# THE HEARING-AID PROGRAM OF THE VETERANS ADMINISTRATION: TWENTY YEARS OF SERVICE

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#### INTRODUCTION

The Veterans Administration's interest in hearing aids began in response to a sharp increase in the number of veterans requiring hearing aids as a result of military service during World War II. Early in the postwar program, demands for service and the scarcity of professionally trained audiologists made it necessary for the VA to institute a program under which hearing-aid dealers provided instruments directly to the veteran. These aids were procured at a relatively high price. In addition, it became evident that the ever-present influence of salesmanship, and in many instances the dealers' lack of formal training, did not provide the quality of hearing-aid evaluation and rehabilitation desired for the treatment of hearing-impaired veterans.

In the early 1950's, the VA began to upgrade the quality of care for its hearing-handicapped veterans by requiring that hearing examinations and rehabilitative measures be conducted by persons trained at least to the master's degree level in audiology. Until its own system of clinics could be fully established, the VA contracted with university and hospital hearing centers in order to provide quality care for its eligible beneficiaries. Additionally, contracts for the direct procurement of hearing aids were negotiated with most of the manufacturers.

Since there were no established performance standards, the number of different makes and models that were represented in the inventory became so large as to be unwieldy and impractical from the point of view of good clinic management. A method was sought that would reduce the stock of hearing aids to a more realistic level, yet which did not do so on just an arbitrary basis. In 1955, a program was designed to enable the VA to procure, selectively, hearing aids having desirable performance characteristics while priced at a reasonable cost to the government. To assist and advise in establishing the criteria upon which to base test procedures and evaluation hearing aids, the VA appointed a group of consultants on hearing-aid performance. Members of this group where recognized authorities in the fields of audiology, electroacoustics, psychoacoustics, and electronics. This group, termed the Panel on Hearing Aid Performance, reviews and upgrades procedures periodically on the basis of new research and clinical findings.

### TEST AND SELECTION PROGRAM

Each year hearing-aid manufacturers are invited to participate in the program, and they receive a brochure which explains tests procedures in great detail. Hearing aids submitted by the manufacturers must meet the following requirements:

1. The instruments must be available to the general public through the manufacturer's dealers.

2. Only clinically acceptable hearing aids are considered. Clinical acceptability is based on physical characteristics as related to use in a clinical situation or use by the wearer. Such factors as exposed batteries, obscure or inaccessible controls, objectionable design features, etc. are examples of criteria utilized in making determination of clinical unacceptability.

3. All on-the-body-type hearing aids are required to have telephone pickup included as a component of the transmitter. The same requirement is made of ear-level hearing aids which fall into the moderate and strong power categories.

Each instrument is tested by the National Bureau of Standards under exacting conditions which have been specified in detail. Further measurement of aids with special characteristics is conducted by the Bio-Communications Laboratory at the University of Maryland. Analyses of these data are performed by the Auditory Research Laboratory, VA Hospital, Washington, D.C. The electroacoustic attributes of the hearing aids are assigned specific weightings based upon their importance, as determined currently by the hearing-aid consultant group. The weighted scores for the several characteristics have been summed to obtain an Index of Characteristics score that represents the performance of each hearing-aid model. This system provides the VA with quantitative data on which to base hearing-aid purchases.

To provide sufficient information on which to judge the performance characteristics of the specific model being evaluated, three sample hearing aids of each model are required for these measurements. These models may fall into one or more of the following categories: a. hearing aids adjusted to yield a 6 dB per octave rise (regular), b. hearing aids adjusted to yield minimum amplification below 1000 Hz and maximum amplification above 1000 Hz (high-pass), c. compression hearing aids, d. bone conduction eyeglass hearing aids, e. directional hearing aids, f. CROS (Contralateral Routing of Signals) hearing aids, and g. BICROS hearing aids. In addition, a manufacturer may submit a model for informal trials and clinical evaluation, if he believes it has advanced features or innovative improvements.

## NEW TWO-YEAR TEST ROTATION PROGRAM

Until this year, a manufacturer submitted a total of seven different models and specified into which of the above categories he wished them to be evaluated. As the testing and evaluation became more complex, the burden on the staffs of the Auditory Research Laboratory, the Sound Section of the National Bureau of Standards, and the BioCommunications Laboratory became such that reports were no longer timely and the costs were becoming prohibitive. In reviewing the records, it was revealed that once an aid was placed on contract, it tended to remain on contract for 2 or 3 years. Therefore, in order to save time and money a 2-year testing rotation program was begun. In the first year, hearing aids of the standard variety, body-worn and head-worn, were tested and selections for contract were made. These aids received a 2-year contract. In the following year, the special aids, i.e., high-pass, compression, CROS, BICROS, and directional, will be tested and selections for a 2-year contract made. The program will then rotate in such fashion every year. The number of aids to be tested will be cut approximately in half, and more in-depth electroacoustic measurements can be made.

Selection of hearing aids for contract is made from among those qualified hearing-aid models which: a. have the lowest cost per point of quality as obtained by dividing the determined cost to the VA by the Index of Characteristics score obtained as a result of the measurements, or b. may be deemed medically necessary to provide adequate hearing rehabilitation for deafened veterans without reference to their measurement results or cost per quality point, or c. have Index of Characteristics scores which are significantly better than the other hearing aids in their category, or d. may be deemed necessary for research purposes.

In order that manufacturers may benefit from the information obtained from exhaustive testing of their aids, such data are relayed to them within a few weeks of completion of the tests. A detailed technical compilation is prepared each year entitled, "Hearing Aid Performance Measurement." It is published by the Government Printing Office and may be purchased by engineers, audiologists, or other interested persons. Selected information is drawn from this book and put in a form that is meaningful to the general public. This latter pamphlet identifies hearing aids that score in the top 25 percent of their category. It is distributed by the VA Information Service and is furnished at no cost to those who request it.

Once the decision is made regarding the hearing aids to be placed on contract, stock levels are developed for the 45 Audiology and Speech Pathology Clinics which dispense hearing aids. Instruments are ordered from the manufacturers by the Hines Supply Depot in Illinois to stock these clinics and also to maintain a small supply of hearing aids at the depot. The manufacturer's information from the National Bureau of Standards and/or the BioCommunications Laboratory, University of Maryland, is sent to each clinic for the guidance of the staff.

In the first years of the program, all of the instruments were body-worn. Five instruments in each of three power categories—strong, moderate, and mild—were placed on contract. In succeeding years, eyeglass aids, behind-the-ear aids, and in-the-ear aids were obtained. To satisfy the requirements of hearing loss severity and configuration, occupation, and special physical requirements, many different hearing-aid models must be available to audiologists and the patients they serve.

In 1975 there were 33 different hearing-aid models in VA clinics. They were categorized by power ranges and special characteristics. In the strong power category there were four on-the-body aids; in the moderate power category there were five hearing aids of over-the-ear type and two eyeglass aids. In the mild power category, there were three over-the-ear aids, one eyeglass aid, and one all-in-the-ear aid.

In the special category, there were four CROS hearing aids. A CROS hearing aid has a receiver on one side and microphone on the opposite side; these were in eyeglasses. There were three BICROS hearing aids, also in eyeglasses. For the BICROS aid there is a receiver going to one ear and a microphone in each temple piece.

There were two body aids that were especially useful for the elderly. They were rather lightweight and have large controls with clearly visible markings. There were two hearing aids with directional properties. These amplify sounds occurring from in front of the individual and to a lesser degree sound occurring behind him. There were three high-pass hearing aids which mainly amplify the high frequencies.

Finally, there were two hearing aids with compression characteristics and one eyeglass bone conduction hearing aid. Compression hearing aids tend to maintain a constant output regardless of the level of the input signal in order to protect individuals who cannot tolerate loud sounds. Table 1 gives the number and percentage of each type of aid issued.

Even with the addition of special-feature hearing aids to clinic stocks, not all hearing-impaired veterans can be adequately aided from this stock for various reasons. Chiefly, the size of the clinic stock must be limited for practical considerations such as bookkeeping, storage room, instrument aging factors, maintenance of repair and replacement parts, etc.

Туре	No. of aids	% Total issue
On-the-body	2030	14.2
Over-the-ear	5197	36.5
Eyeglass regular	1522	10.7
Eyeglass BICROS	638	4.5
Eyeglass CROS	1898	13.3
High-pass	1061	7.4
In-the-ear	346	2.4
Directional	713	5.0
Compression	747	5.2
Bone-conduction eyeglass	102	.7
total	14,254	99.9

TABLE 1. - Aids Issued in Contract Year 1975 by the Veterans Administration

Therefore, the VA provides its audiologists two other avenues for obtaining the proper hearing aids for their patients. Upon request of the audiologist, many manufacturers agree to exchange or modify certain hearing-aid models already on contract so that a particular frequency response or other characteristic may be obtained. Frequently, there is no charge for this service. If no instrument currently in a clinic's stock provides adequate improvement for a patient, other aids not on contract may be procured from manufacturers or dealers, tested on the patient, and purchased.

The VA has 89 Audiology and Speech Pathology centers in the United States, of which 44 do not keep a stock of hearing aids. Our 45 audiology centers that handle hearing aids serve a geographic area which requires some amount of travel for veterans to obtain a hearing aid. However, most clinics accomplish the entire hearing-aid evaluation and all the accompanying services in one day. That one day typically includes travel time.

Some eligible veterans have disabilities that make it too difficult for them to travel to one of our regional audiology centers. In such cases, the audiologist at the VA center closest to the patient may provide the services and request the appropriate hearing aid from the clinic nearest him which does have hearing aids. Service can also be procured from a hearing and speech center close to the patient, or even directly from a hearing-aid dealer, at the discretion of the VA audiology clinic chief.

In 1975 VA Audiology and Speech Pathology clinics were staffed by 332 persons trained at the master's or doctoral level in hearing and speech sciences. Their background has included intensive academic preparation and relevant clinical practicum. Of this total staff, 191 possess the master's degree while 141 have doctoral degrees. Additionally, we have 238 audiology and speech pathology trainees working toward their graduate degrees. Only 95 of our regular staff and 65 trainees are directly involved in the hearing-aid portion of our communicative disorders program. In 1955 we had 20 persons involved with aural rehabilitation in seven VA clinics. Contracts with university and hospital hearing and speech clinics provided the remaining geographical coverage of the nation at that time.

The primary audiological endeavor in VA is to conduct examinations that serve diagnostic or compensation rating purposes. Approximately 25 percent of the overall audiology time and workload is assigned to hearing-aid-related duties. These activities include audiological evaluations, selection of hearing aids, auditory training, speech reading, and counseling in the use of a hearing aid. It should be recognized that the trainees are not viewed as part-time employees since they function in a student capacity.

As a matter of general information, I wish to emphasize that we regard our Audiology and Speech Pathology Program as an integral component of our medical system. This includes the hearing-aid evaluations which, as was noted earlier, consume a relatively small portion of the overall time devoted to communicative disorders. Regardless of hearing-aid evaluations, the bulk of our audiology and speech pathology staff, plant, and equipment would still be required for the diagnostic value and therapeutic advantages the program provides to thousands of veterans with speech, hearing, and language disorders.

The procedure for obtaining a hearing aid from the VA is simple. The veteran who is eligible for treatment of hearing disability applies for a hearing aid to the nearest VA facility. He is given an appointment for an otological examination followed by an audiological examination. Upon determining need for a hearing aid, a hearing-aid evaluation is conducted. When the veteran has been issued a particular hearing aid. the Hines Supply Depot is notified, and a replacement aid is sent immediately to the clinic. In addition, the Prosthetic Distribution Center in Denver is notified regarding the hearing aid issued. The veteran is given a 2-week supply of batteries when he receives his hearing aid from the clinic, and the Denver Prosthetic Distribution Center sends him a 90-day supply of batteries for that instrument and an order form. Later, when the veteran has only a 2-week supply left, he notifies the Prosthetic Distribution Center by the postcard order form, and another 90-day supply is provided him. In addition, he also receives from the Prosthetic Distribution Center a pre-addressed mailing carton with instructions relating to packaging of the hearing aid and sending it to the center any time it requires repair services. Minor repairs and maintenance services are completed at the center. The instrument needing factory repairs is sent to the manufacturer or other commercial facility. The repaired hearing aid is returned to the center to determine if it has been satisfactorily repaired before being sent to the veteran. For the hearing aids currently issued, manufacturers have provided the VA with a 2-year warranty.

In calendar year 1974 there were 16,655 repairs made by commercial resources: 5,494 repairs were of aids under warranty and, therefore, were repaired at no cost to the government. The remaining 11,161 repairs cost \$184,336 for an average cost of \$16.52. In calendar year 1974 the Prosthetic Distribution Center itself provided 3,596 repairs at a cost of \$27,140 (parts and labor) yielding an average cost per repair of \$7.55. In addition, 9,189 miscellaneous accessories were provided at a cost of \$6,478 yielding an average cost per accessory of \$0.70. Also, during calendar year 1974, 1,904,870 batteries were issued at a total cost of \$290,048. The average cost per battery was \$0.15.

Eligible veterans are routinely provided spare hearing aids to utilize when their regular hearing aid is sent in for repairs so that they will not be deprived of amplification. Ordinarily, the veteran who receives an initial hearing aid may return after 6 months for a second instrument. The first one issued then becomes his spare aid. Studies have shown that the majority of veterans retain their regular hearing aid for an average of 8 years before requesting a replacement. We attribute the long life of the hearing aid in our system to the immediate availability of a spare instrument when the regular aid ceases to function and also to the efficiency of our repair facility.

In the Spring of 1975 we reviewed the cost of the VA hearing-aid program. We found the average price of a hearing aid to be \$108. This figure represents the amount charged by the manufacturers plus the cost assignable to the National Bureau of Standards for the measurement of hearing-aid performance. Inasmuch as aural rehabilitation is usually accomplished on a group basis, the cost is relatively low and came to approximately \$7.00 per veteran. The salary costs related to audiological evaluation and hearing-aid selection are estimated at \$40. Hospital costs for each outpatient visit are \$30 on the average. The travel cost per patient, on an estimated basis of a 100 mile round trip at \$0.08 per mile, is \$8.00. The cost of an ear mold, including the impression, packaging, and handling, is \$12.00. At this time, then, we believe it costs the VA approximately \$205 to issue a hearing aid to one of its beneficiaries.

An independent government agency conducted an in-depth study of the costs of the hearing-aid program and found that their study indicated a cost of \$199.90 for each hearing aid issued. Inasmuch as the two studies obtained such similar results, we have confidence that our program is functioning efficiently and at a reasonable cost.

In Fiscal Year 1974, the VA issued 14,401 hearing aids. Of this amount 2,724 went to the military services, 578 went to other government agencies, and the remaining 11,099 went to VA beneficiaries. The VA issue represented a cost of 11,135,188. At the present time there are

74,000 hearing aids in our system being worn by 44,000 veterans. Not every veteran has requested a spare hearing aid just as some do not ask the VA to supply their batteries.

#### **RESEARCH AND DEVELOPMENT AIMS**

With regard to research and development in the area of hearing aids, the VA has provided support to two university programs identified with hearing-aid research, that at Northwestern University and at the University of Maryland. Northwestern University has pioneered in research on binaural hearing aids, the effect of distortion on speech intelligibility, and the efficacy of CROS hearing aids. At the University of Maryland the activities of the past 7 years have been primarily developmental in nature; i.e., the developing of a test procedure for measuring the effectiveness of directional hearing aids, investigation of methods of measuring and specifying intermodulation and transient distortion, the development of techniques for measuring the performance of compression hearing aids, and the measurement of hearing aids with the mannequin KEMAR and the Zwislocki coupler. These activities are reported to the American National Standards Institute Committee on Hearing Aids for their use in standards development and to the manufacturers for their information.

Recently, discussions were held regarding the desirability of a centralized hearing-aid research program which would bring in outside resources in engineering which heretofore have not been utilized. Hearing aids at the moment are simply amplifiers of signal. In the future we foresee that they will also become processors of information, rejecting that which distorts or competes with the speech signal.

In a different vein, the VA performs a helpful service by calling to the attention of the industry areas of needed effort. For example, in April 1975 the VA brought together representatives from the optical frame manufacturers and hearing-aid manufacturers in an effort to improve eyeglass hearing aids. We believe this meeting was of value to both industries, and we will strive to be of continued assistance when areas of difficulty are identified.

The most important thing we can provide a hearing-impaired veteran is a rehabilitation program, of which the hearing aid is a very critical part. The hearing aid must be one found to be suitable for his hearing loss and must be selected without bias from among the best aids available in the marketplace. Hearing disability is so common, but so little understood. It isolates people and deprives them of social, emotional, and financial well-being. We have tried to put forth our best efforts to provide rehabilitation for the hearing-impaired veteran and will continue to maintain what we feel to be an outstanding activity. In addition to the advantages outlined above, we place a premium on the fact that our hearing-aid program is clearly centered in a medical environment. This enables us to offer comprehensive health care rather than the fragmented dispensing of a prosthetic device. Our efforts have been favorably recognized by several congressional committees and by consumer organizations.