

A MOBILE AUDIOLOGY SERVICE FOR THE ELDERLY: A PRELIMINARY REPORT

James H. McCartney
California State University
Sacramento

James F. Maurer and Fay D. Sorenson
Portland State University

INTRODUCTION

A mobile audiology service for the senior citizen has been in operation at Portland State University since 1972. Early results have already been reported (Maurer, Kitterman, McCartney, 1973; McCartney, Sorenson, Maurer, 1973; McCartney, 1974). The purpose of this report is to provide three major reasons for the necessity of such a program, to relate the procedures that have proven successful, and to present the limitations of such an approach.

Many difficulties obviously plague the senior citizen, among the most significant of which are money, mobility and sense problems (i.e. vision and hearing). According to the U. S. Department of Health, Education and Welfare (HEW), Social and Rehabilitation Service (1972), nearly 20,000,000 people are 65 years of age and older. Considering that the population of the U. S. is about 200 million, around 10% of the total U. S. population can be considered "aged". Among people over 65 years of age, the most prevalent sensory disorder was hearing (HEW, 1972). Approximately 17% of those answering the recent national health survey showed some hearing impairment with the most common senescent hearing disorder being "nerve deafness."

Compounding the need for greater hearing health care among the elderly is another limiting factor, money. Most persons over 65 receive their income from four primary sources. They are: social security, pensions, public welfare programs, and wages. Of these, the most common source is social security (HEW), 1972). There are over 16 million older persons in the U.S. receiving social security as a major source of income. According to a 1973 Social Security Administration survey, the average monthly social security payment in 1971 was only \$132.00, and that of the non-white aged even less, showing median incomes only 2/3 of that of aged white couples.

In addition to a significant number of senior citizens with hearing impairment and reduced income to pay for needed health services, biologic aging also greatly influences and limits the mobility of the senior adult to seek what medical help is available. He can no longer view public transportation as a suitable answer because of poorly designed entrances and driving practices which frustrate the less than sure footed older American. He can no longer afford taxi service

which might be an acceptable alternative. He can no longer expect friends to drive him, nor his children, who are more often than not absent. He tends, therefore, to become more isolated and vulnerable to those services which are convenient: newspaper ads, mail order products, and door-to-door salesmen.

Because of the significant need for hearing services among the elderly, their reduced financial resources and mobility, a special program for the senior citizen was initiated two years ago at Portland State University. Project ARM (Auditory Rehabilitation Mobile) is a public service and training facility located at Portland State University in the Program of Speech and Hearing Science, Department of Speech. It serves three counties, at the hub of which is the Portland, Oregon metropolitan area.

The Project comprises an interdisciplinary team including staff members from the University Speech and Hearing Sciences Program, the Institute on Aging and the Department of Sociology. The primary functions of this team include: 1) identification and rehabilitation of auditorally-impaired elderly men and women; 2) development and initiation of specific intervention procedures appropriate for the hearing-impaired elderly; 3) assessment of the impact of this intervention on the lifestyles of older adults; and 4) investigation of social, economic, and psychological problems associated with physically and mentally debilitating forms and degrees of deafness.

The following report is an attempt to summarize the audiologic intervention procedures and to offer some suggestions which may be helpful to those who are or will be planning similar services.

INTERVENTION PROCEDURES

Scheduling

A typical week allows time for one day of screening, three days of mobile van testing, and one day of followup for meetings, staff reports and phone calls. It should be noted in Figure 1 that the hearing screening on any given Monday is at a senior adult center that the van will visit two weeks hence.

The van is driven to the testing site on a Tuesday morning and left until Friday afternoon, at which time it is driven back to the university. The van is available for testing patients 21 hours per week, which is also the maximum number of people the van can serve in a week. One hour is allotted for an audiologic assessment and one hour for a hearing aid evaluation.

Screening

Entrance into the Project's services is primarily through hearing screenings conducted at senior citizen centers. Since the hearing screening is probably the first exposure that the directors as well as the members of the senior adult centers have with audiology, it is considered very important. During initial program development it was assumed that adult centers would provide facilities, planning, and organization which would facilitate and augment the limited resources of the Project.

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1	Screen Site "C"	Van Test Site "A"	Van Test Site "A"	Follow-up	Van Test Site "A"
Week 2	Screen Site "D"	Van Test Site "B"	Van Test Site "B"	Follow-up	Van Test Site "B"
Week 3	Screen Site "E"	Van Test Site "C"	Van Test Site "C"	Follow-up	Van Test Site "C"
Week 4	Screen Site "F"	Van Test Site "D"	Van Test Site "D"	Follow-up	Van Test Site "D"
Week 5	Screen Site "G"	Van Test Site "E"	Van Test Site "E"	Follow-up	Van Test Site "E"

Figure 1. Van location and activity schedule.

These services were rarely provided. The screening procedure reported below reflects those aspects which have evolved and proven successful in our experience.

Initiating Service: Telephone and letter correspondence provides information concerning Project ARM services to the Senior Adult Center Directors. If audiology services are desired, dates are scheduled with approximately eight centers for the academic quarter. Written confirmation is sent to the Senior Center Directors starting date and time of the hearing screening, obligations for a successful turnout and future information concerning mobile van testing. A form is sent along with the confirmation letter providing information in outline for easy readability and appropriate for bulletin board placement for center volunteers.

The final schedule is given to the University Publicity Department which disseminates hearing screening information to local radio stations and newspapers. Announcements are made one week prior to the hearing screening. Project ARM disseminates information to Public Health Nurses, Welfare Departments and local or regional facilities for senior citizens.

Day of Hearing Screening: On the day of the hearing screening the examiners and students arrive approximately 1/2 hour early to quickly arrange testing areas and instruct volunteers, if any, in what is expected of them. The examiners also test their own hearing as a means of assessing the effects of ambient noise upon threshold measures. If normal thresholds are shifted by more than 5 dB, appropriate corrections are noted on the audiometer for the day's hearing screening.

At the senior adult outer registration desk, an intake form is provided for every person to fill out (Appendix). Because each person completes his own intake form, additional precautionary steps are taken. The legibility and correctness of name, address and phone number is checked. Information in the lefthand margin is not filled in by the client, as this will contain information to be coded for eventual computer storage. The abbreviated self-assessment of hearing problems is reviewed by routine questioning. These self-assessed difficulties influence final referral for a complete audiologic assessment on the mobile hearing van. The intake form is taken to the examining room by the client and quickly reviewed through further questioning by the examiner. At the end of the intake form is further information to be filled out by the tester assessing final qualification for the Project's services, since one of the purposes of the screening is appropriate referral to area agencies, i.e., Veterans Administration Hospital and private health insurance programs.

Pure tone air conduction threshold testing is administered bilaterally at 500, 1000, 2000, 3000 and 4000 Hz. The purpose of this threshold assessment as opposed to pass/fail criteria set at some arbitrary limit, such as 25 dB ISO, is to provide greater information relative to referral and counseling. Subsequent to the screening check

the results are reviewed and discussed with the patient and a hearing screening form is given to each person. If an otologic referral is recommended, the patient is requested first to contact his family physician, and if there is none, a list of address and phone numbers of all otologists in the Portland metropolitan area is provided along with appropriate University, private clinics and non-profit clinics. Finally, two additional "handouts" are presented to each person attending the hearing screening. The first is a series of 10 hints that each person can use when talking to a hard-of-hearing individual so that he might understand more clearly. The second was written by a student and consists of an explanation of Project ARM and a series of five common questions concerning hearing loss with the answers provided underneath each question. At the top of each "handout" is the name, address and phone number of the Project so that if any future questions or concerns arise, the client will have someone to contact.

Hearing Screening Follow-up: Results of the hearing screening are reviewed the next day and appointments are mailed to each person who will receive further mobile van testing, stating date, time and location. Within two to three days following the hearing screening a summary of the results is sent to the Director of the Senior Adult Center. This summary includes total number seen, age range, number with hearing losses greater than what one might expect for their age and the number referred for mobile van testing. On a separate sheet mailed along with the summary letter is a schedule of the van appointments. The director or volunteer at the adult center is expected to call each client a few days to a week in advance to minimize "no show" appointments.

Mobile Van

Specific data about the mobile van is as follows:

Truck:	GMC TE 5500 Tilt Model GVC 45,000 pounds automatic transmission power brakes power steering
Van	IAC Model 403-A CT-R examiner room (5.5'x6.5') IAC Model 403-A CT-R test suite (7.5'x6.5') test suites insulated from shell by 4 inches of foam
Overall dimensions:	25 feet long 13 feet high 8 feet wide
Gross Weight:	26,5000
Accessories	central air conditioning central heating electric elevator lift gate thermopane sliding glass door 65 gallon fuel tanks (twin)

Not including truck cab

The waiting and interviewing room provide a comfortable and relaxing environment. It is furnished with carpeting, drapes, paneling, desk and three chairs. A small built in cupboard provides space for hearing aids, ear mold impression equipment, space heaters, coffee and extra audiologic test forms.

The audiologic test room consists of all fixed furniture and equipment. These include: Grason Stadler 1701 diagnostic and research audiometer, swivel chair, two Krohnkite filters, frequency counter, Sony two channel tape recorder, electronic switch and a Grason Stadler Oto-admittance meter.

The client's test room contains an armchair, two fixed dual loudspeakers and a floor cabinet. Furniture that is not fixed to the floor in either the waiting or test room is fastened to the wall with elastic cords for traveling.

The outside steps and electrical power cords are stored in the waiting room during travel. This arrangement is most inconvenient and if a similar truck is obtained for diagnostic testing, it is recommended that collapsible steps be hung on the tailgate of the van and that the power cords be suspended on reels underneath the van.

Hearing Evaluation: Those scheduled for a hearing evaluation subsequent to the initial hearing screening, are routinely administered the following tests within a two hour time period. 1) A seven page in-depth interview covering demographic, health, hearing, and self-assessment information. 2) Audiologic assessment which routinely includes pure tone air conduction and bone conduction audiometry, SISI and tone decay at 1000 Hz and/or affected frequencies, speech reception threshold using the method described by Wilson, Morgan and Dirks (1973) and speech discrimination testing using the Campbell (1965) half-lists administered at a most comfortable listening level (MCL). Obvious exceptions to the above testing routine are taken when indicated, and masking, further speech discrimination testing and Bekesy audiometry can readily be added. 3) The hearing aid evaluation generally includes unaided sound field speech reception threshold, unaided sound field speech discrimination administered at an average conversational speech level of 50 dB HL, and aided speech discrimination administered at an average conversational speech level with the hearing aid set to a "comfortable" gain prior to formal speech testing. Again, obvious exceptions and changes are made to the preceding guidelines as dictated by the client's hearing impairment.

Each client contemplating a hearing aid or scheduled for a hearing aid evaluation on the mobile van is given the Better Business Bureau Consumer Information Series brochure entitled "Facts about Hearing Aids." (1973). It is a 14 page pamphlet restating much of

what is provided during the client's appointment, but continues further with descriptions of types of hearing loss, what to do if one is detected, discusses hearing aids, selection, cost contracts and guarantees, service and repairs, and hearing aid dealers.

Hearing aids used in the evaluation are limited to low cost aids; one body aid and two ear-level aids, all obtainable for less than \$100. These aids are supplemented by used and reconditioned aids donated to the Project by individuals and local hearing aid dealers.

To publicize the need for aids for the low income elderly, a University class in communication used this as a vehicle for a class project. They developed a "flyer," designed the layout and description of the project and its goals and need for hearing aids. These were disseminated by the class along with collection boxes to various service organizations and adult centers. The response to this endeavor generally has been disappointing.

Aural Rehabilitation

Aural rehabilitation involves hearing aid counseling, lipreading instruction and/or auditory training in group or individual sessions. The average time spent in aural rehabilitation has been approximately 5½ hours per individual. The mechanics for setting up the groups have involved various techniques. Some are set up by sending out letters to people selected from the screening results. Some are set up upon request and others are continuous, almost autonomous by now. One adult center for example, has sent out notices in their local newsletters and placed announcements on bulletin boards. Unfortunately, the slowest method (word of mouth) appears to be the most successful.

Suggestions for future aural rehabilitation scheduling would be to place notices in local papers. Any articles about the Project should definitely be used to advertise appropriate aural rehabilitation groups. Letters should be sent only one week in advance of the group meeting, because experience indicates that if they are sent out too far in advance many people lose the notice or forget.

Lipreading sessions stress a combined analytic-synthetic approach. Included in this plan have been visual drills, gross lipreading drill and discussions on the importance of using all environmental cues to anticipate speech. The first few sessions include an explanation of aural rehabilitation, discussion of tips for using residual hearing better, discussion of complaints each participant has about hearing impairment, an exchange of individual problems and counseling with regard to family problems. Concurrent with the aural rehabilitation sessions, individual audiologic needs are delineated, i.e., audiologic assessment, hearing aid evaluation, new earmolds and electroacoustic evaluation of the hearing aid.

Follow-up

Each person seen for an audiological assessment receives a case initiation number which reflects the date of his mobile van testing. At the end of each academic quarter a week is reserved to review all files with the numbers corresponding to the previous three months.

Follow-up is accomplished by calling and/or writing each client in order to assess whether the recommendations have been carried out. If not, the client is reminded of the pertinent recommendations and asked to contact the Project when each has been fulfilled. A note is made of those who need further follow-up and they are contacted on the day set aside each week for office work or reserved for the next quarter's week of file review.

Each phone call and action by the secretary, student, or supervising audiologist is recorded on a route sheet so that cumulative records are kept on each attempt to contact the client. Because of the number of students, faculty and staff participating in the Project, it is sometimes difficult to insure compliance with good record keeping practices. Nonetheless, as noted earlier by Kasten and Goldstein (1970), after two or three attempts to assure compliance with the recommendations with no positive results, it is the policy to consider that no more time can be expended on that individual unless it is an unusually significant case.

Because there is a reduced staff operating the Project during the summer months, relatively few new clients or hearing screenings are scheduled. Instead, the goal is to reserve time for data analysis, assimilation of all information obtained from the various university disciplines participating in the Project, and continued follow-up.

DISCUSSION

There are many problems associated with a new public service. Among the most significant problems that we have encountered are those of ignorance, money, and logistics. Some of these problems have been discussed by Kasten and Goldstein (1970) in a report on barriers to aural rehabilitation of the elderly. They continue to be most perplexing.

The most frequent forms of initial intervention for hearing loss were obtained by directly interviewing each individual during the screening process. Perhaps the most significant aspect of these results is that absence of any form of intervention most characterized the low-income hearing impaired. (Maurer, et. al., 1974). Nearly half of these individuals interviewed reported that they had never been contacted nor sought assistance for their hearing deficits. The most frequent form of initial intervention among the remaining individuals reportedly was performed by hearing aid salesmen.

Ignorance of the lay population to audiology services in general, and Project ARM in particular, is seen in many ways. Most often we are referred to as the "hearing aid people" and people come for "hearing aid tests" or "hearing aid checks." In most instances, the person does not wear a hearing aid but thinks of a hearing test and a hearing aid sale as synonymous. The hearing tests are often reported in the center newsletter as given by public health nurses. The misunderstanding probably arises because the public health nurse routinely administers blood pressure checks and is more visible to the director

and members than is the audiologist. Ignorance and misconception of audiology is also perpetrated by door-to-door salesmen who might reach an individual home before or after the hearing screening and allow his services to be thought of as those provided by Project ARM and audiologists. This has doubled the confusion of the individuals' ideas and created distrust as to who we really are and what we do.

Misconceptions fostered by friends and physicians regarding hearing aids are difficult to overcome. So often, initial instruction in hearing aid use and unrealistic expectations provide a situation where poor acceptability of amplification is the rule rather than the exception. Many physicians and hearing aid dealers must still be unaware of the benefits CROS fittings or vented molds can provide for sharply sloping audiometric configurations. Providing convincing evidence contradicting a doctor's statement can be quite involved. But even when benefits are obvious, money limits procurement of amplification.

CONCLUSIONS

In reflecting upon two years of service and approximately six months of mobile van operation, the following conclusions are drawn.

1. The extent of intervention that Project ARM has provided would not have been possible, with the present funding, without a college or university environment. The assistance from graduate students in audiology and speech pathology has been invaluable in multiplying the capabilities of the present staff. Other agencies should not contemplate similar mobile services if their concern is reaching a large number of people, unless the staff is nearly double that of Project ARM. Providing direct service to the senior adult at Project ARM is one secretary, two audiologists, one part time audiologist, five audiology and speech pathology students, one student research assistant and additional student clerical help.
2. It is the opinion of the senior author that the age of the urban mobile audiology clinic may have already come and passed. This is primarily due to both economical and ecological considerations. The present van or truck, which is not unusual in its gasoline consumption, gets approximately 3 to 3 1/2 miles to the gallon. This is untenable in the present, and will be in the future. This problem is not without solution, however, at least in the urban metropolitan area. The \$20,000 spent on a "stripped" truck, could provide a lot of transportation to an established audiology center or clinic. The vans of the future, then, could possibly be better used in more remote areas where there are no audiology services.
3. The single most effective and substantial contribution of Project ARM has been public education through the hearing screenings. The amount of time spent with each person during the hearing screenings has been an average of 10 minutes. This is still not enough time, however, to adequately answer all questions. The "handouts" are therefore used in a supple-

- mentary manner to support and reinforce comments made during the discussion and to provide each individual with a telephone number to call if future problems arise.
4. The best response to hearing screenings are those scheduled at senior adult centers where hot meals are served. The federally funded nutrition program in the Portland area is called *Loaves and Fishes*, perhaps by other names across the country. *Loaves and Fishes* routinely serves hot meals on Monday, Wednesdays and Fridays. It is most often located in church basements or parish houses, sometimes at established agencies such as the Salvation Army or low income housing projects, high rise buildings, and more rarely at store front "drop in" locations in areas with a heavy concentration of elderly. The meal program provides a "captive audience" for the hearing screening and a climate for socialization and participation in other activities prior to and following the hearing test.
 5. Last, and perhaps most important, the need for better professional publicity on what and who an audiologist is, and effective and renewed communication between the hearing aid dealers, audiologists and otologists remains of paramount importance. The struggle within audiology must continue in order to settle the hearing aid dispensing controversy. On the basis of Project ARM's experiences, one might consider a far-reaching provision within a comprehensive Health Care System that would provide dentures and glasses in addition to hearing aids. The senior citizen should be considered no less vulnerable than the child when considering ultimate hearing aid recommendations and audiologic management. They have been up to now, and most naively.

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APPENDIX
Intake Form

Screening Form:

Date _____

Site _____

Do Not Write
Below This Line

Card Cols.

1-4 _____

Client #

5 1 _____

Deck #

6-11 _____

Screening #

12 _____

13 _____

14-15 _____

16 _____

17 _____

18n _____

19-21 _____

22 _____

23 _____

24 _____

25 _____

26 _____

27 _____

28 _____

29 _____

30 _____

31 _____

32 _____

33 _____

34 _____

35 _____

Name: _____

Address: _____

Telephone: _____ Zip Code _____ County _____

What is your physician's name? _____
his city? _____

Race: 1. White 2. Black 3. Chicano 4. Oriental 5. American Indian

Sex: 1. Male 2. Female

Age in years _____

How did you learn about this service?

1. Newspaper 2. Radio 3. Television 4. Verbal (friend, relative)
5. Service Organization 6. Other (specify) _____

1. Own auto 2. Transportation program 3. Other's auto
4. Public transportation 5. Taxi 6. Walking

What type of work did you do most of your life? _____

What type of work did your spouse do? _____

Were you ever in the military? 1. No 2. Yes

If yes, what were your duties? _____

Did you work in noisy surroundings? 1. No 2. Yes

Was your avocation (hobby) noisy? 1. No 2. Yes

Is your monthly income from all sources more than \$225? 1. No 2. Yes

How many are supported on this income? 1 2 3 4 5 6 7 8 9

Have you ever seen a medical doctor about your ears? 1. No 2. Yes

Have you ever purchased a hearing aid? 1. No 2. Yes

Have you ever been contacted by, or have you ever contacted, a person who
sells hearing aids? 1. No 2. Yes

Can you hear when someone rings the doorbell or knocks on the door?
2. No 1. Yes

Can you carry on a telephone conversation without difficulty? 2. No 1. Yes

Can you hear when someone speaks in a whisper? 2. No 1. Yes

Can you carry on a conversation with one other person when you are in a
noisy place, such as a restaurant or at a party? 2. No 1. Yes

Do you feel that any difficulty with your hearing limits or hampers your
personal or social life? 1. No 2. Yes

Does any problem or difficulty with your hearing upset you at all?
1. No 2. Yes

Right ear

Left ear

36-37 _____

500 Hz.

44-45 _____

500 Hz.

38-39 _____

1000 Hz.

46-47 _____

1000 Hz.

40-41 _____

2000 Hz.

48-49 _____

2000 Hz.

42-43 _____

4000 Hz.

50-51 _____

4000 Hz.

52 _____

Referable audiological loss indicated?

1. No 2. Yes

53 _____

Income within permissible limits?

1. No 2. Yes

54 _____

Eligible for Kaiser testing?

1. Yes 2. No

V. A. testing?

1. Yes 2. No

55 _____

Able or willing to purchase aid? (specify which)

1. No 2. Yes

56 _____

Willing to submit to van testing?

1. No 2. Yes

57 _____

Indicate type of referral for this client?

1. Medical 2. Project ARM 3. Community 4. Audiological
5. Other 6. None

58 _____

Counseled: Interviewer — 1. No 2. Yes

Audiologist — 1. No 2. Yes

59 _____ RE 3000 Hz.

60 _____ LE 3000 Hz.