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ABSTRACT

The number of deaf children with surgically implanted cochlear devices has been increasing since the device was approved in 1989. In rural communities, there may be no one who is knowledgeable about the care of cochlear implants, what to expect of the child's communication abilities, and how to maximize the child's progress. A federally funded training program at Vanderbilt University was designed: (1) to increase the number of trained professionals in three communication-related disciplines who are prepared to serve on cochlear implant teams and are knowledgeable about the best practices in educational management of deaf children with cochlear implants, and (2) to provide related inservice training to daycare, preschool, and school district personnel in rural areas of middle Tennessee and southern Kentucky. The program is a three-semester sequence that begins with a multidisciplinary seminar including selected students from audiology, speech-language pathology, and deaf education. During the second semester, students are placed in various settings with children who have cochlear implants. In the third semester, students work in multidisciplinary teams to provide support and inservice training, primarily to school districts. The curriculum emphasizes problem-based learning and reflects four major competency strands: multidisciplinary team functioning, knowledge of cochlear implant technology, knowledge and skills for effective communication rehabilitation, and knowledge and skills of adult learning methods. Benefits of the training program are outlined for children, university students, professionals, and community members. Contains 11 references. (CDS)

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MULTIDISCIPLINARY TRAINING FOR RURAL OUTREACH TO CHILDREN WITH COCHLEAR IMPLANTS

The National Institute on Deafness and Other Communication Disorders estimates that 1.6% of children under the age of 18 in the United States has an educationally significant hearing loss (NIDCD, 1996). During the 1995-96 school year, 68,070 children between the ages of 6 and 21, many of them residing in rural areas, received educational services for hearing impairment (Niskar et al., 1998). Since the initial FDA approval of a surgically implanted cochlear device for children with profound sensori-neural deafness in 1989, there have been increasing numbers of children who receive cochlear implants. Cochlear Corporation, manufacturer of the common Nucleus Series devices, documented an average annual increase in pediatric implantation of 23% over the period of 1992-1997, and currently it is estimated that approximately 10,000 children worldwide have cochlear implants (Cochlear Corporation, personal communication). As the number of children with cochlear implants increases, the demand for audiologists, speech-language pathologists, and educators of oral deaf children to work on multidisciplinary teams and in educational settings with these children increases. Severe personnel shortages exist for all of these specialty areas in rural locations throughout the United States (1995-1996 Teacher Shortage Areas, Nationwide List, U. S. Department of Education).

Cochlear implant centers are located primarily at major urban area tertiary hospitals. Children from surrounding regions are brought to these centers for surgery and then returned to their local school districts, pre-schools and daycare centers for intervention. It is likely that there may be no one in their home communities who is knowledgeable about the care of cochlear implants, what to expect of the child's communication abilities, and how to provide the most appropriate program for maximizing progress. Outreach to rural areas is one of the most difficult problems cochlear implant teams currently face (Nevins & Chute, 1995) and, indeed, provision of any type of specialized communication services for rural populations is an ongoing area of need (American Speech-Language-Hearing Association, 1991). For example, the Nashville Cochlear Implant Team, based at Vanderbilt University Medical Center, is the nearest implant center for children living throughout predominantly rural middle Tennessee and southern Kentucky. During the period of 1995-1998, approximately 80% of children implanted at Vanderbilt came from rural areas more than an hour's drive from Nashville. It is impractical to expect community and general education personnel to travel considerable distances to learn about cochlear implants and how best to support the young individual who is now in their jurisdiction. This presentation/ paper describes a United States Department of Education funded training grant designed simultaneously (1) to increase the number of trained professionals in three communication-related disciplines who are prepared to serve on cochlear implant teams and are knowledgeable about the "best practices" in educational management of deaf children with cochlear implants and (2) to provide requested inservice training on educational support for deaf children with

cochlear implants to daycare, preschool and school district personnel in rural areas throughout middle Tennessee and southern Kentucky.

Program Components and Model

Design of Program

The program is a three-semester sequence that begins during spring semester with a multidisciplinary seminar including selected students from audiology, speech-language pathology, and deaf education. Curriculum content units include the following: History and Overview of Cochlear Implants (including perspectives from the Deaf community), Auditory Development in Children with Hearing Impairment, Language and Speech Development of Deaf Children, Candidacy Considerations for a Cochlear Implant, Surgical Considerations and Post-Operative Follow-up, Functioning as a Member of a Multidisciplinary Team, Mapping of the Cochlear Implant, Device Trouble Shooting, Auditory Skills Training, Speech and Language Intervention, and Research on Performance of Children with Cochlear Implants. During the semester one or more guest speakers of national stature are brought in to address the seminar and these lectures are opened to area professionals involved in education and intervention of deaf and hard of hearing children. Vanderbilt students participating in the seminar are assigned to multidisciplinary teams for exercises and simulations throughout the semester. Assignments are designed for specific student needs. For example, when assessing children with cochlear implants, the audiology students focus on auditory skills, while the speech-language pathology students concentrate on speech and language evaluations and the deaf education students consider pre-academic skills as well as audition and speech. Role play and simulations are an important part of the seminar: in simulated cochlear implant team meetings, assessment information is shared across disciplines to make the best decision about candidacy and intervention needs for specific children (selected from actual though anonymous-- case histories of children referred to the Nashville Cochlear Implant Team). The practice portion of students' final seminar examination involves simulated presentations of inservice programs targeted toward pre-defined audiences (e.g. daycare workers, teachers of the deaf, administrative and general education staff etc.). In addition, students are asked to reflect on the team process that they experienced throughout the semester (Briggs, M., 1997).

During the second (summer) semester, students are placed in various settings with deaf children who have cochlear implants. These placements are arranged to match individual student's interests and needs. For example, two students in deaf education were able to work in their hometowns of Birmingham, Alabama, and Rochester, New York. A series of assignments targeted toward helping assure that the student will obtain a range of experiences with implanted children is provided as a guide for site supervisors, and videotaping of sample lessons with student self-evaluation is encouraged. These videotapes serve as the basis for discussion with the university supervisor and among the various members of the student multidisciplinary teams. Students who remain in Nashville must attend a weekly seminar to share experiences and continue to discuss issues related to rehabilitation of children with cochlear implants. One of the primary issues is how to transition from a child using total communication prior to implant to increasing reliance on auditory verbal communication once the child has received the implant (ref). Those students who have practicum/clinical experiences in other communities mail weekly lesson plans to the university supervisor, who contacts the site supervisor every two weeks by telephone. In addition, they are required to submit two self-evaluated videotapes - one at the beginning of the practicum experience and one toward the end.

During the final (Fall) semester, students work in multidisciplinary teams to respond to requests for educational support and general information on cochlear implants. During the first year, most of these requests came from school districts or preschools where children recently implanted by the Nashville Cochlear Implant Team had returned for educational and rehabilitative programming; some

were in rural settings. Requests also came from the Tennessee State Coordinator for Early Intervention and from the Consortium of Deaf Educators. The Vanderbilt students worked in fluid teams (whoever's schedule best matched the timeslot) to design, present, and evaluate the inservice program. Prior to the actual presentations, students spent time learning how to design a workshop for "adult learners" (Eyler, 1998). They then practiced applying this knowledge by planning and giving a presentation to a class of undergraduates in special education and one for audiologists/speech language pathologists serving on an aural rehabilitation team for adults. Each student was expected to serve on at least two teams that provided actual outreach inservice.

Conceptual Framework

Problem based learning: In recognizing the limitations of conventional teaching methods and practice, many educators have begun to experiment with an educational approach first used in medicine and called problem based learning (PBL) (Barrows & Tamblyn, 1980). PBL is the learning that results from the process of working toward the understanding or resolution of a problem. In other words, students are given the problem or issue *first* as a means of stimulating further learning, as opposed to first being provided with the facts independent of a problem-solving environment. This allows students to individualize their learning by pursuing only what they do not know. PBL assumes that when we encounter complex "real world" problems that require us to research the literature and consult with experts for advice, we are more likely to retain the information that we learn. In contrast, research suggests that much of the information provided in a strict lecture format is never absorbed or remembered (Miller, 1978; Norman, 1973). A PBL curriculum typically de-emphasizes the lecture format and emphasizes hands-on problem-solving skills, self-directed learning, and independent critical thinking. Traditionally a faculty tutor facilitates the learning process with small groups of students by guiding them through the resolution of a problem, developing self-directed learning skills in the process. As a group, the students discuss the various aspects of the problem that they have researched and attempt to integrate their findings into an educational or management plan. It is important to emphasize at this point that PBL instruction is not being advocated in isolation. Not all knowledge for a complete educational background can be gained through PBL. The use of classroom lectures, laboratory experiences and traditional practicum continue to be essential components of audiology, speech-language pathology and teacher education. PBL, however, can provide the contextual environment that appears to be critical for integrating factual knowledge and independent problem-solving skills. By having students from traditionally separate disciplines together in the seminar with the focus on a common "complex problem" (the educational management of young children with cochlear implants), we hope that they will share what they have learned as a class, thus appreciating the strengths that each group contributes.

Competency Strands: Four major competency strands are reflected in the program curriculum. These strands, indicated in Figure 1 across the top of the matrix, include the following : Multidisciplinary Team Functioning, Knowledge of Cochlear Implant Technology, Knowledge and Skills for Effective Communication (Re)habilitation, and Knowledge and Skills of Adult Learning Methods. These general competencies reflect the program's overall emphases. Not only should students learn the technical information to make them knowledgeable about cochlear implant technology and implantation issues, but they need to become familiar with approaches to intervention and learn specific techniques to maximize the communication and educational progress of children with cochlear implants. In order to function effectively within the multidisciplinary context that is essential in managing these children, students must learn to work cooperatively in teams and to appreciate the contributions of team members from other professional disciplines. In addition, to function effectively in a training/support role for adults who are learning about children with cochlear implants, students should be able to assess what their audience needs and wants to know (audience analysis) and how to present that information in a collaborative and not condescending manner.

Compentency Strands

Levels of Independence	*Multidisciplinary Team Functioning*	*Knowledge of Cochlear Implant Technology*	*Knowledge & Skills of Communication (Re)habilitation*	*Knowledge & Skills of Adult Learning Methods*
Didactic Learning	Seminar Module • team building	Seminar Modules Guest Lectures Lab Experiences Observations • mapping • troubleshooting • hardware • surgery	Seminar Modules Guest Lectures Lab Experiences Assessments • audition • speech • language Observations in clinic	Seminar Module Guest Lecture Interactive Learning Activities
Simulations	Simulation of participation in C.I. Team Meeting • Effective Communication • Problem Solving	Simulation of Inservice Program – Content Information	Simulation of a Re(hab) Team meeting using case histories of C.I. candidates • interpreting assessment data • setting (re)habilitation goals • treatment out-com evaluation	Role Play Practice Inservice Presentations to local groups
Independent Application	Practicum Experience (function as part of intervention team) Inservice Presentations to school personnel	Practicum Experience (demonstrate knowledge of concepts/technology) Inservice Presentations to school personnel	Practicum Experience (provide competent clinical/educational (re)habilitation Inservice Presentations to school personnel	Inservice Presentations to school personnel

Figure 1 presents the matrix on which this model training program is based. The four competency strands discussed previously are listed across the top, and three "levels of independence" are listed on the vertical axis. These three levels represent increasingly independent functioning where students are moving from more didactic, traditional methods of learning toward supported, yet fully independent, application of the concepts (structured when possible as problem-based learning). The intermediary level of independence consists of simulations and role plays, where students have the opportunity to practice some of the skills that they will need at the level of independent application. Various activities that illustrate the curricular information at each of the three levels are included in the matrix. These are meant to be illustrative and not exclusive.

Benefits of the Program

The benefits of this training program can be seen at several different levels, including the following:

For Children

Having well-informed, knowledgeable teachers , audiologists, and speech-language pathologists ultimately benefits the children with cochlear implants who are in schools and clinics under their care. The students involved in this training program are learning in depth about cochlear implants and the educational methods that will best support children who use them. When these students begin their professional careers, they should be a resource about cochlear implants to other personnel, as well as taking leadership in providing the service that meets these children's needs. In addition, via the inservice outreach provided by the students in training to other professionals serving children with cochlear implants, a wider range of personnel is being given pertinent information, including personnel in rural settings where information and support is not readily available. That can only help implanted children function more effectively in their care and educational settings. School and daycare personnel who are knowledgeable about cochlear implant equipment are more likely to troubleshoot the device and take appropriate action, if indicated. They are more likely to include the kinds of auditory skill training that are necessary for the most effective use of a cochlear implant (Tye-Murray, 1992.).

For University Students

The participating Vanderbilt University students have the benefit of a unique opportunity to study, learn, and work with students from other disciplines. This should help them function more effectively on multidisciplinary teams, whether in hospitals, clinics, or schools.

Students gain:

- hands-on experience with children who have cochlear implants
- practice in presentation of workshops for professionals and parents
- opportunity to observe candidacy evaluation, surgery, mapping and rehabilitation sessions
- supervised experience providing rehabilitation and educational training for children with cochlear implants
- awareness of issues of service delivery in rural areas for low incidence disabilities
- opportunity to become involved with families considering the surgery
- opportunity to follow children through the surgery and into a rehabilitation program
- development of a resource library for future students and personnel in (rural) school districts

For Other Professionals

This training model provides a bridge between the university medical center and regional (including rural) school systems. In the past it has been difficult for members of the Nashville Cochlear Implant Team to respond to requests for information and support from the many educational settings where children with implants reside. While it is still necessary for Implant Team professionals to follow-

up in person on highly specific information, especially if there are complications involved with a particular child, student teams are well prepared to provide general information. Although it is not a complete solution to the need for the Implant Team to work with school personnel directly, it has helped by providing a more flexible and time-efficient way to get basic information and general programming information on cochlear implants to school professionals . Specific questions about a particular implanted child who may be having problems are referred back to the team members involved in the surgery and programming of the implanted device. After conducting the general training workshops, student teams can then facilitate continuing interprofessional communication. The students are often in the position to guide school personnel to the most appropriate resource if they have issues that require more specialized information.

For the Community

The program-sponsored guest lectures by national experts in the area of cochlear implants in children are open to interested professionals and parents in the community. This serves as a professional development opportunity for teachers of the deaf, speech-language pathologists and audiologists in Davidson County and surrounding areas. Information assembled by program students furnishes a resource for the Tennessee State Department of Education to provide technical assistance to daycare centers and preschools enrolling children with cochlear implants: even small programs in rural areas have access to this technical assistance.

Summary/Application

The educational model of problem-based learning can be adapted to training programs in many areas of special education in order to encourage students to work in interdisciplinary settings and to focus on identification of problem areas and practical ways in which they can independently seek out information and solutions. Such "active, problem-solving" ways of learning serve all students in helping professions well, not just those who may be moving into service delivery in a rural setting.

Special education for populations that are low-incidence (hearing, vision, autism, multiple disabilities, etc.) is traditionally difficult to provide in rural settings. Using graduate students from regional training facilities to bring information and support to teachers who may not have had specific background in this area of exceptionality can provide a resource for rural educators while involving postsecondary students in active learning and problem-solving. This poster session portrays such a "partnership" using multidiciplinary students who serve deaf children with cochlear implants. Other types of low-incidence disability also could be modeled on this approach.

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