Follow-Up Survey of New Hearing Aid Users

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A follow-up survey of patients who were fitted for amplification and received a brief hearing aid orientation was conducted over a two year period at Walter Reed Army Medical Center. Subjects were adults with predominantly adventitious mild-to-moderate hearing losses. An analysis of 377 patients' responses showed that: (a) the type of aid issued was almost exclusively a monaural, ear level instrument (94%), consistent with the trend away from CROS/BICROS fittings; (b) 91% of the patients rated their aids as satisfactory or excellent and reported a mean of 11.9 hours of use daily; (c) ratings of satisfaction in selected listening environments were consistently higher for quiet as opposed to noisy conditions, although audiometric data showed that the aids provided a mean of 25% improvement in speech discrimination in noise; (d) there appeared to be little relationship between ratings of user satisfaction and severity of hearing loss or improvement in noise; and (e) frequency of follow-up requirements was judged to be significant but not excessive since 32.6% of the patients required additional assistance.

A common intention of hearing aid fitting procedures is to select an amplification system that will maximize a patient's communicative functioning under everyday listening situations. Often implicit in its intention, albeit not explicit, is that the tests used to evaluate patient performance with amplification have at least some degree of predictive validity. Unfortunately, research conducted to measure success with amplification outside of the clinical arena is sparse. Yet, at a recent conference on research needs in amplification, validation of hearing aid success was identified as the most

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pressing need. According to Walden (in press), "Since the validation criterion is performance in everyday living, we need to know how much benefit can be expected from amplification, in what specific communication situations significant benefit will be obtained, and the characteristics of patients who benefit most from a hearing aid."

One approach to obtaining such information is the use of self-assessment inventories of hearing aid use, benefit, and success. Here, the patients are queried following a trial period with amplification as to the subjective benefit provided by the instrument under a variety of listening conditions, as well as their opinions regarding the overall performance of the hearing aid.

Ewertsen (1974) reported on the frequency of hearing aid use in relation to age, gender, diagnosis, and severity of hearing loss for 1,006 patients receiving free hearing aids from the Danish Health Centre. He found that the frequency of hearing aid use increased in proportion to degree of sensitivity loss. He noted further, however, that those with conductive pathology used their instruments more often than those with cochlear hearing loss and that there was no substantial decline in the use of amplification with increasing age.

In a follow up study with 47 new hearing aid users, Jerger and Hayes (1976) showed no definitive relationship between speech reception threshold (SRT) or word recognition score (WRS) and user satisfaction. In dissonance with Ewertsen (1974), Jerger and Hayes found that dissatisfaction with a hearing aid varied as a function of the age of the user.

During the past several years the Army Audiology and Speech Center has surveyed the hearing aid usage patterns of persons receiving hearing aid orientation. Surr, Schuchman and Montgomery (1978) analyzed the responses of 430 persons who were issued hearing aids at the Army Audiology and Speech Center, Walter Reed Army Medical Center (WRAMC). Frequency of hearing aid use was calculated as a function of the patients' age, audiometric data, and hearing aid evaluation data. Moreover, responses were evaluated according to type of hearing aid fitting and the length of post-fitting training.

Surr et al. (1978) reported that overall hearing aid use did not vary substantially as a function of the type of instrument issued. Consistent with the findings of Ewertsen (1974), frequency of hearing aid use increased as a function of hearing loss for speech; however, in disagreement with Ewertsen (1974) and Kapteyn (1977), there was an inverse relationship between age and frequency of use. That is, patients above the age of 50 years wore their aids less often than their younger counterparts.

Of particular interest in the Surr et al. (1978) study was the finding that patients enrolled in the long auditory rehabilitation program wore their aids more often than those receiving only a brief (1½ hour) orientation period even when age difference between the two groups was accounted for in the data analysis.

Hepler, Walden and Wang (1981) constructed a 64-item bipolar questionnaire to assess the effectiveness of amplification under typical daily listening conditions. One hundred twenty-nine hearing aid users from the Army Audiology and Speech Center, WRAMC, and Purdue University Hearing and Speech Center were asked to rate the benefit provided by their instrument in each of the 64 listening situations on a rating scale ranging from "very helpful" to "hinders performance". In addition, Hepler et al. analyzed the obtained scale scores with regard to several patient factors such as age, years of hearing aid use, frequency of hearing aid use, marital status, educational level, audiometric variables, and whether the patient received any post-fitting aural rehabilitation. They found that greater benefit with amplification was derived for younger patients who wore their aids for the majority of the day and whose audiogram was characterized by sensitivity loss across the frequency range. These results are consistent with those of Surr et al. (1978). Hepler et al. also summarized those listening environments that were most conducive to improvement in listening with amplification.

In this study results of a survey of older, predominantly retired patients who had undergone a brief, two-hour hearing aid orientation following fitting with amplification are presented. This population differs substantially from the groups of active duty soldiers who participate in an intensive ten-day residential program of aural rehabilitation at the Audiology and Speech Center, Walter Reed Army Medical Center.

METHOD

Subjects

Table 1 presents a description of the population studied. The mean age was 61 years with a range from 38 to 85 years, as compared to a mean of 47 years for the Surr et al. (1978) study. The mean pure tone average and speech reception threshold under earphones was 30 dB HL and 23 dB HL respectively. The audiograms of these patients were characterized by predominantly high frequency sensitivity loss above 1000 Hz as evidenced by an average slope of 46 dB between 1000 and 4000 Hz. Of particular interest was that the mean improvement in monosyllabic word recognition in noise permitted by the hearing aid was 25% with a range from 0-72%.

Data Analysis

A hearing aid questionnaire developed by the Walter Reed Aural Rehabilitation staff was used to query the patients' satisfaction with amplification under a variety of common listening conditions and environments. Data obtained from 377 respondants were entered into a computer and later cross-tabulated with several audiometric variables including pure tone

Table 1

Audiometric Profile of the Sample Surveyed
(The Different N's Reflect the Fact that Complete
Audiometric Information was not Available for All Patients)

	Age	PTA	Slope (1k-4k HZ)	SRT	SDS	Aided Improvement
N	200	194	194	191	189	97
Mean	61.3 yrs.	30 dB	46 dB	23 dB	82%	25%
S.D.	9.0 yrs.	12 dB	21 dB	13 dB	16%	15%
Range	38-85 yrs.	2-63 dB	0-90 dB	0-64 dB	12-100%	0-72%

average, speech recognition threshold and aided improvement on a monosyllabic word list in the presence of background noise.

RESULTS AND DISCUSSION

Table 2 presents the type of hearing aids used by 374 subjects surveyed. The numbers in parentheses represents those data reported by Surr et al. (1978) for their sample of 409 listeners. There is substantial change in fitting trends between the two studies. Whereas 353 subjects (94% of the present sample) wore monaural ear-level instruments, only 64.5% of those in the Surr et al. study were fitted with that type of hearing aid. Further, the percentage of CROS/BICROS fittings was reduced from 30% to a low of only 4% in the present study. This reflects the changes that have occurred in our current ability to reduce low-frequency response of a hearing aid electroacoustically versus using a CROS-type instrument to achieve a similar result.

In contrast, patients who attend the intensive residential program show a much higher percentage of binaural ear-level fittings than those who attend the two-hour orientation as in the present survey. However, patients in the present study may be considered for binaural amplification if a need is indicated at the time of the follow-up survey.

Table 2

Type of Hearing Aid Configuration Used by 374 Subjects

	N	%
Post Auricular	353 (264)[a,b]	94.0 (64.5)
In-the-Ear	7 (-)	2.0 (-)
CROS/BICROS	14 (124)[b]	4.0 (30.3)

[a]Includes IROS
[b]Numbers are from Surr et al. (1978)

Table 3 shows the distribution of performance ratings for each of seven listening environments. In the four relatively quiet environments (church, restaurant, general quiet setting, and TV), the vast majority of ratings were satisfactory, especially if the "not applicable" category is excluded. In the three noisy situations (noisy setting, party and meeting), however, the aids were rated somewhat helpful slightly more often than satisfactory, but as one would expect,were considered less satisfactory than when listening in quiet. That is, only 25% rated the aid satisfactory in a noisy setting as compared to 89% in a quiet environment. The apparent paradox is that performance on the clinical hearing aid evaluation suggests that relatively little benefit should be obtained in a quiet listening situation, whereas considerable profit should be gained when listening in a background of noise. These hearing aid users are not making judgments on the relative contribution of the aid to intelligibility (which is much greater in noise), but on absolute intelligibility, which is still higher in quiet. In addition, amplified listening in noise may be annoying or stressful, and that undoubtedly influenced the judgments as well.

Table 3

Distribution of Performance Rating for Each of Seven Listening Environments (Data are Percentages Based on N=377)

	Satisfactory (%)	Somewhat Helpful (%)	Little Or No Use (%)	N/A (%)
Quiet Setting	89	6	1	4
Church/Lecture	67	15	2	16
T.V.	85	11	1	3
Restaurant	65	23	5	7
Noisy Setting	25	42	27	6
Party	38	46	11	5
Meeting	45	39	7	9

The relationships between several audiologic variables and performance rating for hearing aid satisfaction are presented in Tables 4 and 5. Table 4 contains the cross tabulation between the pure tone average (500-2000 Hz) and hearing aid performance rating. The majority of listeners rated their hearing aid performance as excellent or satisfactory regardless of degree of pure tone sensitivity loss. Only 14 (7.2%) of the 194 patients surveyed found the hearing aid only somewhat helpful. Significantly, no one reported that amplification was of little or no benefit. The relationship between speech reception threshold and performance rating is presented in Table 5. As would be predicted from the data shown in Table 4, the

majority of patients found their aids to be of considerable benefit regardless of SRT, with a slightly greater percentage of responders with an SRT of 20 dB or better reporting excellent performance from their instruments than the other categories of speech reception threshold. However, if the excellent and satisfactory categories are combined, the group with an SRT of 20-40 dB showed the highest percentage. Here again, no one reported his amplification system to be of little or no use.

Table 4

Relationship Between Pure Tone Average and Hearing Aid Performance Rating for Subjects (N = 194)

	Performance Rating				
PTA in dB	**Excellent**	**Satisfactory**	**Somewhat Helpful**	**Of Little Or No Use**	**Total**
<20	21 (53.8%)	14 (35.9%)	4 (10.3%)	0	39
20-40	66 (52.8%)	52 (41.6%)	7 (5.6%)	0	125
40-60	12 (42.9%)	13 (46.4%)	3 (10.7%)	0	28
>60	2 (100%)	0	0	0	2
	101 (52.1%)	79 (40.7%)	14 (7.2%)	0	194

Table 5

Relationship Between Speech Reception Threshold and Hearing Aid Performance Rating (N = 191)

	Performance Rating				
SRT in dB	**Excellent**	**Satisfactory**	**Somewhat Helpful**	**Of Little Or No Help**	**Total**
<20	50 (54.3%)	34 (37.0%)	8 (8.7%)	0	92
20-40	43 (50.0%)	39 (45.3%)	4 (4.7%)	0	86
>40	6 (46.2%)	5 (38.5%)	2 (15.4%)	0	13
	99 (46.6%)	78 (40.8%)	14 (12.6%)	0	191

Table 6 summarizes the relationship between aided improvement in monosyllabic word recognition in noise and performance rating. Here, those responding the most in the "excellent" category were individuals who achieved 10-20% improvement in word recognition score, although over 50% of the listeners stated that the aid performed excellently across all categories of aided improvement. Only eight, or approximately 8% found the aid only somewhat helpful, and no one reported no benefit from amplification.

Table 6

Relationship Between Aided Improvement in Monosyllabic Word Identification in Noise and Hearing Aid Performance Rating (N = 97)

	Performance Rating				
% Of Aided Improvement	Excellent	Satisfactory	Somewhat Helpful	Of Little Or No Use	Total
<10	7 (43.8%)	5 (31.2%)	4 (25.0%)	0	16
10-20	20 (71.4%)	7 (25.0%)	1 (3.6%)	0	28
20-30	16 (51.6%)	12 (38.7%)	3 (9.7%)	0	31
>30	10 (45.5%)	12 (54.5%)	0 (0.0%)	0	22
	53 (54.6%)	36 (37.1%)	8 (8.2%)	0	97

A summary of the overall satisfaction of hearing aid use by the 377 patients queried is shown in Table 7. The majority of patients were highly satisfied, with 51% rating the aid as excellent and 91% as at least satisfactory. Significantly, only 1% of the patients reported receiving little or no benefit from amplification. In addition, answers to other questions on the survey indicated that most of the patients used their aids approximately 12 hours per day; four hours at work, six hours at home and two hours social and other use. They did not experience many adjustment problems except for occasional acoustic feedback reported by 10% of the respondants. Of the almost two-thirds of the patients that use the telephone regularly, 85% were satisfied with amplified telephone listening.

In the study by Surr et al. (1978), the patients who received a brief orientation were virtually identical as a group to the population sampled in the present study with respect to age, retirement status, degree and type of loss, audiometric configuration, and other demographic characteristics. However, in that survey, only 64% of those patients reported more than half-time use. These results appear to be inconsistent with the present study where a mean of 11.9 hours of use was reported. A direct comparison between the two studies is difficult to make, however, since half-time use was not explicitly defined in the present study.

Also, 254 of 377 respondants (67.4%) required no follow-up assistance in using their hearing aid. The remaining 32.6% experienced only minor problems such as earmold discomfort or feedback. While 32.6% represents a clinically significant proportion requiring additional help, the nature of the problems and the modest clinician time required to correct those problems suggest that follow-up assistance is not a serious clinical concern.

To summarize, the picture emerges of a group of 377 patients who use their post-auricular hearing aids extensively in a variety of listening environments and who report few problems with aid use in general and telephone

Table 7
Overall Satisfaction of Hearing Aid Use by 377 Patients Surveyed

	N	%
Excellent	193	51
Satisfactory	151	40
Somewhat Helpful	31	8
Of Little Or No Use	2	1

use in particular. They continue to have their greatest difficulty listening in noisy and group situations but are basically well satisfied with their fittings.

These results allow us to counsel our patients that it is very likely they will be satisfied with their aids after a period of use, despite any initial adjustment difficulties they may experience. In addition, this survey reinforces our emphasis on preparing patients for less than perfect performance in noise and encourages us to devote more time to that aspect of hearing aid adjustment. Finally, the distribution of problems that require follow-up is useful information both for advising patients as to what problems are likely to arise and for allocating staff time to resolve these problems when they occur.

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