billing. Hospitals faced with serious financial hardships are loath to hire clerical staff that is viewed as nonessential, recurring operating expenses. Paradoxically, the lack of adequate staff to properly register and bill patients adversely affects the collection process and contributes to the financial woes. In addition, without adequate secretarial support, the audiologists must assume burdensome clerical functions, reducing their professional productivity and lengthening their work day. Emotionally, this unfavorable working environment leads to professional burn-out and resignations of these difficult-to-replace audiologists.

An additional financial problem involves the compensation for the operative procedure. Private insurance reimbursement on a fee-for-service basis may cover professional fees. However, Medicare and Medicaid reimbursement is insufficient to cover the surgeon's or the audiologist's time or the cost of the device. Generally, private or public third-party payers do not adequately reimburse hospitals for the cost of the cochlear implant system.³ Changing Medicare and Medicaid policy on the reimbursement for the implant surgery, for aural rehabilitation after surgery, and for the purchase of the device has been a frustrating challenge. Regrettably, savings accrued by reducing the cost of deafness to the social welfare system are not applied to the medical care system's annual budget.

Given these limiting factors, is there a possible way to provide the necessary long-term auditory rehabilitation for the influx of the estimated half-million to a million hearing-impaired individuals who are potential candidates for cochlear implants? In order for this technology to be made available to such a large number of patients, a change in the existing delivery system is essential. In most states, hearing aids are dispensed by licensed audiologists. Thus, in many communities, a large entrepreneurial, autonomous hearing aid-dispensing system exists.

Postoperative programming of cochlear implants can be divided into two phases. The first is the immediate, initial postoperative 3-month phase, when the individual's thresholds and a stable "map" are established. The second, long-term phase continues indefinitely, for as long as the patient uses the implant. During this stable stage, follow-up services for cochlear implants are somewhat analogous to those faced by rehabilitative audiologists who dispense programable hearing aids.

Rehabilitative audiologists could be recruited, trained by the manufacturers, and certified in cochlear implant programming to provide the long-term services. In addition, they could actively participate in the identification of patients who cannot benefit from available amplification and who are potential cochlear implant candi-

dates. The manufacturers would have to provide affordable, efficient "user-friendly" software to facilitate the delivery of the ongoing services that cochlear implant recipients require. The initial stimulation and programming would be performed at the center where the patient received the implant. However, once a stable implant "map" has been established, the patient would be referred to a participating, knowledgeable rehabilitative audiologist for ongoing, long-term care. Reimbursements for these services would be provided by third-party payers and, as necessary, by the patient. Involving this large group of professionals would enhance the availability of this valuable technology to the large numbers of severe to profoundly deaf individuals who are potential candidates for cochlear implants.

In summary, it is estimated that there are a half-million to a million hearing-impaired individuals in the United States who could benefit from cochlear implants. However, the technological advances are rapidly outstripping our existing medical and audiological care delivery system. The myopic health care budgetary bureaucracy that underfunds cochlear implant-related services must

be influenced to recognize the enormous educational and societal financial savings achieved by restoring hearing to profoundly and severely hearing-impaired individuals. It is essential that university audiological programs educate students in the field of cochlear implants. The manufacturers of cochlear implants must develop simple-to-use, inexpensive software to facilitate the lifelong programming that each patient with a cochlear implant will require. A community-based delivery system must be built up to provide the necessary long-term programming that cochlear implants require.

BIBLIOGRAPHY

1. Mohr PE, Feldman JJ, Dunbar JL. The societal cost of severe to profound hearing loss in the United States. Bethesda, MD: Project Hope Policy Analysis Brief, April 2000.
2. Blanchfield BB, Feldman JJ, Dunbar J. The severely to profoundly hearing impaired population in the United States: prevalence and demographics. Bethesda, MD: Project Hope Policy Analysis Brief, October 1999.
3. Garber S, Ridgely MS, Bradley M, Chin KW. Low levels of insurance reimbursement impede access to cochlear implants [research highlights]. Santa Monica: RAND Health, May 2000.