Responses to a Hearing Problem Inventory

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Responses to a self-administered Hearing Problem Inventory containing 51 items were obtained from 329 patients prior to and after a program of hearing aid counseling, training in coping with communication problems, hearing aid fitting, and maximizing hearing aid benefit. The effects of experience, hearing loss, age, and employment on problem severity scores and hours of hearing aid use were examined. Comparisons of PRE and POST data showed reductions in problems reported and increases in wear time. Experience in wearing a hearing aid had a large effect on problem scores and reported wear time. Hearing loss also had a substantial effect on problem severity and hours of use, especially for the inexperienced users. Age effects were small, but employment was higher among experienced users. The relationship between problem severity and hours of use was found to be complex. Nonhearing-loss factors were shown to have a larger effect on problem scores and wear time than the amount of hearing loss. Rehabilitation strategies should focus on reduction of problems which interfere with maximum aid wear, not on acoustical matching of hearing aids to hearing loss.

A number of hearing problem inventories or hearing performance scales have been published in the last several decades. Although there are major differences in design and content, the questionnaires of High, Fairbanks, and Glorig (1964); Noble and Atherley (1970); Ewertsen and Birk-Nielsen (1973); Alpiner, Chevrette, Glascoe, Metz, and Olsen (1975); Kapteyn (1977a,b); and Giolas, Owens, Lamb, and Schubert (1979) have been used by a number of clinicians to facilitate or evaluate some aspect of the aural rehabilitation process. In a similar vein, clinicians at this facility have had access since 1973 to questionnaires completed by patients prior to the hearing aid fitting and counseling process (PRE) and again after patients had been wearing their aids for a short time (POST).

This report will examine some factors which appear to influence both the patient's responses on problem/performance/satisfaction questionnaires and also the amount of time the patient wears his aid. Many of the 51 items which comprise this particular Hearing Problem Inventory (HPI: 1976 version) appear on other scales. Topics include: (a) emotional reactions to the hearing loss; (b) the effect of impairment on everyday activities; (c) signal and environmental influences on the communicative process; (d) the use of visual cues;

and (e) use, fit, and care of the hearing aid. Data from earlier versions of the HPI suggested that responses were influenced largely by the patient's set towards and/or ability to cope with his hearing loss. Next in importance appeared to be the amount of hearing loss, followed by the patient's experience as a hearing aid user. The age of the patient and whether he was employed appeared to have little, if any, influence.

PROCEDURE

The data for this report were made available from HPIs (1976 version) filled out by patients who received hearing aids between February 1977 and April 1978. The PRE HPI was completed before the patient was seen for hearing aid evaluation and associated services; the POST HPI was mailed to each patient approximately six weeks after his aid had been fitted. All HPIs from patients seen during the time frame were included in the analysis if: (a) the patient was fitted with a hearing aid, and (b) s/he completed identical forms of the PRE and POST HPI. The number of patients meeting these two criteria totaled 329. In addition, 138 patients completed the PRE and were fitted with aids but did not return the POST. Thus, the data to be reported constitute 70.4% of the sample population. This return rate is similar to that reported by Surr, Schuchman, and Montgomery (1978) for military personnel but lower than the 93% return rate of Kasden and Robinson (1971).

The HPI from which these data were compiled was a five-page form containing 51 items, 50 of which were statements with each statement followed by a set of multiple-choice responses. Forty-two of the fifty response sets concerned frequency of occurrence of the problem. If the patient selected the "Almost never a problem" response, his choice was coded as a zero problem after Weed (1969). If the patient selected the "Almost always a problem" response, his choice was coded as a four. If no response was selected, a dash was entered; this code was not entered into the data pool. The remaining item, which asked the patient to record the number of hours the hearing aid was worn each day, was not coded. A set of rules was devised for processing and scoring by temporary, part-time personnel. The HPI score for each patient was obtained by summing the coded item scores, subtracting the number of hours worn, and dividing by the number of responses.

After the HPIs had been processed for use by the clinician, the patients' data were inserted into a three-way matrix, which consisted of five hearing-loss categories, four age groups, and two hearing aid experiential groups. The five hearing-loss categories were based on Goodman (1965) and the air conduction average of 500, 1000, and 2000 Hz in the better ear was used. The boundaries of the four age groups were determined by two factors: (a) the age distribution of the VA population and (b) research by Hutton (1960) which showed an age influence on aural rehabilitation. Patients were also grouped

as to whether they were receiving initial aids or replacement aids. Within each of these experiential groups, PRE and POST data were entered in separate cells.

The categorizing process described above produced 80 cells into which the data from individual patients were entered. In the analyses which follow, the data were pooled and rearranged within four large groups: (a) the PRE data from patients receiving initial fittings, (b) the POST data for those receiving initial fittings, (c) the PRE data for those receiving replacement fittings, and (d) the POST data for those receiving replacement fittings. Only the data within these four groups were pooled and rearranged.

RESULTS

Descriptive Data

In order to examine the effect of hearing loss within each of the four main data groups (initial, replacement, PRE, POST), the data within each of the five hearing-loss categories were pooled. The reduction from 80 cells to 20 cells of patient data was necessitated by the small amount of data in some of the original 80 cells. The resulting data are presented in Table 1. In the upper part of this table are presented median data for hearing loss, a live-voice W-22 discrimination score, and age for each hearing-loss category. Medians were used because of the skew of many of the distributions. Also shown in this table are the PRE and POST 25th, 50th, and 75th percentiles on the HPIs for patients who received their initial aids and for experienced users who received replacement aids. All of the 160 patients who received their first hearing aids were males; of the 169 experienced users who received replacement aids, 167 were males.

As a consequence of the research design, the medians for hearing loss are seen to increase progressively in each experiential group from slight to severe-profound. The age medians, however, are relatively constant and thus do not interact with these hearing loss data. Comparison of the medians of the two experiential groups discloses no trends and reveals only minor differences in hearing loss, discrimination score, or age between the two groups. These characteristics of the descriptive data enable us to examine the effects of a number of variables on patients' responses to the inventory questions.

Hearing Loss and Aid Experience

Examination of the median HPI data of the two patient groups across the five hearing-loss categories in Table 1 reveals the influence of hearing loss on self-rated problems. Looking first at the initial fitting PRE scores, we see that the medians increase from 2.0 to 2.8 as median hearing loss increases from 22 dB to 83 dB. The POST medians for these same patients after they had been wearing aids for about two months display: (a) decreases in hearing problems

Table 1

Hearing Problem Inventory scores and descriptive data for 160 patients receiving
their initial hearing aid and 169 patients receiving a replacement
aid; all descriptive values are medians

Variables		I Slight	II Mild	III Moderate	IV Moderately Severe	V Severe- Profound
				Hearing Loss Category		
Initial Fittings						
Hearing loss (dB)		22	33	47	65	83
Discrimination (W-22)		96%	92%	88%	75%	56%
Age in Years		52	59	61	62	63
N		55	55	35	12	3
HPI Scores	75%	2.4	2.5	2.6	3.0	
PRE	50%	2.0	2.1	2.3	2.7	2.8
	25%	1.8	1.8	2.0	2.5	
HPI Scores	75%	1.9	2.0	1.9	2.0	
POST	50%	1.5	1.6	1.3	1.9	2.1
	25%	1.1	1.1	0.9	1.6	
Replacement Fittings						
Hearing Loss (dB)		19	35	48	62	78
Discrimination (W-22)		96%	92%	92%	89%	56%
Age in Years		55	57	56	57	57
N		18	39	50	45	17
HPI Scores	75%	2.0	2.2	2.2	2.3	2.0
PRE	50%	1.4	1.8	1.9	1.8	1.5
	25%	1.1	1.5	1.7	1.5	1.1
HPI Scores	75%	1.8	1.8	1.8	1.9	1.9
POST	50%	1.4	1.3	1.6	1.5	1.4
	25%	1.1	1.0	1.3	1.3	0.9

The PRE-POST HPI differences are significant at the .001 level (Sign Test) for both experience groups.

throughout the hearing-loss categories and (b) somewhat larger decreases in the moderate and severe-profound hearing-loss categories. Since the reduction of problems for these patients is greater as hearing loss increases, the influence of hearing loss on their problem ratings is diminished after their initial fittings.

For the patients receiving replacement fittings, the influence of hearing loss is further diminished. The PRE median HPI scores for these experienced hearing aid users show a moderate increase and then a decrease in problems as hearing loss goes from slight to severe-profound. The POST medians for these patients display no increase with hearing loss, a result which was not anticipated. Rather, we expected that the resultant curve would be less steep than that for the inexperienced users but greater than zero. High et al. (1964)

reported that 30% of their patients were experienced users; however, they did not report any differences in slope of impairment ratings between the experienced and inexperienced users. The data in the present study show a progressive decrease in slope of problems attributable to hearing loss. The steepest slope represents the inexperienced, unfitted patients, followed by a lesser slope for the newly fitted patients, followed by an essentially flat curve for the experienced users. The median data for the POST replacement fittings indicate that the influence of hearing loss on patients' ratings was completely counterbalanced by experience.

The fact that amount of hearing loss exhibits minimal influence on the POST responses of patients receiving replacement aids may be due to insensitivity of the HPI (1976) to the problems of experienced hearing aid users. However, it also may reflect many years of successful experience with a hearing aid. The fact that these patients requested replacement aids implies that they have found aids to be beneficial. If they are successful users, probably it is because they have learned how to live with and manage their hearing problems. If the preceding assumptions about the characteristics of these experienced users are correct, then their development of skills minimizing the influence of hearing loss is not surprising. The magnitude and consistency of the influence of experience on the HPI scores provides impressive evidence of the need for rehabilitation programs which will quickly reduce the problems of new users.[1]

In addition to the effects of hearing loss and experience on the HPI median scores, the variability attributable to other factors and to errors of measurement can be seen in the range from the 25th to the 75th percentiles for each hearing-loss category. In most instances, this variability is of approximately the same magnitude as the variability attributable either to hearing loss or to experience. Given the zero hearing-loss slope for the POST replacement fittings and the wide range of problem scores within each hearing-loss category, it is clear that amount of hearing loss does not have nearly as much influence on patients' responses as do nonhearing-loss factors.[2] Clinical investigators from Kodman (1961) to Kapteyn (1977a,b) have emphasized the importance of this finding. The fact that there are wide ranges in hearing problem scores in each hearing-loss category seems inconsistent with hearing aid strategies which focus primarily on acoustical matching of an amplifier to a hearing loss.

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[1] Patients receiving their first hearing aids routinely participated in two group orientation sessions which were designed to maximize use of aids and to teach patients how to deal with problems that are commonly encountered. Patients receiving replacement aids were counseled individually about continuing problems.

[2] The strength of this statement is dependent on the size of the error of measurement. The HPI PRE-POST correlation for the 169 experienced users was .66. The PRE-POST correlation for wear time for these patients was .80.

The data presented in Table 1 also make it possible to examine the effect of hearing aid fitting and counseling on the patients' responses. For those receiving their initial fittings, all 13 of the POST percentile scores are lower than their corresponding PRE scores. The overall percentage of problem decrease is similar to that reported by Tannahill (1979) for a group of new users. Comparison of the POST scores of the experienced users with their corresponding PRE scores shows that 13 are lower and 2 are tied. Thus, the HPI is sensitive to rehabilitation programs, both for new users and for experienced users as well.

The influences of hearing loss and experience on hours of hearing aid wear are presented in Table 2. The median wear times reported by patients fitted with their initial aids are about eight hours per day for those in the slight and mild categories and then increase irregularly to 15.0 hours per day for those in the severe-profound group. The PRE and POST medians for patients receiving replacement fittings show a similar leveling in the lower two categories of approximately 10.5 per day (PRE) and 12.0 hours per day (POST). Above 35 dB, Category II, the reported wear times increase as hearing loss increases to the 16.0-hour medians for the severe-profound group. Comparison of the POST medians of those receiving initial fittings with the POST medians of those receiving replacement fittings reveals the effects of experience on wear time. The POST medians of the experienced users are seen to be consistently higher than those of the inexperienced users. Kapteyn (1977a) also reported that experienced users wear their aids two to three hours more per day.

Examination of the interquartile ranges in Table 2 discloses that considerable variability is attributable to nonhearing-loss factors. In view of the number of patients and the PRE-POST correlation of .80 for number of hours worn as reported by the experienced users, these ranges merit examination. The ranges for patients receiving their initial fittings are close to 7.5 hours in the four hearing-loss categories for which data are available. In contrast, the POST range of the experienced users decreases from 8.1 (slight) to 3.4 hours (severe-profound). Thus, the experienced patients report longer wear time and less variability than those receiving their initial fittings. These two benefits cannot be attributed to the influence of hearing loss.

For the patients receiving initial fittings, 96% reported wearing their aids at least one hour per day; for those receiving replacement aids, 100% reported wear of at least one hour per day. These percentages of aid utilization are similar to other reports in the United States and in Continental European literature but are higher than those reported in a number of British studies of elderly patients. Kodman (1961) and Brooks (1972) have presented evidence that the rate of questionnaire return is higher for satisfied than for dissatisfied patients. Also, longer wear times are reported by mail than in direct interview. Thus, it seems likely that the amount of hearing aid utilization reported herein is higher than that of the patients who did not return

Table 2

Hours per day of hearing aid wear reported by 156 patients with their initial
hearing aid and 168 patients using a replacement aid; in parentheses
are the number of patients reporting zero hours of wear

Variables		I Slight	II Mild	III Moderate	IV Moderately Severe	V Severe- Profound
		| Hearing Loss Category				
Initial Fittings						
Hours worn	75%	12.2	12.3	15.4	12.2	
POST	50%	8.1	8.4	11.4	8.2	15.0
	25%	3.8	5.4	8.2	5.0	
N		54(3)	55(0)	33(1)	11(0)	3(0)
Replacement Fittings						
Hours worn	75%	15.0	14.2	16.3	16.5	17.2
PRE	50%	10.5	10.5	14.0	15.5	16.1
	25%	6.0	5.4	9.6	11.2	14.0
N		18(2)	38(4)	49(2)	44(2)	17(0)
Hours worn	75%	15.6	14.0	16.2	16.7	16.7
POST	50%	12.5	11.5	14.6	15.8	15.9
	25%	7.5	7.6	9.4	12.2	13.3
N		18(0)	38(0)	47(0)	44(0)	17(0)

The differences between the two experience groups in POST wear time are significant at the .001
level (Kolmogorov-Smirnov Test).

the POST.

Chronological Age

In order to examine the effects of age, the date in the five hearing-loss
categories were collapsed, and the data from the four age groups were held
separate within each of the four initial, replacement, PRE, and POST
groups.[3] These regrouped data are presented in Table 3. Examination of the
four sets of HPI median scores (PRE initial users, POST initial users, PRE
replacement users, and POST replacement users) discloses trends which
parallel those of the previous section. However, within each group, the HPI
medians as a function of age can be examined.

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[3]Thus, all the PRE scores for patients receiving their initial fittings remained within that group;
the POST scores for these patients remained within a second group. Similarly, the PRE and
POST data for the replacement users remained within their respective groups. As a result of this
rearranging within groups, the previously established differences between the two experiential
groups remain the same. However, within any one of the four groups (initial fitting, replacement
fitting, PRE, POST), the age data can be examined.

Table 3

Hearing Problem Inventory scores and descriptive data for 160 patients receiving
their initial hearing aid and 169 patients receiving a replacement
aid; all descriptive values are medians

Variables	Age Category			
	A Under 50	B 50-57	C 58-65	D Over 65
Initial Fittings				
Age	41	54	62	72
HL	25	30	35	41
Discrimination (W-22)	90%	93%	89%	80%
N	38	50	44	28
HPI Medians				
PRE	2.0	2.0	2.3	2.4
POST	1.4	1.5	1.6	1.8
Replacement Fittings				
Age	46	54	60	72
HL	43	50	46	53
Discrimination (W-22)	91%	86%	91%	85%
N	35	57	50	27
HPI Medians				
PRE	1.8	1.7	1.7	1.8
POST	1.4	1.6	1.4	1.7

For patients receiving their initial fittings, both the PRE and POST median
HPI scores increase with age. In these unfitted or newly fitted patients, the
effect of age on HPI scores accelerates above age 54. For the patients re-
ceiving replacement aids, no systematic age effect on the HPI medians can be
seen. Again, experienced, successful hearing aid users are able to minimize
the influence of age; in contrast, age clearly influences the self-ratings of
unfitted or newly fitted users.

The data, when grouped by age categories, also show increases in median
hearing loss of 16 dB (initial) and 10 dB (replacement) for the two experiential
groups. In order to minimize the confounding influence of hearing loss on
these data, all patients with slight loss were removed from age categories A, B,
and C. This manipulation reduced the increases of age categories A to D to 1
dB for the initial group and 6 dB for the replacement group. New medians
were computed for each of the groups. Of the resulting 16 PRE and POST
medians, 11 remained the same, 4 increased by 0.1, and 1 increased by
0.2. The age effect patterns remained the same: (a) small but consistent
increases in self-perceived problems as age increased for patients receiving
their initial fittings and (b) minimal age effects for experienced hearing aid
users.

Age effects on various hearing problems have been identified by some investigators; e.g., Jerger and Hayes (1976) and Surr et al. (1978). On the other hand, Ewertsen (1974) and Kapteyn (1977a,b) did not find an age effect in their data. The absence of an age effect in some studies may be related to the smaller magnitude of the effect and to the restricted age range in some studies. It is possible that the magnitude of the age effect in the present study is limited by the absence of a group of young adults, e.g., median age 30.

Hours of wear data, regrouped by age categories, are presented in Table 4. For those receiving their initial aids, the medians show a small reduction in the reported number of hours worn as age increases. For patients receiving

Table 4

Hours of hearing aid wear by 156 patients with their initial hearing aid and 168 patients wearing a replacement aid

Variables	Age Category			
	A Under 50	B 50-57	C 58-65	D Over 65
Initial Fittings				
Hours worn per day POST Medians	10.0	9.8	9.5	8.4
Replacement Fittings				
Hours worn per day PRE Medians	12.7	15.4	13.6	11.8
Hours worn per day POST Medians	13.2	15.6	13.3	12.1

replacement aids, both the PRE and the POST show a decrease in wear time above age 54, category B. Again, an age effect on aid use has been reported by by Jerger and Hayes (1976) and Surr et. al. (1978). Kapteyn (1977a) did not find an age effect but noted that the degree of hearing loss increased as age increased in his sample. The present data support Kapteyn's recommendation that, in order to study the effect of age on the number of hours worn, it is necessary to balance hearing loss in the groups under evaluation.

The fact that there is a decrease in aid wear of roughly an hour per day per decade above age 55 may have implications for hearing aid design and for the rehabilitative process. For instance, Kapteyn (1977a) reports that older patients are bothered more by loud sounds. Presumably, adding appropriate circuitry in the manufacture of hearing aids could reduce this complaint. Kapteyn (1977b) makes clear that wear time is also influenced by what he terms "psycho-social" factors.[4]

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[4]Kapteyn's "psycho-social" factors may be summarized as follows: (a) a realistic acceptance of

Examination of the relationships between the HPI (1976) scores, Tables 1 and 3, and hours of wear data, Tables 2 and 4, may be of interest to those clinicians who use some kind of questionnaire in the rehabilitative process. As previously noted, for initial users HPI scores and wear time both increase as hearing loss increases. Even here, however, close inspection reveals differences in rates of increase. For experienced users, only wear time increases with hearing loss. When the age medians are examined, HPI scores are seen to increase gradually; hours of wear are seen to decrease gradually. The complexity of the relationships between self-judged problems and self-reported wear suggests that all inventories should provide wear time information to the clinician. Furthermore, it is probable that wear time provides a better indication of rehabilitative status than does the problem perception or satisfaction of the patient.

Employment

In order to examine the influence of employment on HPI scores and aid wear, the POST data in Tables 1 through 4 were further subdivided into those patients employed and those not employed. The HPI scores for the employed, experienced users were found to be systematically higher by approximately 0.2 in all five hearing-loss groups. In contrast, no trend was evident for the inexperienced users.

Hearing aid wear time data for the two employment groups and the five hearing-loss categories are presented in Table 5. For patients receiving their initial fittings, four of the hearing-loss categories show longer wear time for employed users; for those receiving replacement fittings, all five hearing-loss comparisons show longer wear time for employed users. Perhaps the most interesting data in this table pertain to the employment percentages. It is evident that the percentages of employment of the experienced users are higher than those of the first-time users in four of the five hearing-loss categories.

Specific data relating median HPI scores and hours of wear to employment status in the four age categories are not presented herein; however, the POST HPI scores and hours of wear were examined in each category and found generally to follow the age and employment influences seen in Tables 4 and 5. As before, the effects of age were smaller and more consistent for the employed patients.

DISCUSSION

The data in this report are consistent with previous reports which show that

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being hearing-impaired, (b) a realistic expectation of the help afforded by a hearing aid, (c) social withdrawal due to aging, (d) character (introversion vs. extraversion), (e) personality structure (flexibility vs. inflexibility), (f) extreme sensitivity and overreaction to minor problems, (g) family's attitude toward an individual's hearing loss, and (h) ability to live independently.

Table 5

POST fitting (median) hours of hearing aid wear as a function of hearing
loss, experience wearing a hearing aid, and employment (N=324)

Variables	Hearing Loss Category				
	I	II	III	IV	V
				Moderately	Severe-
	Slight	Mild	Moderate	Severe	Profound
Initial Fittings					
Percent employed	65%	44%	29%	33%	67%
Hours worn per day					
Employed	8.1	10.5	14.8	14.5	15.5
Unemployed	8.2	7.2	11.5	8.2	14.0
Replacement Fittings					
Percent employed	78%	56%	68%	40%	59%
Hours worn per day					
Employed	13.8	11.6	15.6	15.9	16.5
Unemployed	7.0	11.0	12.2	15.6	15.8

the largest source of variability in patients' perceptions of their problems and
in hearing aid utilization is *not* hearing loss. For example, Ewertsen and
Birk-Nielson (1973) reported a range of from 0% to 100% self-assessed impair-
ment for patients having only a mild loss. Kapteyn's definitive studies (1977a,b)
led him to conclude that the use of a hearing aid has less to do with the amount
of hearing loss than with "psycho-social" factors. Much earlier, Kodman
(1961) recommended that clinicians, when fitting aids, should not rely solely
on audiologic and otologic information.

The present study demonstrates that experience in wearing an aid has a
major effect both on patients' perceptions of their problems and also on their
utilization of aids. The amount of hearing loss and age were shown to have
smaller effects; employment also was shown to have minimal effects. The cu-
mulative magnitude of these effects can be seen when the POST use data of
the young, employed, experienced users with the most hearing loss (drawn
from 4 A,B; 5 A,B) are compared with the POST data of the older,
unemployed, inexperienced users with the most loss (drawn from 4 C,D; 5 C,D).
Although the two groups had the same amounts of hearing loss, the former
group reported a median wear time of 16.3 hours; the latter group reported a
median of 10.0 hours. Probably of equal importance was the difference in
variability for the two groups. In the group with higher wear, the difference
between the 25th and 75th percentiles was only 2.7 hours; in the lower wear
group, the difference was 7.0 hours.

Since the largest source of variability both in the perception of problems by
patients and in their utilization of hearing aids is not hearing loss, it follows that

strategies of fitting patients which fail to deal systematically with non-acoustical parameters are not attacking the major sources of the problem. Strategies utilized for the fitting process should be selected to decrease or eliminate the problems which interfere with maximum aid utilization. This proposal is consonant with the recent report by Barfod (1979) that speech audiometry is a poor indicator of long-term hearing aid benefit. For this reason, Barfod recommends that the process of fitting hearing aids include manipulation of nonhearing-loss influences in order to maximize hours of wear. Owens, Gerber, and Uken (1978) emphasize the need to provide systematic follow-up of problems from thirty days to two years after the aid is selected. Hardick and Lesner (1979) describe a rehabilitative program in which the patient learns how to identify and cope with his hearing problems.

Examination of the views of Barfod (1979), Owens et al. (1978), and Kapteyn (1977a,b), as well as the present data, leads us to the conclusion that the traditional matching of hearing aids to hearing loss does not provide an adequate model for rehabilitation. Even though there are limitations at present on our ability to identify and quantify the effect of each nonhearing-loss factor, it *is* possible to change the model from one designed to maximize speech perception to one designed to maximize hours of wear. The evidence suggests that this change would be beneficial for the hearing aid user as well as provide more effective rehabilitative tools for the clinician.

SUMMARY

Responses by 329 patients to a 51-item, self-administered Hearing Problem Inventory were examined in order to identify some of the influences on patients' perceptions of their problems and on the amount of time aids were worn. Experience wearing a hearing aid was shown to have substantial influence on both problem perception and hearing aid use. The effects of hearing loss were large for the inexperienced users and small for the experienced users. Age increases were generally accompanied by increases in problems and decreases in wear time. Employed patients had slightly higher problem scores and longer hours of aid use. Employment was higher for experienced hearing aid users than for those receiving their initial fittings.

Comparison of PRE and POST HPI scores showed large systematic reductions in self-assessed problems by patients who were receiving their initial fittings, counseling, and orientation training. Experienced hearing aid users showed smaller but still systematic PRE-POST reductions in HPI scores. Hearing aid wear time increased progressively from the POST wear times of the initial users to the wear times reported on the PRE HPIs of the experienced users to the POST wear times of the latter.

The relationship between severity ratings of hearing problems and hours of use of hearing aids was found to be complex. For all groups of patients,

hours of wear increased as hearing loss increased. This relationship did not hold for problem scores; problem scores went up only for the inexperienced users. Hours of wear increased with experience; problem scores went in the opposite direction. Age and employment increased problem scores; age decreased wear time; and employment increased wear time. There were large differences between the ratings of experienced and inexperienced users; these differences were not always paralleled by differences in hours of use.

The effect on problem perception and hearing aid use was shown to be greater for nonhearing-loss factors, a finding consistent with other recent reports. For this reason, the primary goal of the hearing aid fitting, counseling, and adaptation process should be changed from that of maximizing the acoustical match of the aid to the patient to that of maximizing the number of hours the aid is worn by the patient.

ACKNOWLEDGEMENTS

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APPENDIX

PROBLEM ORIENTED AUDIOLOGICAL RECORD

The purpose of this set of statements and questions is to give the audiologists who will be working with you as much information about your hearing problem as you can tell us.

Try to ask yourself each question separately and answer them one at a time. Sometimes there are different questions about different aspects of the same topic. For example, there are a number of questions about how your hearing problems affect your job. Try to answer each one separately as best as you can.

You may find that some of the questions do not apply to you. If so, please write in the reason why. For example, if the statement is "I understand what my boss says to me at work", and if you are not working, please write an answer that states you are not working. This will let us know that you do not have a problem in this area.

If the question is "How many hours a day do you wear your hearing aid?", and if you do not have a hearing aid at this time, please write an answer such as "I do not have a hearing aid."

We want to know about *you* and your problems. In this way we can do a better job of solving your specific problems. There is space at the end for you to write about problems you have which are not listed.

HEARING PROBLEM INVENTORY (ATLANTA)

1. I turn the radio or TV down before I try to carry on a conversation:
   _____ Almost always
   _____ Most of the time
   _____ Half of the time
   _____ Usually not
   _____ Unnecessary to

2. The telephone pickup on my hearing aid is good:
   _____ Understand almost all
   _____ Understand most

_____ Miss half or more
_____ Cannot use on my aid
_____ No pickup on my aid
_____ Do not have aid

3. I don't have a problem hearing over the telephone at work or at home:
_____ Almost no difficulty
_____ Usually hear enough to understand
_____ I get some but miss a lot
_____ I miss most of what is said
_____ I cannot use at all
I have a problem because: _____

4. I can understand the people that I talk with a lot, like family and friends:
_____ Almost always
_____ Most of the time
_____ Half of the time
_____ Not usually
_____ Almost never
Don't understand because: _____

5. I feel that listening to several people talk at the same time is too hard:
_____ Almost always too hard
_____ Most of the time too hard
_____ Half of the time
_____ Usually too hard
_____ Almost never too hard

6. My hearing loss is embarrassing to my family, especially when we go out:
_____ Almost never embarrassing to them
_____ Sometimes embarrassing
_____ Half of the time
_____ More than half
_____ Almost always

7. My family steps in and makes decisions for me when I don't hear:
_____ Almost always they step in
_____ Most of the time
_____ Half of the time they do
_____ Usually they don't
_____ Almost never

8. People have to talk slowly for me to understand them:
_____ Almost everyone has to
_____ Most people have to
_____ About half need to

_____ Some need to
_____ Almost no one

9. I feel people avoid talking to me because of my hearing loss.
    _____ Everyone avoids talking to me
    _____ Most people avoid
    _____ Half of the people avoid
    _____ Most people don't avoid
    _____ Almost never avoid

10. I do not take part in social activities as much as I did before I began to lose my hearing:
    _____ Almost always I do not
    _____ Most of the time I do not
    _____ Half of the time I do not
    _____ Usually I do
    _____ Almost always I do

11. I have difficulty understanding what people say in a large room.
    _____ Almost never
    _____ Not usually
    _____ Half of the time
    _____ Most of the time
    _____ Almost always

12. I ask people to repeat when I cannot understand what they say:
    _____ Almost always I ask
    _____ Most of the time
    _____ Half of the time I ask
    _____ Not usually
    _____ Almost never

13. When I have difficulty understanding my family and friends, they go right on talking and leave me out. This happens to me:
    _____ Almost never
    _____ Several times a day
    _____ Half of the time
    _____ Most of the time
    _____ Almost always

14. I avoid meeting strangers because of my hearing problem:
    _____ Almost never avoid
    _____ Usually do not avoid
    _____ Avoid half of the time
    _____ Avoid most of the time
    _____ Avoid almost always
    Avoid because: _____

15. Because I have difficulty understanding what is said to me, I say things that don't fit into the conversation. This happens to me
    _____ Less than once a day
    _____ Several times a day
    _____ Half of the time
    _____ Most of the time
    _____ Almost always

16. My family gets annoyed when I don't understand what they say.
    _____ Almost never gets annoyed
    _____ Several times a day
    _____ Half of the time
    _____ Most of the time
    _____ Almost always

17. I wear my aid:
    _____ Almost all the time
    _____ Most of the time but have problems
    _____ Wear about half the time
    _____ Do not have an aid
    _____ Not able to wear it
    _____ Only a little bit because
    Explain problems: _____

18. I can control the noise level where I live.
    _____ Almost always I can't
    _____ Most of the time I can't
    _____ Half of the time I can
    _____ Most of the time I can
    _____ Almost always I can
    I can't control it because: _____

19. The person I talk with most is easy to understand.
    _____ Almost never
    _____ Usually not
    _____ Half of the time
    _____ Most of the time
    _____ Almost always
    This person is my: _____

20. The people I talk with a lot get my attention before starting to talk to me:
    _____ Almost always do
    _____ Most of the time
    _____ Half of the time
    _____ Usually do not
    _____ Almost never do

21. People at work get my attention before they start to talk to me:
    _____ Almost always
    _____ Most of the time
    _____ Half of the time
    _____ Usually do not
    _____ Almost never
    _____ Not working

22. Trying to talk with my family makes me nervous.
    _____ Almost never does
    _____ Usually doesn't
    _____ Half of the time it does
    _____ Most of the time it does
    _____ Almost always

23. My hearing loss keeps me from going out and doing many things I want to do:
    _____ Almost always prevents me
    _____ Most of the time
    _____ Half of the time
    _____ Usually doesn't
    _____ Almost never interferes
    Cannot do: _____

24. When lots of people are talking in a large room I can't carry on a conversation:
    _____ Almost always can't hear
    _____ Most of the time I can't
    _____ Half of the time I can't
    _____ Usually can
    _____ Almost always can

25. When there are several conversations going on and I can't follow what is being said to me I feel left out and uncomfortable:
    _____ Almost always feel left out
    _____ Most of the time
    _____ Half of the time
    _____ Usually don't feel left out
    _____ Almost never feel left out

26. When someone talks behind me, I miss the first part of what they say:
    _____ Almost always miss
    _____ Most of the time
    _____ Miss half of the time
    _____ Usually don't miss
    _____ Miss less than once a day

27. I watch other people's facial expressions when talking to them:
_____ Almost always
_____ Most of the time
_____ Half of the time
_____ Not usually
_____ Less than once a day

28. Except at home, trying to talk with people makes me feel uncomfortable:
_____ Makes me uncomfortable almost always
_____ Most of the time
_____ Half of the time
_____ Bothers me some times
_____ Almost never

29. When I don't hear a whole statement, I try to guess at the words I missed and figure it out:
_____ Almost always figure it out
_____ Most of the time
_____ Half of the time figure it out
_____ Usually can't figure it out
_____ Almost never

30. Other people do not seem to understand what it is like to have a hearing problem:
_____ Almost never understand
_____ Usually do not
_____ Half of the time do
_____ Most of the time understand
_____ Almost always understand

31. My family and friends complain that I turn up the radio and TV too loud:
_____ Almost always I do
_____ Most of the time
_____ Half of the time
_____ Less than ½ the time
_____ Almost never

32. Listening requires a lot of hard work and concentration for me:
_____ Almost always
_____ Most of the time
_____ Half of the time
_____ Not usually
_____ Hardly ever

33. I am not having problems with my hearing aid because it:
_____ Helps in almost all situations
_____ Helps in most situations

_____ Helps in ½ the places
_____ Helps in only a few places
_____ I can't wear an aid
_____ I don't have an aid
Describe problems: _____

34. I have difficulty understanding if I cannot see the speaker's face well:
_____ Have difficulty less than once a day
_____ Several times a day
_____ Half of the time
_____ Most of the time
_____ Almost always

35. My hearing loss causes problems for me at work:
_____ Less than once a day
_____ Several times a day
_____ Half of the time
_____ Most of the time
_____ Almost always
_____ Not working
What problems? _____

36. Noise is a problem at work:
_____ Less than once a day
_____ Usually is not
_____ Half of the time
_____ Most of the time
_____ Almost always is
_____ Not working
Describe: _____

37. I don't hear important sounds around me, like the phone ringing:
_____ Almost always don't hear
_____ Usually don't hear
_____ Hear about ½ of the sounds around me
_____ Usually hear sounds around me
_____ Almost always hear
Environmental sounds I miss _____

38. Because of my hearing loss I do not enjoy my job like I used to:
_____ Almost never enjoy it
_____ Don't enjoy it most of the time
_____ Like it half as much
_____ Like it most of the time
_____ Still like it as much
_____ Not working

39. Not knowing which direction sound is coming from is a problem to me:
    _____ Almost always can't tell direction
    _____ Most of the time
    _____ Half of the time I don't know
    _____ Not usually a problem
    _____ Almost never a problem

40. When watching a speaker I should concentrate on:
    _____ His lips
    _____ The lower half of his face
    _____ His whole face and body
    _____ Should not concentrate
    _____ Don't know

41. How many hours a day do you wear your aid? _____

42. I don't understand when people try to talk with me from another room:
    _____ Understand nothing
    _____ Understand less than half
    _____ Understand about half
    _____ Understand most
    _____ Understand almost all

43. I have trouble with my earmold:
    _____ It is too loose
    _____ It hurts my ear
    _____ It is too tight
    _____ My hearing aid squeals
    _____ My earmold is OK
    _____ I don't have an earmold

44. I wash my earmold: ___ Do not have an earmold
    _____ Once a day
    _____ Once a week
    _____ Once a month
    _____ Once a year
    _____ Hardly ever

45. Check those items which might cause hearing loss:
    _____ Cold weather
    _____ Some medications
    _____ Loud noises
    _____ Certain foods
    _____ Circulation problems

46. The aid I am wearing now is
    _____ The best I've ever had because:

_____ One of the better ones, but needs:
_____ About the same as most aids:
_____ Not as good as most aids:
_____ The worst aid I've had:
_____ I don't have any aid
Explain: _____

47. I cannot carry on a conversation with people who talk softly:
_____ Almost never can
_____ Usually can't
_____ Can half the time
_____ Can most of the time
_____ Almost always can

48. If eligible I will receive a spare aid:
_____ In the mail in 6 months
_____ Only if I apply for it
_____ Don't know
_____ Have working spare aid

49. All batteries and repair needs are handled by:
_____ Atlanta VA Prosthetics
_____ Local hearing aid dealers
_____ The Denver VA Center
_____ Don't know

50. I control the corrosion caused by moisture and perspiration by using a drying kit:
_____ Dry out my aid regularly
_____ Dry aid in summer
_____ Dry it only when needed
_____ My aid does not require
_____ Don't know about this
_____ Don't have an aid

51. I have learned how to adjust to and manage my hearing problems:
_____ Successfully manage them almost always
_____ Manage them most of the time
_____ Manage them about ½ the time
_____ Usually cannot
_____ Almost never can
Cannot manage these problems: _____
_____

NAME   SS#   DATE

HOME TELEPHONE NUMBER   OFFICE TELEPHONE NUMBER