

Tele-Audiology: Remote Cochlear Implant Mapping

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Within the intermountain region, there are in excess of 260 pediatric cochlear implant users, many of which live outside the immediate Salt Lake valley. Cochlear implants require regular maintenance and adjusting, which is typically performed at a cochlear implant center. The sole provider of pediatric cochlear implant services in this large geographical area is Primary Children's Medical Center. Thus, families outside of the Salt Lake valley are required to travel for several visits each year and as many as multiple visits each month for multiple months. Considering the travel expense incurred with cochlear implant visits, the time away from home and work for the parents and the school and socializing time missed for these children, an investigation into telehealth practices as they pertain to audiologic cochlear implant services is warranted.

Introduction

With the population growth of the intermountain region, families are traveling longer distances to the larger cities for specialized healthcare. Services that are only offered in one location such as cochlear implant care and maintenance require families to travel as much as ten hours round trip to the Salt Lake City area for these necessary services. The frequency of audiologic visits for cochlear implant programming can range from once each year to multiple visits in a given month. While these families are informed of the needed audiologic visits, the frequency of these visits and the subsequent time and financial requirements requisite for successful cochlear implant function before implantation, providing a high level of cochlear implant service in innovative ways to this growing population has been a recent topic of discussion.

Telehealth is the transmission of health-related services and information by means of telecommunication technologies (Wikipedia, 2008). It is a means of linking rural and urban communities with an appropriate level of health care and the added convenience of less patient travel. The American Speech-Language-Hearing Association, audiology's current governing organization, noted in 2005 position and technical statements that telehealth practices are an appropriate method of service and can be used in bridging the service gap that occurs in rural and underserved areas and to those with impaired mobility. The use of telehealth within the field of audiology is relatively new with only limited publications that include otoscopy, hearing aid fittings (Krumm, 2007), audiometric testing (Givens et al., 2003; Givens & Elangrovan, 2003), otoacoustic emission and automated ABR testing (Krumm et al., 2008). No published information, however, pertains to remote cochlear implant programming and further stresses the need for this investigation.

Intermountain Healthcare operates 21 urban hospitals along the Wasatch front and 9 rural hospitals that span from Burley, ID to St. George, UT, a distance of 484 miles (IHC Report to the Community, 2006). With the many IHC hospitals as a future possibility, this study will focus on two remote hospitals outside of the Salt Lake valley – Utah Valley Regional Medical Center (UVRMC) and Logan Regional Hospital (LRH) in addition to the host hospital, PCMC. These facilities were chosen because of their proximity to many children with cochlear implants and collaborative interests expressed by audiologists at these centers. As these facilities are all within the same IHC cooperation, telecommunication abilities are common among all.

The purpose of this study is to determine the feasibility and quality of cochlear implant services via

telecommunication technologies.

Methodology

Approximately thirty children with unilateral or bilateral cochlear implants will be seen at a remote site (UVRMC or LRH) for routine cochlear implant programming and audiologic validation (44 miles between Provo and SLC, 82 miles between Logan and SLC). Included participants were chosen by the 1) manufacture of their cochlear implant device, 2) developmental age, and 3) positive history of cooperation as noted by the managing cochlear implant audiologist. The vast majority of pediatric cochlear implant recipients have devices from two of the three different US manufactures. Only one of these two manufactures expressed interest in this type of study as the Federal Drug Administration (FDA) prohibits any form of distance cochlear implant programming. Advanced Bionics Corporation has agreed to participation in this soon to be IRB approved research.

Procedures

It is anticipated that participants will be brought to on of the two remote sites (UVRMC or LRH) for regular cochlear implant programming. The remote site audiologist will take a brief history along with immittance testing for assessment of middle ear function. Next, the participant's cochlear implant will be connected to the remote site's networked computer where a remote connection to PCMC's cochlear implant center will be preestablished. The patient's cochlear implant history, previous auditory goals and progress will be discussed with the cochlear implant audiologist. Cochlear implant programming will then proceed in a typical inoffice fashion. Cochlear implant adjustments will be assessed by the remote site audiologist through typical ageappropriate behavioral testing. Additional cochlear implant adjustments will be made based on behavioral outcomes. The participant's guardians will then schedule a followup visit based on the recommendation of the cochlear implant audiologist.

Upon completion of each remote site cochlear implant appointment, the participant's guardians will be given a patient satisfaction survey. Each participating audiologist will also complete a satisfaction survey. Each survey outline will follow the already established Utah Telehealth Network surveys (utahtelehealth.net) and adapted for the purposes of this study. Surveys will be a primary means of determining feasibility and quality of cochlear implant services via telecommunication technologies.

Discussion

It is anticipated that this research will provide cochlear implant patients and their families a needed audiologic services at a more reasonable distance to the families' residence along with demonstrating the safety, reliability and appropriateness of remote cochlear implant programming in eventual FDA approval of such teleaudiology practices.

Foreseeable challenges with this research include financing of audiologic services and the exclusion of those patients with implant devices other than those of Advanced Bionics Corporation. Currently, Medicaid and all other providers of health insurance investigated within the state of Utah do not view teleaudiology practices as an acceptable form of audiologic care. Thus, funding from other sources will be required or IHC approval of a health care services waiver will need to be sought. With approximately 260 pediatric cochlear implant patients seen at PCMC, the majority reside along the Wasatch Front. The interaction between these families is facilitated by common schools, therapists and regular meetings for families of children with hearing loss. The challenge of providing a much requested service at a more reasonable location with this study will exclude many patients

with devices other than Advanced Bionics Corporation. However, once success is established with this study, it is anticipated that the other cochlear implant manufactures will be willing to participate in future studies. This will also increase our sample size an estimated three fold.

Given the large number of professionals from varying disciplines (audiology, manufacturing, information systems, management, legal and financing) needed to make this research structurally sound, IRB approval is estimated to be obtained summer 2008.

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