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**CONTRIBUTED PAPERS**

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## **Development of an Ecological Audiologic Rehabilitation Program in a Home-for-the-Aged**

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An ecological approach to audiologic rehabilitation, which stresses working with individuals who are hearing impaired, their communication partners, and with their communication environments, was used in the development of an audiologic rehabilitation program in a home-for-the-aged. The program components included hearing assessment, provision and maintenance of personal hearing aids and assistive listening devices, environmental modifications to maximize accessibility, education of staff and residents regarding hearing loss-related communication handicap, training in communication strategies, and the operation of an audiology drop-in clinic and self-help group. Experience with the program supports the position that the standard clinic-based audiology model is not sufficient for residents in a home-for-the-aged. An ecological model of audiologic rehabilitation is critical for the improvement of everyday communication.

The standard clinic-based audiology model for the elderly who are institutionalized is often inaccessible and insufficient (Dodds & Harford, 1982; Garstecki, 1982; Humphrey, Herbst, & Faurqi, 1981; Hutchinson, Schow, & Nerbonne, 1980; Kelly, 1985; Regional Municipality of Hamilton-Wentworth & Hamilton-Wentworth District Health Council, 1988). The prevention and remediation of

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communication handicap in these individuals may be achieved with a more functional "ecological" approach, which stresses self-care and mutual aid by working both with individuals with hearing impairment and their communication partners, and with the environments which present obstacles to their communication (Epp, 1987; Hull, 1977; Noble, 1983; Noble & Héту, 1994).

Audiologic rehabilitation for the elderly residing in institutions requires a broad approach. Many of the receptive communication problems of the elderly are not corrected by hearing aids alone. Auditory deficits interact with linguistic and cognitive deficits to complicate the communication process (Granick, Kleban, & Weiss, 1976; Health and Welfare Canada, 1988; Hull, 1992; Rousch, 1985; Smaldino & Traynor, 1982; Thomas et al., 1983). In addition, social, emotional, and motivational aspects of institutional life are influenced by, and frequently impose barriers to, communication (Hull & Giffin, 1989; Lubinski, Morrison, & Rigrotsky, 1981).

The ecological model of audiologic rehabilitation attempts to provide a broader basis for remediation. The components of an ecological approach can be put into the framework for analyzing and remediating communication handicap illustrated in Figure 1. Within this model, it is assumed that communication consists of a message exchanged for particular purposes between a sender and a receiver in an environment. Both the receiver and her/his communication partners are considered to play necessary roles in efficient communication. Thus, education and support are given to both the receiver and sender so that both can improve communication by adapting to the needs of their partner. Modifications are also made to help overcome poor acoustics, poor lighting, and/or obstructive furniture which create barriers to accessibility. In these ways, the environment and the linguistic content and physical form of the message can be controlled to facilitate communication. Many researchers have espoused this approach to assessment

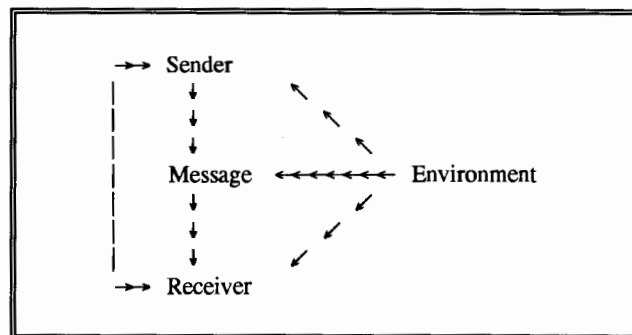


Figure 1. Components of an ecological approach to audiologic rehabilitation for analyzing and remediating communication handicap.

assessment and remediation (Coyte, 1992; Erber, 1988; Getty & Héту, 1991; Héту & Getty, 1991; Lubinski et al., 1981; Pichora-Fuller, 1992; Purves & Brooks, 1987; Trychin, 1987, 1993; Trychin & Albright, 1993; Trychin & Boone, 1987; Trychin & Forgatch, 1988).

### **PROGRAM ORIGIN**

A large scale survey of seniors was undertaken in the Regional Municipality of Hamilton-Wentworth, Ontario. A result of this study was the identification of community-based audiologic services as one of six community support service initiatives (Regional Municipality of Hamilton-Wentworth & Hamilton-Wentworth District Health Council, 1988). In 1991, funding was obtained through the National Health Research and Development Program of Health and Welfare Canada to carry out two companion research projects: (a) to develop and provide an audiologic rehabilitation program within a home-for-the-aged, following an ecological model (Head, 1990); and (b) to evaluate the effectiveness of the program (Pichora-Fuller, 1990). This paper provides a report on the rehabilitation program and a description of its ecological approach.

### **REHABILITATION PROGRAM GOAL**

The immediate goal of the rehabilitation program was to minimize limitations which hearing loss places on the scope and effectiveness of communication for residents in a home-for-the-aged. An additional and primary goal was to establish a model for communication-based audiological health care for elderly residing in institutions, using an ecological model.

### **DESCRIPTION OF PROGRAM SITE**

St. Joseph's Villa (the Villa), Dundas, Ontario, was chosen for the site of the project because it was believed to be an environment in which the scope and effectiveness of communication could be increased. The Villa has an historical commitment to leadership and to the development of innovative programs in order to meet the changing needs of the elderly. It aims at the total physical, social, emotional, and spiritual care of the elderly, while encouraging them to maintain their independence. Many residents have lived in the area all of their lives and are familiar with one another prior to moving into the Villa.

The wide range of daily activities and opportunities for communication available at the Villa act as motivation for residents and staff to improve communication. Many residents attend worship services and church activities in the community, visit friends, and attend concerts or lectures.

### **Physical Setting**

The Villa, a charitable home-for-the-aged licensed by the provincial government, was founded in 1879. The present building was completed in 1970 and houses 370 residents on six floors, including a special care unit for confused ambulatory individuals. Private, semi-private and four-bed rooms are available for residents. Building facilities include a chapel, meeting rooms, TV rooms, an auditorium, bowling alley, games room, and indoor pool.

As in many institutions for the elderly, there are no carpets, except in some individual rooms. The auditorium is similar to a gymnasium with high ceilings and hard surfaces. The chapel has noisy overhead fans and residents report not being able to hear talkers, whether or not they are using a microphone. The dining areas are frequently reported to be areas where communication is difficult. Residents are seated at square tables of four, chairs are scraped along floors when residents sit down and get up, and dishwashers are often in operation during meal times. Television volumes are increased in TV rooms and resident rooms in an attempt to compensate for hearing difficulties. Activities, resident paging, and emergency information are announced over a public address system. Organized activities are almost always carried out without the use of amplification systems. Previous to this project, assistive listening devices (ALDs) were not in use.

### **Staff**

The Villa has approximately 403 full- and part-time staff. Services provided at the Villa include nursing, medicine, occupational therapy, physiotherapy, pastoral care, social work, and recreation. Professional clinics including ophthalmology, optometry, podiatry, dentistry, and otorhinolaryngology are scheduled on a regular basis. Community hearing aid dealers provide support to residents as needed. There is a full range of support services, such as dietary, laundry, maintenance, and housekeeping. Additional services include a beauty salon, barber shop, and bank. There is also an active corps of volunteers who provide services to the residents.

## **PARTICIPATING RESIDENTS**

Not all Villa residents participated in the program. The major criterion for including a resident, following chart review, was a registered nurse's recommendation that the resident would benefit and be able to participate fully in the program. Initially, 95 residents were eligible for inclusion in the evaluation and rehabilitation programs based on the criterion. In December, 1992, there were 49 residents who were willing to participate in the audiologic rehabilitation program. By the end of the program (December, 1993), 30 residents were active participants in the program. Nineteen residents either chose not to continue with the program or were eliminated due to a decrease in cognitive or health status, or

**Table 1**  
Degree and Type of Hearing Loss in the Better Ear  
for Residents in the Audiologic Rehabilitation Program

Degree and type of hearing loss	Number of residents
Hearing within normal limits	3
High frequency sensorineural hearing loss (> 2 kHz)	5
Mild sensorineural hearing loss	1
Mild-to-moderate sensorineural hearing loss	5
Moderate sensorineural hearing loss	7
Moderate-to-severe sensorineural hearing loss	8
Severe-to-profound mixed hearing loss	1

death. The degree and type of hearing loss, if any, in the better ear of the 30 residents who completed the program are outlined in Table 1.

A survey of hearing aid use by the residents in the program revealed that 17 of the residents were wearing hearing aids prior to the start of the program, 13 of the residents were unaidable due to hearing loss within normal limits, high frequency hearing loss (> 2 kHz) only, or preferring not to be aided. Three residents obtained new hearing aids during the first 6 months of the program.

The age range of residents in the program was 60 to 94, with an average age of 85 years. Some of the most independent residents were in the upper age range. There were 4 males and 26 females in the program. All residents were English-speaking.

### PRE-PROGRAM PREPARATIONS

During the preparation phase, the program audiologist was involved in the following activities: orientation to the Villa and observation and assessment of residents' activities, environmental assessment, purchase of ALDs, chart reviews, establishment of the audiology clinic, and preparation of materials. An environmental inventory was used to assess acoustics informally and to guide decisions about assistive listening interventions. Based on the results of the environmental assessment, ALDs were ordered for the chapel and auditorium, as well as systems for personal use. An example of completed inventories for two areas, including recommended changes are illustrated in the Appendices. Chart reviews were conducted to obtain information that would aid in planning services for program participants. Information collected included medical history, medications used, hearing loss history, vision history, results of manual dexterity assessments, results of mobility assessments, results of psychological assessments, and residents' interests and activities.

The program audiologist was also involved in organizing the installation of the

audiometric booth and related equipment in the audiology office. A sound booth was installed in December, 1992. Audiometric equipment included a clinical diagnostic audiometer, impedance audiometer, and a real ear analyzer with a hearing aid test box. Therapy materials, including an audiologic rehabilitation manual, were developed based on the information gathered about the residents.

### **THE AUDIOLOGIC REHABILITATION PROGRAM**

The audiologic rehabilitation program included resident services involving instrumentation and therapy, a drop-in clinic, activities to maximize accessibility, staff services, attendance at resident review conferences, and community education. Operation began January 1, 1993, with a termination date of December 31, 1993.

#### **Resident Services Involving Instrumentation**

Each resident in the program was given a standard audiological assessment, including otoscopic examination. Live voice, high-frequency word lists, presented to the better ear auditory-only and auditory-visual (Erber, 1988), visual identification of consonants, auditory identification of stop and nasal consonants, and auditory-visual identification of voiced and voiceless fricatives (Erber, 1988) were also administered, in quiet. When indicated, residents were referred to their family physicians, who could refer the residents to the in-house otorhinolaryngologist. A copy of the audiogram and report was put in the medical chart. Ongoing follow-up was recorded in the medical chart's progress notes section.

Those residents with hearing aids had their hearing aids checked electroacoustically and real-ear measurements were carried out for each individual. Hearing aids in need of repair were recommended to be returned to the agency of purchase for repair. If hearing aids were found to be inadequate to meet residents' amplification needs, adjustments were made to improve functioning or a hearing aid evaluation appointment was recommended for prescription of a new hearing aid. A hearing aid evaluation appointment was also recommended for those residents who were candidates for amplification, but did not own a hearing aid. Prior to this appointment, nursing staff and family were contacted to discuss the appropriateness of amplification. First-time use of amplification or replacement of nonfunctional or inappropriate amplification was recommended for 10 residents. Of these 10, 3 residents followed through with the recommendation and attended a hearing aid evaluation appointment.

When a hearing aid evaluation was performed, advantages and disadvantages of monaural and binaural fittings, and amplification in general, were discussed with the individual. Ergonomic factors such as handedness, dexterity, vision, ear used for the phone, and cognitive ability were considered. In conjunction with the resident, the ear to fit and the style of hearing aid were discussed and determined. Hearing aid evaluations were carried out using real-ear measurement.

These appointments included discussion of the funding procedure of the Assistive Devices Program, Ministry of Health, Ontario and the 30-day trial period. The Assistive Devices Program provides a grant for the purchase of one hearing aid by any resident of Ontario who is 19 years of age or older and needs a hearing aid. This grant is available once every 5 years, if the hearing aid previously funded is no longer functional. Government assistance forms were provided for the individual, along with a list of local hearing instrument practitioners.

Hearing aid check appointments were provided on an ongoing basis, sometimes as often as daily, during the 30-day trial period. Real ear measures and electroacoustic analyses were carried out on the hearing aid. All residents in the program who had hearing aids had them labelled with their initials. Labelling helped to identify owners of "lost and found" hearing aids.

For those residents who might benefit from them, ALDs, such as personal amplifiers, FM systems, and infrared systems, were recommended and could be loaned on trial on a short-term basis. Two residents were interested in the purchase of personal ALDs. One resident purchased a personal FM system. Another resident had an unsuccessful trial with a closed caption decoder and was also unsuccessful with the use of a variety of ALDs with the television. It was recommended that individuals use the ALDs that were installed in the chapel and auditorium, as well as portable ALDs, during other Villa activities. By the end of the program, 20 of the residents who participated in the program were using them regularly.

#### **Resident Services Concerned with Therapy**

*Audiologic rehabilitation curriculum.* To ensure that a minimum of standard information was provided to all residents in the program, a curriculum was written which included topics to be covered and questions to be asked of residents. The manual was used in both group and individual sessions. The curriculum included information on the following topics: how to obtain a hearing aid; batteries; how to insert an earmold; how to insert an in-the-ear hearing aid; parts of a hearing aid; cleaning and care of the earmold and hearing aid; listening checks and troubleshooting; communication strategies; infrared systems; FM systems; personal amplifiers; television, telephone, and alerting devices; telephone training; coping with poor listening environments; listening activities; intonation; facial expressions and gestures; speechreading. Samples of all assistive devices described in the manual were available for resident use and were demonstrated at group and individual sessions.

*Group rehabilitation.* Group sessions were available to groups of 10 or fewer individuals on a weekly basis. Each session lasted between 30 and 45 min. The previously described curriculum was used as a basis for discussion and demonstration. Other training, such as problem-solving, speechreading, or auditory training, was provided, depending on group needs and interests.

Difficulties occurred in scheduling groups due to the number of activities available for residents. Residents found it difficult to cope with changes in routine and it was necessary for sessions to be scheduled around chapel services, meals, baths, and medical appointments.

It was also difficult to keep residents faithful in their attendance. Unless invitations were sent to the individual on the same day the group was to meet or individuals were escorted by the audiologist, few individuals attended. A list of group times was posted on the office door, but this did not improve attendance. Residents reported that they enjoyed the meetings, but had trouble remembering when the meetings were scheduled because of the busy daily schedule. Health difficulties and preoccupation with changes in health status also took precedence over the residents' participation. Twenty-two residents were involved in the groups. All groups had completed the standard minimum of information in four to six sessions over a 6-month period. One group of 3 individuals met on a regular basis for further speechreading, auditory training, and peer support.

*Individual rehabilitation.* Individuals who experienced mobility problems, health status that impeded participation in a group, or severe hearing loss with substantial receptive communication difficulties were initially provided with individual rehabilitation. Individual rehabilitation was provided to others, as needed. In fact, all residents in the program received some individual services.

Individuals were typically seen once or twice a week. Sessions lasted from 20 to 60 min. The curriculum was followed, but more importantly, sessions were modified to meet individual needs.

Residents were prepared for Villa activity attendance in order to increase their social interactions with other residents. Preparation included orientation to ALDs that might be used and problem-solving activities.

Special adaptations were made for 7 residents with poor vision. These adaptations included orientation to assistive devices and hearing aids through the use of touch, verbal description, large diagrams, and audiotaped materials.

### **Drop-In Clinic**

A drop-in clinic was provided for residents and staff to discuss difficulties related to hearing loss and to obtain on-the-spot hearing and immittance testing if problems and/or changes were suspected. Many residents attended the clinic due to problems with their hearing aids, especially dead batteries and cerumen build-up in earmolds or hearing aids. Emotional support was also provided for residents in need of encouragement. The program audiologist also attended appointments with hard-of-hearing residents who had substantial receptive communication difficulties, in order to facilitate communication. This provided significant opportunity for problem-oriented therapy.

There were no set hours for the drop-in clinic. Residents and staff were encouraged to call or attend anytime during regular work hours and to leave a



note if the program audiologist was not in the office. The drop-in clinic was a popular part of the program. Residents reported that they were pleased with this service and used it on a regular basis.

#### **Activities to Maximize Accessibility**

To maximize accessibility, ALDs were obtained for use throughout the Villa and were available to all residents. A loan program was established to allow individuals to try devices. Personal amplifiers were available on loan for individuals whose hearing aids were out for repair. Personal amplifiers and infrared systems were also loaned to residents for use with television and radio. Personal amplifiers and FM systems were available for loan to staff who wished to try devices to improve communication with residents in adverse communication environments. If device use was successful for the individual, the device could be recommended for purchase.

The program audiologist was involved in the installation of FM systems in the chapel and auditorium of the Villa. The audiologist attended daily chapel services and activities to aid residents and staff in the use of ALDs.

By the end of the program, reports with recommendations for changes were compiled and provided for the Dietary Department and the Senior Housing Committee. Physical plant and programmatic changes aimed at increasing accessibility require considerable cooperation and understanding from many constituents, as well as resolution of financial and physical hurdles. Such changes are likely to be gradual and long term.

#### **Staff Services**

Inservices were available to staff. A series of four standard 30-min inservices were made available to all departments at the Villa, as follows:

1. *Hearing Loss Related to the Aging Process and Effects of Hearing Loss on Communication:*  
Included information regarding prevalence of hearing loss, causes and characteristics of presbycusis, effects of hearing loss on communication and everyday life, and ways to improve communication.
2. *Hearing Aids:*  
Included information on purchasing a hearing aid; batteries; parts and styles of hearing aids; inserting batteries; care, maintenance, and troubleshooting of hearing aids; and what hearing aids cannot do and can do. Hands-on practice was given in the use of hearing aids and troubleshooting.
3. *Assistive Devices:*  
Provided information on the proper use and maintenance of the assistive devices including personal amplifiers, FM systems,

infrared systems, alerting devices, and telephone devices. Staff were given the opportunity to try out all of the devices.

4. *Environmental Coping and Problem Solving:*

Included a review of the effects of hearing loss on communication and a discussion of environmental factors that affect communication for hard-of-hearing people, and of models of problem-solving. Staff were asked to problem-solve ways to improve communication in various settings around the Villa.

Inservice times were booked with each department. Each inservice was provided three times in three different time slots for Nursing Staff in order to accommodate each shift. Inservices were either booked during regular staff meetings or other times, at the discretion of the department manager. Each of the four inservices was videotaped so that the tape could be made available to all departments of the Villa. The completed tape was placed in the Staff Library.

A folder of handouts and readings was prepared for each inservice. Each department, as appropriate, was given a folder. Folders were placed in the Staff Library and left with the Volunteer Coordinator. A copy of the Task Force Report "Acquired Hearing Impairment in the Adult" (Health and Welfare Canada, 1988) and its companion information folder was provided for the Library, each department and Nursing Station.

Staff attendance at inservices tended to be low. Specifically, out of 403 Villa staff, 88 attended inservice one, 44 attended inservice two, 42 attended inservice three, and 62 attended inservice four.

Informal inservices were carried out with staff on resident floors regarding specific problems and/or specific residents. Nursing staff were provided with inservices when a new hearing aid was obtained by a resident.

### **Resident Review Conferences**

The audiologist attended resident review conferences to discuss individual residents' progress with other staff members, such as nurses, occupational therapists, physiotherapists, pastoral care staff, and social workers. Future programming for the individual was discussed. These conferences gave the audiologist the opportunity to work as a part of a team in planning for, and in understanding the needs of, the individual.

### **Community Education**

Opportunities were also available for more community education via presentations through venues such as the Villa Residents' Council, a Community Service Providers Group, student interns, St. Joseph's Villa Mission Awareness Day Display, and a Rehabilitation Program Open House.

## CASE STUDIES

To illustrate how on-going support can be provided within an ecological model, the following case studies are presented.

### Case Study #1

L.V. is a 91-year-old female resident who is legally blind, has Parkinson's Disease and a history of strokes. She leans to the left side, and is nonambulatory, except when she moves herself very slowly from her chair to her wheelchair. She has decreased manual dexterity bilaterally, but is somewhat better with the left hand. She has dysphagia and few people speak with her because of receptive and expressive communication difficulties. L.V. enjoys conversation with others, but communication tends to be limited to family and staff at a close one-to-one range. L.V. listens to talking books throughout the day, while seated in a special chair in the hallway outside of her room. Her family is supportive and visits on a regular basis.

L.V. has a severe mixed hearing loss in the right ear, with an optimal word recognition score of 20%. She has a severe-to-profound mixed hearing loss in the left ear, with an optimal word recognition score of 64%.

At the start of the program, she was not able to participate successfully in activities or chapel services because of her hearing loss. L.V. had worn hearing aids for many years, and at program start was wearing a behind-the-ear hearing aid fit to the left ear. Although L.V. was having much difficulty with feedback, she continued to wear the hearing aid throughout the day. Due to the shape of her left ear canal and the fact that she leans to the left side, it had been difficult to get a well-fitting mold that would stay in the ear. L.V. was not able to get the volume of the hearing aid loud enough to hear others or her talking books well. She was not eligible for government assistance, as the present hearing aid was less than 2 years old and had been purchased with government assistance.

A standard mold was obtained and consignment stock body aids were tried with L.V. Both she and her family were supportive of a change to a body aid. The program audiologist and the family physician wrote letters to the provincial government on L.V.'s behalf to request funding for the new hearing aid on the basis of the significant change in her medical condition since the purchase of the present hearing aid. Funding was obtained and the hearing aid was ordered. L.V. had some trouble manipulating the controls on the hearing aid; she was aware that her physical condition will possibly deteriorate further and that she would have to rely on others more. The program audiologist drew an enlarged diagram of the hearing aid and the location of the controls and saw L.V. daily or every second day during the trial period to practice with the controls. It was expected that if L.V. was aware of what needed to be done in order to operate the hearing aid, she would at least be able to instruct others how they could be of help to her. Hearing aid use instructions were posted in L.V.'s room.

Hearing aid use instructions were also posted in the washroom where the hearing aid was put on every morning and in front of the medical chart. L.V. kept the hearing aid after the trial period was completed. L.V. designed a pouch (the pattern was drawn by the program audiologist) and it was made for her, so that the hearing aid could be securely attached and not swing forward when she got up out of her chair.

Numerous phone calls were made to the family regarding progress with the hearing aid and the family was oriented to the use of the hearing aid and to use of communication strategies, such as decreasing the talker's rate of speech and rephrasing rather than repeating. Inservices were provided for nursing staff regarding the use of the new hearing aid, as well as use of the hearing aid with the telephone.

Staff and family members reported that communication had become easier, and that others had to get close to L.V. only to hear what she had to say. L.V. reported improvements in her ability to hear during conversation and with her tape recorder, thus increasing the amount of time she was able to listen to talking books. L.V. was oriented to the use of the FM system, which was installed in the chapel, with her hearing aid. L.V. required someone to couple the FM system with a loop to her body aid. She was able to attend chapel services once a week and reported that this was the first time in many years that she had been able to follow the service.

#### **Case Study #2**

I.I. is a 94-year-old male resident. Many people have mentioned that it is difficult to communicate with him. I.I. is an extremely active individual, who had reportedly stopped attending some activities such as meetings and discussion groups, because of his hearing problem. He has continued to be active in the Gardening Club, although both he and the instructor report that communication is almost impossible in the group, and is still very difficult on a one-to-one basis.

I.I. has a moderately-severe sensorineural hearing loss bilaterally. Word recognition scores, at optimum, are 8% for the right ear and 28% for the left ear. I.I. had a behind-the-ear hearing aid fitted to the right ear and an in-the-ear hearing aid for the left ear. He used these hearing aids interchangeably, preferring to use the in-the-ear hearing aid in most situations.

The program audiologist suggested that an earmold be made for the left ear so that the behind-the-ear hearing aid could be worn on the left side. The first day of the change in aided ear, residents, staff, and I.I. reported to the program audiologist that communication had improved greatly. I.I. reported that he had difficulty when speaking with family members over the telephone. He did not know how to use his T-switch with the telephone. Practice was carried out with extension phones until I.I. became more comfortable with the use of the T-switch. I.I. reported that conversation was clearer with the use of the T-switch and that he

was more comfortable talking to family members over the phone. I.I. was also interested in the use of assistive devices, and was oriented to the use of the FM system and infrared system.

The Gardening Club met in a highly reverberant room, with no windows and noisy fans. Activities took place in the greenhouse as well as outdoors. The FM system was taken to the meetings. The instructor was oriented to the use of the FM system and communication strategies. During group conversation, the instructor reduced the rate of her speech and reiterated what others, not in the range of the personal microphone, were saying by rewording their comments and adding her own. About halfway through the first meeting, the instructor remarked that this was the first time I.I. had heard her. At the end of the session, I.I. remarked on how fast the time had gone, and attributed this to the fact that it was the first time he could hear during these meetings. We were able to use the FM system both inside, for discussions and activities, and outdoors for tours of individual garden plots and in the greenhouse. Others also commented on how marvellous it was to have I.I. be part of the group.

### OBSERVATIONS

Program experience as exemplified in the above case studies suggests that the standard clinic-based audiology model is not sufficient for residents in a home-for-the-aged. An ecological approach to audiologic rehabilitation which stresses self-care and mutual aid through working with both individuals with hearing impairment and their communication partners as well as with their communication environments is crucial to improving everyday communication.

Use of ALDs seemed to have had the greatest impact on the hard-of-hearing residents. Residents appear to have become more active participants since the installation of the ALDs. Our experiences demonstrated the importance of having ongoing technical support in the use of ALDs for residents of the degree of frailty encountered in this setting.

Staff attendance at inservices was an area of concern. When inservices were part of the regular, mandatory staff meeting, a maximum number of staff were available for education. If inservices were booked at other times and attendance was not made mandatory by department managers, attendance tended to be low. Inservices must be available on an on-going basis, not only to refresh the memories of those who have already attended, but also to educate new staff members.

Residents' attendance at group audiologic rehabilitation tended to be inconsistent. Due to the number of activities available during the day, it was difficult to schedule these sessions. Residents also found it difficult to cope with changes in routine and to remember when groups were scheduled.

Resident use of the drop-in clinic was very promising. Residents expressed that they were pleased to be able to drop by when they were having difficulties with their hearing and/or hearing aids. Residents and staff also called the audi-

ology office to have the program audiologist visit the floor to help solve problems. Visits by the program audiologist to resident floors and scheduled activities allowed involvement of all key players within a realistic environment and has proven successful in promoting effective solutions and in enhancing the knowledge base and skills of both residents and staff.

Evaluation of this program through our companion research project (Pichora-Fuller & Robertson, 1993) has been completed. It is hoped that a positive outcome will influence change in the type of programs provided for the elderly who are institutionalized, to incorporate an ecological approach to rehabilitation.

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## APPENDIX A

### ENVIRONMENTAL ASSESSMENT

Date: November 20, 1992

Area: Chapel

Activity: Religious Service

Staff Present: One member of the clergy and two pastoral care staff

Number of Residents in Attendance: 20

Use of Signage: Not used

Use of Appropriate Communication Strategies: Physical movement and gestures may be cues to place in service for those who regularly attend.

Use of Assistive Devices: Use of public address system with two stationary microphones.

Room/Seating Arrangement: Main floor has rows of pews with center and two side aisles. Wheelchairs are located in front, sides, and back. Balcony has rows and chairs.

Lighting: Overhead fluorescent lighting and pot lights are present. Lamp on lectern blocks speaker's face.

Carpets/Drapes/Upholstered Furnishings: Floors are carpeted. There is glass on the balcony barrier. Pews are upholstered, three walls have stained glass windows.

Subjective Appraisal of Acoustic Environment: Speaker's voice not carried well by public address system. There is a constant "hum" from the overhead fans. The ceilings are very high and the room is very reverberant. The doors are open and noise from the hallway is apparent.

Suggested Changes: Close the doors to the hallway. Turn the fans off during the service. Add soft hangings to the walls and the glass barrier of the balcony. Check the level of the public address system. Get a smaller lamp for the lectern. Try infrared and FM systems to see which works best.

## APPENDIX B

### ENVIRONMENTAL ASSESSMENT

Date: November 20, 1992

Area: Residents' Main Dining Room

Activity: Lunch

Staff Present: Five dietary staff

Number of Residents in Attendance: The dining room is full (> 100 people)

Use of Signage: The menu is posted on the door.

Use of Communication Strategies: The dietary staff tend to speak louder than normal and repeat when necessary.

Use of Assistive Devices: Not used

Room/Seating Arrangement: The 25 tables are small and square, with four residents seated at each table.

Lighting: Overhead fluorescent lights and suspended lamps. Windows to the outside along one wall.

Carpets/Drapes/Upholstered Furnishings: Drapes on the windows along the hallway, which are open. Outside windows covered with blinds. Floors are tiled and there are acoustic barriers between the resident eating area and the staff eating area. Chairs are vinyl-covered with wooden frames. There are no tablecloths or placemats on the tables.

Subjective Appraisal of Acoustic Environment: Room is noisy and reverberant. Fans in the ceiling are noisy. Chairs scrape the floors as they are pushed in and out. Noisy dishwasher is used during the meal. Door to kitchen is open.

Suggested Changes: Add tablecloths or placemats. Close curtains on windows along hallway. Replace outside window blinds with curtains. Add acoustic tile to ceiling. Add carpet to floor. Put rubber tips on chair legs. Turn fans off during meals. Close kitchen door. Don't run dishwasher during meals. Use more acoustic barriers to divide dining room into smaller areas. Individuals could try use of personal assistive listening devices at the tables.