

Aural Rehabilitation For Individuals With High Frequency Hearing Loss

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Thank you,

I'm very pleased to have the opportunity to speak at the ARA Summer Institute. I will be presenting major portions of a paper entitled, "Aural Rehabilitation for Individuals with High Frequency Hearing Loss," written by Roy K. Sedge, Director of the Army Audiology & Speech Center, Walter Reed Army Medical Center. This paper will focus on Walter Reed's residential Aural Rehabilitation Program for hearing impaired adults. The characteristics of the existing program, as well as the highly individualized elements of a new, soon-to-be implemented program, will be discussed.

A survey of AR programs — both outpatient programs and residential programs suggests that the majority are oriented toward either the prelingually deaf or geriatric populations. As important as these two populations are, the vast majority of hearing impaired citizens in this country are young and middle-aged adults. If we eliminate individuals under age 18 and over age 60 from the prevalence estimates, a population of 9 to 12 million young and middle-aged hearing impaired adults exists in this country. IT is this age group — approximately 350 individuals per year — that participates in the one and a half week Aural Rehabilitation Program at Walter Reed Army Medical Center.

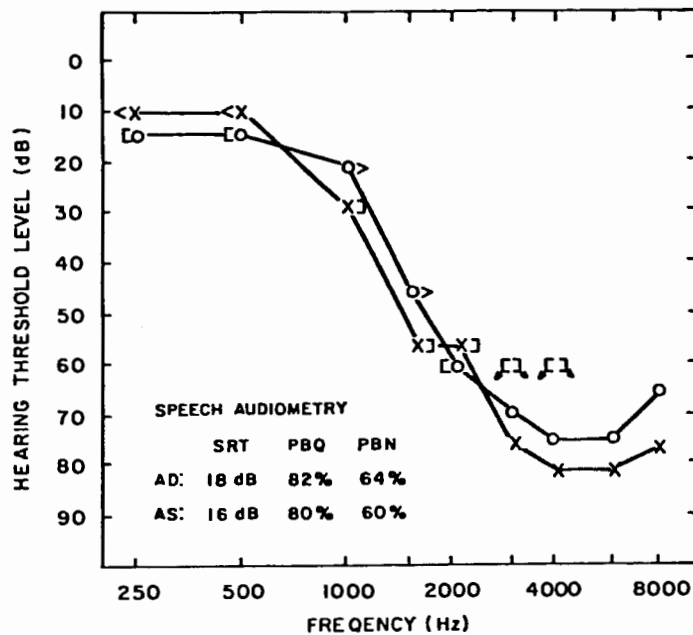
Our present program — which has undergone numerous modifications in the past 33 years — is unique in that it operates as

a one and a half week residential program. When soldiers are identified as hearing impaired, they become eligible for our service. If indicated, the soldier is sent to Walter Reed by a standard air evacuation procedure and admitted to the hospital. Once on our Ward, a hearing aid evaluation is performed and the patient is fitted with a hearing aid. They then attend aural rehabilitation classes in a group setting. Classroom sessions include a variety of topics such as hearing aid orientation, hearing conservation, telephone usage, explanation of audiological test procedures, anatomy and physiology of the ear, discussion of hearing disorders, speechreading, auditory training, outside listening activities, assertiveness training, and other counseling sessions both group and individual geared toward adjusting to the aid.

Although the group-oriented one and a half week program appears to result in a high rate of hearing aid use, it is felt that greater emphasis on individualized training in speechreading, auditory speech recognition and auditory-visual integration skills is desirable. In addition, greater emphasis on listener control of difficult communication situations and adjustment counseling appears warranted. Therefore, the Army Audiology & Speech Center has embarked on a major project to modify its residential aural rehabilitation program. The overall goal of this project is to provide more individualized communication-oriented therapy. The majority of the research which forms the basis for these program modifications was conducted by the Research Section of the Army Audiology & Speech Center. The new program is being implemented in stages at the present time. Further research and modification are required before the program can be considered fully implemented and in its final form.

Although it is likely that much of the new program could be successfully implemented in a variety of civilian clinical environments, it was designed specifically for Walter Reed's patient population and clinical environment. The majority of patients seen at the Army Audiology & Speech Center come from a relatively homogeneous patient population. First, they tend to be relatively young males. The mean age of soldiers attending the residential aural rehabilitation program is approximately 35 years. The range is approximately age 18 to age 50. Another relatively unique characteristic of the patient population is generally good speech reception thresholds. Most patients have speech reception thresholds better than 30 decibels hearing level. Consequently, these patients typically have normal speech and language. Even the more severe cases rarely have impaired speech production.

As a final distinguishing characteristic, the vast majority of the patients seen at the Army Audiology & Speech Center have noise-induced hearing losses. As a result, they typically have high-frequency losses, often with normal sensitivity in the low-to-mid frequencies. Errors in speech recognition tend to be concentrated in confusions of the high frequency, low-intensity consonants. Further, communication often may be impaired only in difficult listening situations such as in the presence of a competing signal or where the listener does not have the benefit of visual cues. Figure one shows audiometric data for a typical hearing-impaired adult seen at the Army Audiology & Speech Center.



1. Audiometric findings for an adult with a typical acquired sensorineural hearing loss.

Following the hearing evaluation and hearing aid fitting, a rehabilitation evaluation is administered. It is designed to measure the patient's ability for speech recognition, speech production, problem awareness and situation control, and possible adjustment problems related to the communication handicap.

Such an individual diagnostic evaluation of the patient's aural rehabilitative needs is essential. Research and clinical intuition make it clear that similar audiograms do not necessarily yield similar communication problems and, therefore, similar aural rehabilitative needs. The rehabilitation evaluation is directed toward measuring individual differences among subjects, thereby providing a basis for tailoring the rehabilitation to the patient's particular needs. The elements of this evaluation will be briefly discussed.

The speech recognition element of the rehabilitation evaluation consists of tests of auditory and visual consonant recognition as well as a test of audiovisual sentence recognition ability. Time limitations do not allow a detailed description of these tests. Briefly, the consonant recognition tests are intended to determine the nature of the patient's auditory confusions and the number of homophonous consonant groups that he can recognize visually. Of particular interest in these consonant tests is a determination of the degree of redundancy between the patient's auditory and visual confusion. This concept was discussed in detail by Walden and his colleagues in their 1974 paper. The consonant recognition tests provide insight into the patient's basic ability to extract information from the auditory and visual speech signal. Speech samples of such short duration, however, may provide limited insight into more general ability of patients to recognize speech under everyday listening conditions. The best single measure of the patient's everyday communication ability, therefore, is provided by an audiovisual sentence test presented in the presence of a competing talker babble.

The second element of the rehabilitation evaluation estimates the patient's speech production ability. Since most have normal speech production, frequently this consists of a rather quick screening test. For those patients suspected of having speech production problems, however, a thorough evaluation of the patient's articulation, loudness control, voice quality and use of prosodic features is administered by our Speech Pathology Section.

The third area covered in the rehabilitation evaluation is an assessment of problem awareness and situation control. Situation control refers to the patient's ability and willingness to change the listening environment in order to enhance communication. Such an assessment is particularly important with patients seen at the Army Audiology & Speech Center because their communication problems frequently are limited to certain difficult listening situations. The extent to which the patient can identify those environmental factors which make communication difficult, as well

as his assertiveness in affecting improvements in the listening environment, play a major role in determining the handicapping effect of his hearing impairment. Most patients are able to identify at least some of the environmental factors which create communication difficulties. Despite this, it is surprising how few routinely act to eliminate these impediments to effective communication.

The patient's problem awareness and ability to control the listening environment can be partially assessed through a patient interview. The results of such an interview can be supplemented by published questionnaire-type rating scales of communication handicap, such as the Denver Scale of Communication Function developed by Alpiner and his associates and Sander's Profile Questionnaires for Rating Communicative Performance.

The final element of the rehabilitation evaluation is an assessment of possible adjustment problems. An appraisal is made of the soldier's vocational, familial, social and emotional adjustment to the communication handicap. The degree of adjustment plays a critical role in determining both the degree of communication handicap and the patient's prognosis for rehabilitation. Again, some insight into the adjustment problems of the patient can be obtained via a patient interview supplemented by a self-assessment communication inventory.

During the assessment of possible adjustment problems, one of the critical questions to be asked is the extent to which the patient admits to a communication handicap. His willingness to admit to a communication problem seems to be highly related to his success in the program. The clinician also looks for evidence of maladaptive communication strategies. Often these take the form of overly aggressive or passive reactions to communication difficulties. The clinician also attempts to assess the particular needs and demands for accurate communication dictated by the patient's family, social and work environments. These factors will effect the nature and outcome of therapy.

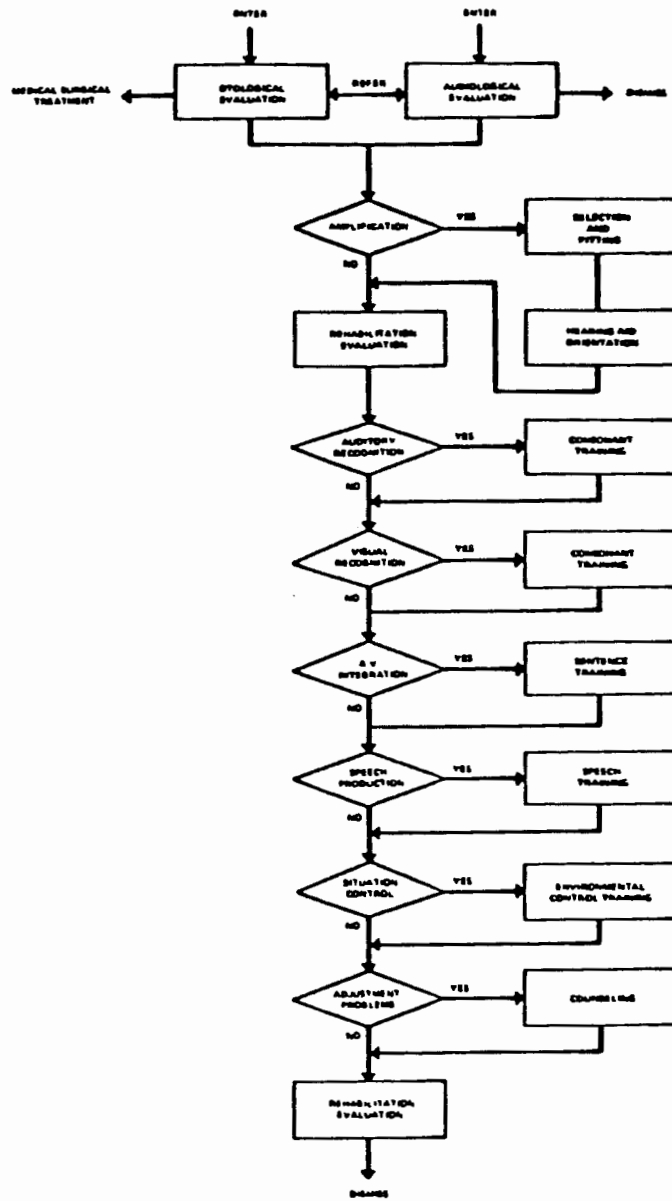
Typically, it is useful to discuss the results of the rehabilitation evaluation with the patient in some detail. This serves to assure the patient that the clinician understands the nature of his communication handicap. The clinician should outline the specific goals of therapy for the patient and, to the extent possible, suggest an appropriate time table for accomplishing these goals. By describing the nature of the communication problem and estimating the progress that may be accomplished by a concentrated individualized therapy program, the patient is more likely to enthusiastically enter into the therapeutic process. Each of the

elements of the rehabilitative program will now be briefly described.

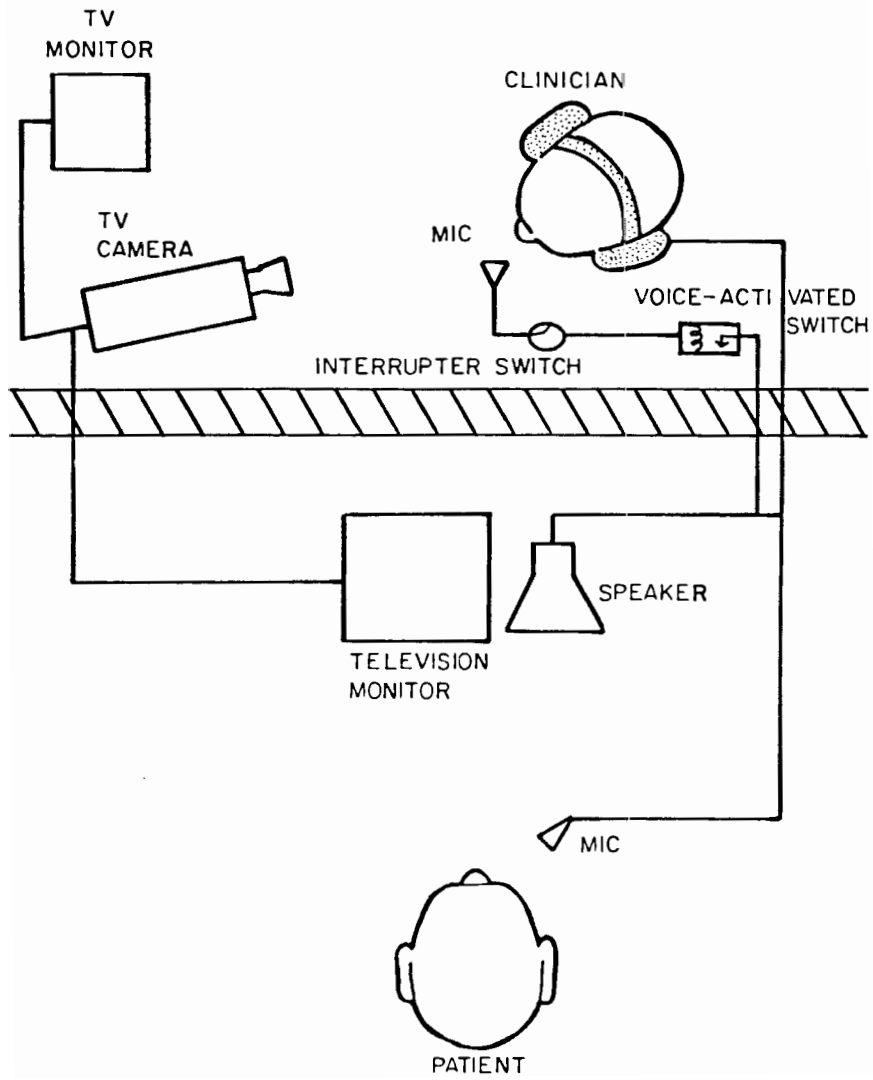
A flow chart summarizing the entire rehabilitation program is shown in Figure Two. It can be seen that the elements of the therapeutic program parallel the areas tested in the rehabilitation evaluation. The first element in this process is speech recognition training. The environment depicted in Figure Three has provided to be relatively ideal for providing the type of individualized training being administered at the Army Audiology & Speech Center. It is a two-room arrangement connected by a simple closed-circuit television system. The patient is in a different room from the audiologist but observes the clinician via the television system. The television monitor in the clinician's room is provided in order that the clinician maintain the correct position in reference to the camera. The clinician and patient are connected acoustically via a two-way calibrated sound system. Such an arrangement allows the clinician to present the auditory stimuli at calibrated levels and known signal-to-noise ratios. It also permits speechreading materials to be voiced normally without danger that the patient will hear the stimuli. Finally, it seems to appeal to the preoccupation that most people in our society have for watching television!

Much of the speech recognition training focuses on analytic auditory and visual consonant recognition. The consonants are presented for recognition and paired-comparison discrimination in varying vowel contexts and syllable positions. The fundamental training technique consists of one hundred percent immediate feedback of the correctness of each patient response with immediate repetition of all incorrect responses. Walden and his associates described these techniques in detail in their 1977 paper. Figures 4-7 show sample lessons for both visual and auditory analytic training. Recent data reported by Walden and Anderson suggest that both analytic auditory training and analytic lipreading training have a substantial positive effect on the auditory-visual sentence recognition ability of the hearing-impaired patients seen at Walter Reed. Specifically, they observed an improvement in auditory-visual sentence recognition ability of approximately 20% as a result of seven hours of either analytic auditory training or analytic lipreading training. Interestingly, there was little difference in average improvement between the patient group receiving the auditory training and the group receiving the lipreading training.

In addition to the auditory and visual consonant recognition training, auditory-visual sentence recognition training is also provided. Such training requires that the patient integrate his newly



2. Model aural rehabilitation program for the hearing-impaired adult.



learned skills of auditory and visual consonant recognition into the reception of more realistic speech messages. Some of this training is being conducted on an experimental basis at the Army Audiology & Speech Center with a voice-activated switch in the audio circuit. Using continuous speech as a stimulus, the switch allows the high intensity speech sounds to be transmitted to the patient, while not transmitting those sounds possession less energy. The switch is adjustable so that the patient's dependence on visual cues can be controlled. By adjusting the switch to transmit only the vowels and high intensity consonants, the patient is forced to rely on visual cues to identify the low intensity consonants. As training progresses, the patient is required to maintain acceptable auditory-visual speech recognition in the presence of increasingly degraded auditory signals. The effectiveness of this training was reported by Montgomery. An auditory-visual sentence recognition test was administered to a group of patients before and after eight hours of individual training on the voice-activated switch. The training was spread over a two-week period. He found that this training resulted in an 18% improvement in the ability of his patients to audiovisually recognize sentences presented in a background of noise.

The third element of the new program is situation control training. The goals of this phase of the program are to teach the patient to identify those environmental factors which make communication difficult, and to improve the communication environment when difficulty is encountered. This training is provided to patients in small groups. It includes lectures, demonstrations of various impediments to communication such as noise and visual distractions, and role playing to encourage situation control. Once confidence is gained within the clinic, these newly found skills are practiced outside the Center. Situation control training may be thought of as a type of assertiveness training, in that the patient is taught to assert himself in difficult listening situations. Many patients are hesitant to try to control listening situations because this frequently will require that they expose their hearing handicap. Further, they fear that people will be annoyed by frequent requests to talk louder, face the patient, turn down the radio, or move to a quieter environment. Through role playing and assignments outside of the clinic, patients gradually learn that most people are happy to make changes in their speaking habits or the listening environment to improve communication.

The period prior to and during which patients are seen for aural rehabilitation typically is a time of increased emotions. The hearing loss has progressed to the point where it can no longer be

EXERCISE #1

NAME _____

DATE _____

AUDITORY S/N = _____ VISUAL

VOWEL _____ CONSON. POS.: I M F

STIMULI:

b - bargain

r - robber

v - varnish

d - dollar

SAME/DIFFERENT

r - b _____

b - v _____

d - b _____

v - d _____

d - r _____

d - d _____

b - b _____

r - r _____

r - v _____

v - v _____

IDENTIFICATION

v _____

d _____

r _____¹

r _____

r _____

b _____

b _____

d _____

r _____

d _____

v _____

d _____

v _____

b _____

v _____

b _____

EXERCISE #28

NAME _____

DATE _____

AUDITORY S/N = _____ VISUAL

VOWEL _____ CONSON. POS.: I M F

STIMULI:

t - <u>t</u> opic	sh - <u>sh</u> opping
g - <u>g</u> olfer	b - <u>b</u> argain
th - <u>th</u> ought	n - <u>n</u> ot
s - <u>s</u> ocket	l - <u>l</u> arge

SAME/DIFFERENT

t - th _____	t - g _____	s - t _____	sh - t _____	t - n _____
g - g _____	th - th _____	sh - sh _____	s - s _____	b - b _____
n - l _____	l - sh _____	l - s _____	n - sh _____	n - s _____
th - s _____	g - s _____	sh - g _____	g - th _____	t - l _____
t - t _____	sh - sh _____	n - n _____	l - l _____	th - n _____
n - g _____	l - g _____	l - th _____	s - sh _____	b - th _____

IDENTIFICATION

b _____	s _____	g _____	l _____	t _____	n _____
sh _____	th _____	b _____	s _____	g _____	l _____
t _____	n _____	sh _____	th _____	b _____	s _____
g _____	l _____	t _____	n _____	sh _____	th _____
l _____	t _____	n _____	sh _____	th _____	b _____
	s _____				g _____

ignored by the patient. He is being asked to wear a hearing aid toward which he is likely to have an initially negative reaction. Further, he is being taught that he must not only admit his hearing handicap to others but attempt to control communication situations when he encounters difficulty. It is not surprising that many of these patients experience minor adjustment problems during this period.

Because of the potential for such problems, the final element of the rehabilitation program is adjustment counseling. Time is devoted to informal, individual and group discussions with the patient. Among the areas of personal adjustment which are explored are: acceptance of the hearing handicap; tense interpersonal relationships related to the communication handicap; maladaptive communication strategies; vocational problems related to the communication handicap; and the patient's general self-image as a hearing-impaired person.

Many aural rehabilitationists have not given sufficient attention to the patient's social, vocational and emotional problems adjusting to his communication handicap. It is not uncommon for such problems to prevent effective aural rehabilitation from taking place. Frequently, it is just such problems which cause the two most common failures of an aural rehabilitation program; that is, failure of the patient to keep his appointments and failure of the patient to wear his hearing aid.

Much can be gained in this counseling process by simply allowing the patient to express his feelings, by pointing out possible maladaptive communication strategies, and by suggesting methods of coping with the communication problem when problems are encountered. Frequently, considerable acceptance and understanding of the communication handicap is acquired simply by being with other patients who share the same problem. Occasionally, a patient will be encountered whose problems adjusting to the hearing loss are sufficiently serious that referral to a trained counselor is required. In such cases, it is often necessary that the counseling precede other elements of the rehabilitation program. Optimum rehabilitation of the patient requires that he be motivated and enthusiastically enter into the rehabilitative process.

At the conclusion of the one and half week program, the rehabilitation evaluation is readministered in order to determine the patient's progress. While a quantitative index of improvement is provided for speech recognition and speech production, improvement in situation control and adjustment to the communication handicap must be subjectively evaluated at the present time.

EXERCISE #2

NAME _____

DATE _____

AUDITORY S/N = _____ VISUAL _____

VOWEL _____ CONSON. POS.: I M F

STIMULI:

c - coffee

b - bargain

v - yarnish

y - yawn

SAME/DIFFERENT

c - v _____ v - y _____ v - v _____ y - y _____

y - b _____ b - b _____ b - c _____

c - c _____ y - c _____ v - b _____

IDENTIFICATION

y _____ v _____ c _____ v _____

c _____ y _____ v _____ y _____

v _____ c _____ b _____ b _____

b _____ b _____ y _____ c _____

Reed's new aural rehabilitation program, there are no objective data to demonstrate that the improvement measured in many of the patients at the conclusion of the eight day program is maintained on a long-term basis. Such documentation requires a follow-up evaluation of the patients several months after the completion of the program. Such follow-up is difficult with Army patients because they come from all over the world. Since much of the rehabilitation evaluation consists of recorded and written materials, a plan is presently being considered which would allow the Army audiologist at the patient's local Army post to obtain the required follow-up data.

To summarize, this report has focused on what the Army Audiology & Speech Center considers to be the state-of-the-art program for hearing-impaired soldiers. Until the program is fully implemented and additional clinical experience and research data obtained, the program must be considered experimental. Preliminary indications of the effectiveness of the program, however, are encouraging.

To review, the program has the following essential characteristics: first, it is a comprehensive program which focuses on the communication handicap rather than simply on the hearing loss; second, much of the therapy is individualized to the patient's particular rehabilitative needs; third, the program is designed to provide short-term, concentrated therapy in a residential setting, although it probably could be adapted to a more traditional approach; and finally, the program is relatively quantitative, allowing for objective measurement of patient progress.

The field of audiology has made tremendous progress in recent years in the ability to identify and explain auditory pathology. As valuable as is this contribution, it may have led to a rather restricted view of hearing loss and the field of audiology in general. Aural rehabilitation must begin to occupy a larger and larger percentage of the practicing audiologist's time. Further, hearing loss and aural rehabilitation must be viewed within the broader context of communication problems. The handicapping effect of a hearing impairment is influenced by a wide variety of factors. By identifying these factors through an appropriate diagnostic evaluation and tailoring the patient's aural rehabilitation on the basis of these diagnostic results, audiologists at the Army Audiology & Speech Center hope patients will achieve their maximum potential for effective communication.