

Analysis of Prefitting versus Postfitting Hearing Aid Orientation Using the Glasgow Hearing Aid Benefit Profile (GHABP)

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Abstract

Results of this study demonstrate the advantages of both pre- and postfitting hearing aid orientation (HAO) sessions. This study demonstrated that HAO counseling is helpful in expediting hearing aid benefit and satisfaction through the education of our clients and that this benefit and satisfaction is age dependent as measured by the Glasgow Hearing Aid Benefit Profile (GHABP) (Gatehouse, 1997). Patients with greater initial disability, as identified by item 1 of the GHABP, receive significant benefit from prefitting and/or postfitting counseling as compared to patients receiving no counseling. Implications of these findings are discussed.

Key Words: Age, benefit, disability, Glasgow Hearing Aid Benefit Profile, hearing aid orientation, hearing aids, perceived handicap, prefitting hearing aid orientation, satisfaction

Abbreviations: AR = Audiologic rehabilitation; GHABP = Glasgow Hearing Aid Benefit Profile; HAO = hearing aid orientation

Sumario

Los resultados de este estudio demuestran las ventajas de las sesiones de orientación (HAO) previas y posteriores a la adaptación de auxiliares auditivos. Este estudio demostró que las HAO son útiles para acelerar el beneficio y la satisfacción con el auxiliar auditivo por medio de la educación de nuestros clientes, y que este beneficio y satisfacción son dependientes de la edad, conforme lo demuestra el Perfil de Glasgow de Beneficio del Auxiliar Auditivo (GHABP) (Gatehouse, 1997). Los pacientes con mayor discapacidad inicial, identificados por el ítem 1 del GHABP, reciben un beneficio significativo de una consejería previa y posterior a la adaptación, comparados con pacientes que no reciben tal consejería. Se discuten las implicaciones de estos hallazgos.

Palabras Clave: Edad, beneficio, discapacidad, Perfil de Glasgow de Beneficio del Auxiliar Auditivo, orientación sobre auxiliares auditivos, discapacidad percibida, orientación previa a la adaptación de auxiliares auditivos, satisfacción

Abreviaturas: AR = Rehabilitación audiológica; GHABP = Perfil de Glasgow de Beneficio del Auxiliar Auditivo; HAO = Orientación sobre auxiliares auditivos

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Many factors may influence the success of new hearing aid users. One major problem is individuals presenting with inappropriate expectations of hearing aid performance at the initial fitting (Kricos et al, 1991). Kricos et al (1991) recommend the candidate receive frank counseling regarding realistic expectations for hearing aid benefits, actual use, and daily care of the hearing instrument. Previous research has not addressed the effectiveness of a prefitting hearing aid orientation (HAO).

In other health-care fields, the effectiveness of presurgical education, training, and counseling has been reported in several papers (e.g., Mumford et al, 1982; Hathaway, 1986; Webber, 1990). Specifically, Hathaway found that patients who receive taped, written, or verbal preparation generally required less pain medication postsurgery and recovered faster than patients who did not receive preoperative preparation. Mumford et al found that prepared patients are often found to have a shorter length of hospital stay. Further, preprocedural education can reduce anxiety, increase coping ability, and shorten the hospital stays of surgical patients (Butler et al, 1996). Butler et al evaluated pre-hospital education for total hip replacement (THR) surgery candidates and found the experimental group to have less anxiety and require less occupational therapy and physiotherapy than those who received no pre-education. The method of preprocedural education was the administration of a simple information booklet mailer. The application of these findings to the field of audiology, specifically hearing aid provision, is a logical step. A prefitting hearing aid orientation (HAO) may be the appropriate vehicle to present this information.

Ward and Gowers (1980) and Ward (1981) determined the efficacy of postfitting HA counseling, using either individual face-to-face instruction and/or self-instruction using a written notebook. The instruction in both formats significantly improved the scores of elderly HA users on a test of knowledge of hearing tactics, compared to a control group who received only cursory instruction at the time of the HA fitting. Superiority of one format over the other was not demonstrated. Using the Hearing Handicap Inventory for the elderly (HHIE; Ventry and Weinstein, 1983), Abrams et al (1992) demonstrated a significant reduction in degree of perceived

handicap in a group of patients who had received hearing aids and a three-week counseling-based program of audiologic rehabilitation (AR) in a group format. A second subject group who received hearing aids with no training also had a significant reduction in perceived handicap although not as great as that of the group receiving training. A control group, who did not receive hearing aids nor AR, exhibited no change in degree of perceived handicap.

Self-perception or "measurement" of one's current condition with regard to disability from hearing loss has been established as a clinically relevant and accurate method of identifying areas in need of remediation (McCarthy et al, 1990). The Hearing Handicap Scale (HHS) developed by High et al in 1964 was an early attempt to measure hearing handicap. Since the introduction of the HHS (High et al, 1964), many self-report scales for audiologic rehabilitation have been designed (Noble and Atherly, 1970; Speaks et al, 1970; Alpiner et al, 1974; Giolas et al, 1979; McCarthy and Alpiner, 1980; Newman and Weinstein, 1986; Demorest and Erdman, 1987; Kaplan et al, 1991). These scales were designed to assess perceived levels of disability, patient and significant-other attitudes and coping abilities toward hearing loss, communication performance in different environments, and hearing aid performance and use (Hutton, 1991; Schow et al, 1993). Although the HHIE, HHIA, and the SAC are recommended by the American Speech and Hearing Association (ASHA, 1997), handicap scales have not been totally accepted in the field of audiology as valid measures of hearing aid user outcomes (Schow et al, 1993).

The Glasgow Hearing Aid Benefit Profile (GHABP; Appendix) is a hearing handicap scale that is designed to be a measure of individual client concern and expectation accountability (Gatehouse, 1997). With this questionnaire, the patient identifies up to eight listening situations considered by the patient to be difficult. For each situation, the patient rates the amount of difficulty, the level of annoyance, the proportion of time the patient's hearing aid is worn during the situation, the amount of help provided by the hearing aid, the level of difficulty in the situation with the hearing aid, and the degree of satisfaction with the hearing aid. The GHABP represents a client-focused rehabilitation protocol. The importance of this is

that it sets up a paradigm in which the clients identify their own communication difficulties and then utilize the audiologist as a resource for solving these communication problems. This concept of patient empowerment has its theoretical basis in the work of educators and psychologists who have worked primarily with socially disadvantaged populations (Wallerstein and Bernstein, 1988). The empowerment philosophy is based on the idea that to be healthy, people must be able to bring about changes, not only personally but also socially (Feste and Anderson, 1995). Rappaport (1987) defines empowerment as a “process by which people gain mastery over their lives.” A well-designed HAO should be the vehicle for empowering our patients.

It is widely accepted within our profession that self-perceived measures of disability, handicap, hearing aid use, and hearing aid satisfaction are all components of a positive amplification intervention outcome. The GHABP is a simple and effective tool to evaluate these important parameters. Using the GHABP, this investigation evaluated prefitting versus postfitting HAO, in order to determine the most effective timing to attain the positive patient outcome measures necessary for improved communication using amplification.

METHOD

Participants

Forty-five individuals participated in this investigation. All individuals were solicited from the clinic population of the Department of Audiology and Speech Pathology at the Gainesville Veterans Administration Medical Center (GVAMC). Subject ages ranged between 60 and 80 years with a mean age of 70.70 years (see Table 1). Subject selection was based on a hearing loss criterion of a bilateral sensorineural hearing impairment with pure-tone thresholds poorer than 40 dB HL at 1000 or 2000 Hz in the better ear (Ventry and Weinstein, 1983). Pure-tone averages (i.e., 500Hz, 1000 Hz, 2000 Hz) for participants were 70 dB HL or better. Subject word-recognition scores at 40 dB SL were above 61% for each ear. All participants were native English speakers with adult onset hearing loss. All participants were new hearing aid users, fitted with conventional analog hearing aids upon inclusion in the study. Those patients being followed by the Visual Impairment Service Team (VIST) program within the VA system were excluded from the study. Potential participants were screened using the Mini-Mental Status Exam-

Table 1. Group Age and Audiometric Results

	Prefitting	Postfitting	Control
Age	m = 69.53	m = 70.28	m = 72.06
	SD = 6.09	SD = 5.63	SD = 5.66
PTA (r.)	m = 36.13	m = 38.73	m = 40.07
	SD = 9.82	SD = 8.74	SD = 10.88
PTA (l.)	m = 36.93	m = 37.40	m = 38.06
	SD = 8.51	SD = 7.95	SD = 8.26
HFPTA (r.)	m = 51.53	m = 54.27	m = 53.07
	SD = 8.86	SD = 8.98	SD = 8.99
HFPTA (l.)	m = 53.13	m = 52.93	m = 51.87
	SD = 6.8	SD = 9.68	SD = 6.98
SRT	m = 29.33	m = 30.53	m = 32.93
	SD = 9.37	SD = 5.50	SD = 7.70
PBMAX	m = 78.80	m = 85.71	m = 82.56
	SD = 9.31	SD = 8.41	SD = 8.95

ination (Folstein et al, 1975) to rule out cognitive pathology as a possible confounding variable. A score of 23 or higher was required for inclusion in the study. Subject confidentiality was maintained by assigning a number to all participants.

Instrumentation

All participants received a complete audiologic evaluation that included otoscopic inspection, standard pure-tone air- and bone-conduction testing, speech reception thresholds, and word-recognition testing. Testing was completed by a certified audiologist using a diagnostic audiometer (Grason Stadler model 1710) under headphones (model TDH 50P) in a double-walled test chamber (Tracoustics model RS 254 BS) meeting American National Standards Institute [ANSI] code S3.1-1991. Speech testing including speech reception thresholds and word recognition (CID22) was completed using a compact disc player (TEAC model PD 80 mkII) routed through the audiometer.

For all hearing aid fittings, the National Acoustic Laboratories Revised version (NAL-R) target gain measures was used. This formula for target gain is the standard procedure for hearing aid fittings at the GVAMC.

All equipment was calibrated to meet the standards of the ANSI (1989, 1991). Listening checks were performed daily. Audiometric results for the three groups were consistent (see Table 1).

Protocol

Three groups of 15 participants each were selected using a systematic random sampling scheme. Word-recognition scores of participants were monitored for each group to insure balancing. At the time of the casting of earmold impressions at the GVAMC audiology clinic, all veterans agreeing to take part in the study completed the Mini-Mental Status Examination (Folstein et al, 1975) and items 1 and 2 of the GHABP (Gatehouse, 1997). These items were randomized to eliminate any fatigue factors or order effects.

The control group received no HAO. The other two groups received the same HAO series consisting of two one-hour sessions. One of these groups received the last of the HAO sessions at least one week preissue, while the other of these groups will receive

the last of the HAO sessions at least one week post-issue. The two HAO sessions were administered approximately one week apart. The control group was offered the opportunity to attend an HAO after this study had been completed. The HAO sessions were administered to all groups by the same two audiology graduate students, who were not aware of the specific goals of the investigation. The GVAMC secretary throughout the course of the study recorded the number of patient contacts per subject. The administration of the final assessment took place five weeks from the time of initial hearing aid fitting. Assessment included the remainder of the GHABP.

HAO Content

The design of the hearing aid adjustment program used in this study was a modification of one developed by Holmes at the University of Florida. It is a combination of communication skills training and HAO. Nonverbal and situational cues are addressed as well as information on environmental modifications to facilitate best possible listening situations. Expressive skills, which enable individuals with hearing impairment to communicate their needs to others in an assertive, nonthreatening manner is also part of this protocol. The participants received information and were counseled on their specific hearing impairment and needs. This included basic anatomy and physiology, the audiogram, and how these topics apply to their personal hearing concerns. Care and proper maintenance of the hearing instrument were covered in detail. A one-on-one counseling session took place in which each patient received a written packet of materials that went along with the sessions.

Statistical Method

The study design consisted of a randomized, double-blinded, 3-arm trial. Patients in the study were randomized to one of three treatment groups with balanced group allocation ($n = 15$ per group). One patient ultimately was excluded from the study due to the occurrence of unusual circumstances during his participation in the study (certain extraneous events escalated this individual to social celebrity status after prefitting measures were obtained and before postfitting measures were completed). Baseline char-

acteristics of interest and baseline levels of certain outcome measures were determined for each subject prior to the start of the study. Outcome variables of interest were assessed only after patients completed their respective study group protocols. Simple summary statistics and pairwise Pearson and Spearman correlations among response variables and baseline covariates were initially considered along with clinical relevance and importance in arriving at a final subset of covariates and outcome measures to be used in the analysis (Snedecor and Cochran, 1980, pp. 175–193 [correlations], 274–297 [transformations]). Outcome variables that were analyzed rigorously included items 3, 4, 5, and 6 from the Glasgow Hearing Aid Benefit Profile (GHABP) scoring instrument. GHABP item 1 (the prefitting analogue of item 5) and item 2 were considered as potential confounders or moderators of treatment effect.

Differences in outcome measures between experimental groups were evaluated in the context of several different statistical models. Analysis of covariance (ANCOVA) was used to compare group means adjusted separately for each baseline covariate of interest (parallel slopes model) and also to determine if differences among group means depended on the level of the baseline covariate being considered (nonparallel slopes model) (Fleiss, 1986). Given the study design and sample size, covariates were only considered individually with regard to their influence as confounders or moderators of treatment effect so as to avoid possible “overfitting” of the data. Analysis of variance (ANOVA) was used to compare unadjusted response means among the experimental groups. For each response variable, preliminary model fitting was carried out so that residuals from the model fit could be assessed for distributional normality and the presence of any systematic pattern of variation, which could be removed by transformation. This residual analysis indicated that the distributional properties of item 3 from the GHABP appeared to benefit from arcsine square-root transformation. The within-subject Pearson correlation between pre- and poststudy determinations of several of the outcome variables was also evaluated in order to decide if the poststudy determination or the difference between pre- and poststudy determinations would be the more appropriate form to analyze. (A correlation coefficient

greater than 0.5 favored the difference score, while a correlation coefficient less than 0.5 favored the poststudy score.) These correlations were such that the difference between items 1 and 5 from the GHABP (pre- versus poststudy $r = .54$). The significance of interactions between group and covariate effects in the nonparallel slopes ANCOVA model and group main effects in the parallel slopes ANCOVA and ANOVA models were all assessed by F test (Fleiss, 1986). Tukey’s pairwise multiple comparison procedure was used to evaluate pairwise differences among group means while maintaining an experiment-wise significance level of 0.05 (Fleiss, 1986). When a significant interaction between covariate and group effects was detected, the covariate cutpoint was determined above or below which a pairwise difference between group means first became significant at a Tukey-adjusted significance level of 0.05. Final model fits were all evaluated for highly influential observations or outliers using Cook’s distance, a measure of the relative change in model regression coefficients that would occur if a particular observation were removed (Weisberg, 1980). Observations demonstrating a Cook’s distance >1 were considered to be highly influential and thus suspicious. Patient data values were rechecked for validity in this situation, and models were refit with the influential observation excluded in order to characterize the nature of the influence. R-squared was also calculated for each model fit to determine the percent of variability in the outcome measure accounted for by each model.

RESULTS

Glasgow Hearing Aid Benefit Profile Difference of Items 5 and 1 (GHABP5-1) (Difference Score)

Items 1 and 5 on the GHABP are designed to reflect initial and residual disability of the patient respectively. Each patient was asked to address the first item on the GHABP. This item pertained to the patient’s unaided listening difficulty in specific situations and was administered at the time the ear molds were cast. Approximately one month postfitting, the patient was asked to answer item 5, which is actually a re-asking of item 1 after the introduction of hearing

Table 2. The Summary Statistics for the Difference Score for GHABP Items 5 Minus 1 (GHABP5-1)

Group	N	Mean	SD	Median	Minimum	Maximum
Control	15	-37.91	11.48	-37.50	-60.00	-18.75
Prefit	15	-45.25	12.13	-43.75	-75.00	-25.00
Postfit	14	-35.05	21.33	-33.12	-66.66	0.00

Table 3. Simple Summary Statistics Showing Patient Hearing Aid Use (GHABP3)

Variable Group	N	Mean	SD	Median	Minimum	Maximum
Control	15	85.50	14.64	87.50	56.25	100.00
Prefit	15	88.69	12.75	93.75	62.50	100.00
Postfit	14	83.51	26.34	95.83	25.00	100.00

aids. No significant differences were observed among unadjusted GHABP5-1 difference score group means (Table 2).

Glasgow Hearing Aid Benefit Profile Item 3 (GHABP3)

The third item on the Glasgow Hearing Aid Benefit Profile (GHABP3) refers to the amount of time the patients spend wearing their hearing aids (Table 3). No significant differences were observed among unadjusted GHABP3 group means nor among group means adjusted separately for each covariate of interest in parallel slopes ANCOVA models. Similarly, no significant covariate-dependent differences were observed among group means in nonparallel slopes ANCOVA models that included the same covariates. The previously described pattern did not change when controlled for initial disability

(GHABP1) and perceived hearing handicap (GHABP2).

Glasgow Hearing Aid Benefit Profile Item 4 (GHABP4)

The fourth item on the GHABP proposes a means to assess hearing aid benefit (Table 4). No significant differences were observed among unadjusted GHABP4 hearing aid benefit group means nor among group means adjusted separately for each covariate of interest in parallel slopes ANCOVA models. Similarly, no significant covariate-dependent differences were observed among group means in nonparallel slopes ANCOVA models that included the same covariates. The previously described pattern did not change when controlled for initial disability (GHABP1) and perceived hearing handicap (GHABP2).

Table 4. Simple Summary Statistics Showing Patient Hearing Aid Benefit (GHABP4)

Variable Group	N	Mean	SD	Median	Minimum	Maximum
Control	15	57.55	9.84	60.00	31.25	68.75
Prefit	15	63.38	14.57	65.00	29.16	83.33
Postfit	14	62.44	18.72	65.62	25.00	100.00

Table 5. Simple Summary Statistics Showing Patient Hearing Aid Satisfaction (GHABP Item 6)

Group	N	Mean	SD	Median	Minimum	Maximum
Control	15	62.44	13.11	65.00	25.00	75.00
Prefit	15	67.58	10.16	66.66	50.00	93.75
Postfit	14	65.68	12.48	68.33	37.50	81.25

Glasgow Hearing Aid Benefit Profile Item 6 (GHABP6)

The sixth item on the GHABP provides a measure of patient hearing aid satisfaction (Table 5). No significant differences were observed among unadjusted GHABP6 group measures of hearing aid satisfaction nor among group measures of hearing aid satisfaction adjusted separately for each covariate of interest in parallel slopes ANCOVA models. Age-dependent and GHABP1-dependent differences among group measures of hearing aid satisfaction were observed in non-parallel slopes ANCOVA models ($p = 0.026$ and 0.031 respectively for age \times group and GHABP1 \times group interaction effects). In patients younger than 66 years of age, mean hearing aid satisfaction was significantly higher in the postfitting group when compared to the control. The postfitting group's mean hearing aid satisfaction was also significantly greater than the control group's hearing aid satisfaction in patients whose GHABP1 (initial disability) score was $\geq 70\%$. Mean hearing aid satisfaction was significantly greater in the prefitting group when compared to the control patients whose initial disability (GHABP1) score was $\geq 64\%$. The previously described pattern did not change when controlled for initial disability (GHABP1) and perceived hearing handicap (GHABP2).

DISCUSSION

The sixth item on the GHABP offers a means to assess patient hearing aid satisfaction. Patients younger than 66 years of age in the postfitting group were significantly more satisfied with their hearing aids than those matched subjects in the control group. It would appear that the timing and type of HAO provided are well received by this age group. Different counseling methodologies should be investigated regarding those individuals above the age of 66 years.

The postfitting group mean was also significantly greater than the control group mean in those patients whose GHABP1 score was $\geq 70\%$. Patient hearing aid satisfaction was significantly greater in the prefitting group compared to the control group in those patients whose GHABP1 (initial disability) score was $\geq 64\%$. This suggests that patients with greater initial disability, as identified by

the GHABP, receive significant satisfaction from prefitting and/or postfitting counseling as compared to patients receiving no counseling. This finding would agree with Brooks (1979). Further investigations targeting elevated initial disability scores as part of the inclusion criteria would reduce ceiling effects.

Patients receiving prefitting counseling showed slightly greater, but not statistically significant, improvements regarding situational listening difficulties when compared to the postfitting and control groups. These results suggest that client familiarity and competency with the hearing instrument may be obtained more efficiently with prefitting counseling than with the traditional no-counseling and postfitting-counseling regimes. This may not suggest that prefitting counseling is actually better but, rather, client exposure to hearing instrument care and use strategies should be expedited, once hearing aid intervention is pursued.

The third item on the GHABP (GHABP3) refers to the amount of time the patient spent wearing their hearing aids. No significant differences were observed among the control, prefitting, and postfitting groups using these measures. The homogeneity of this cohort may have considerable influence on the amount of time the patient wears his or her hearing aids. Outstanding patient compliance and cooperation from this age group of veterans should be noted. All of the participants do receive their health care and hearing aids free. This may be an uncontrollable condition possibly responsible for creating elevated subject response. In addition, five-weeks-postfitting measures may possibly still be within the "honeymoon" period. A longitudinal study measuring the amount of time the patient wears their hearing aids, in this and other "fee-for-service" populations, is warranted.

The fourth item on the GHABP offers a means to assess hearing aid benefit. No significant differences were observed among the three experimental groups. It cannot be ruled out that free acquisition of hearing aids rendered the measurement tools used in this study insensitive to these elevated differences in hearing aid benefit between groups.

The GHABP is a clinical tool capable of evaluating various aspects of clinical procedure while maintaining clinical suitability and utility. While maintaining a client-driven

agenda, it is designed to provide numerical outcome measures for quality assurance and in developing individual patient audiologic management strategies.

CONCLUSIONS

Patients younger than 66 years of age in the postfitting HAO group were significantly more satisfied with their hearing aids than those in the control group. Patients with greater initial disability, as identified by the GHABP item 1, receive significant benefit from prefitting and/or postfitting counseling compared to patients receiving no counseling. The results of this finding indicate the importance of audiologic HAO for persons with more initial disability as measured by item 1 on the GHABP. Furthermore, it indicates that the effectiveness and appropriateness of an HAO may be better suited for those under the age of 66 years. This certainly points out the need for further investigation into development of appropriate age-related hearing aid care and use delivery models.

Traditional protocol for the elderly client with hearing impairment has been one of voluntary postfitting HAO. The results of this study demonstrate the advantages of both pre- and postfitting HAO sessions. This study demonstrated that HAO counseling is helpful in expediting hearing aid benefit and satisfaction through the education of our clients and that this benefit and satisfaction is age dependent—HAO being more appropriate for our younger patients (>66 yr.) and less appropriate, by itself, for our elderly patrons. This appears to be true if the client presents with a realistic level of perceived hearing disability, which echoes Kricos et al (1991). This may suggest that a combination of pre- and postfitting counseling may be the best clinical procedure to ensure hearing aid acceptance that confirms Brooks's (1979) findings. Further investigation is needed to validate the efficacy of such a model considering various levels of initial disability and age.

REFERENCES

- Abrams H, Hnath-Chisolm T, Guerreiro S, Ritterman S. (1992) The effects of intervention strategy on self-perception of hearing handicap. *Ear Hear* 5:371–377.
- Alpiner JG, Chevrette W, Glascoe G, Metz M, Olsen B. (1974) The Denver scale of communication function. Unpublished manuscript, University of Denver.
- American National Standards Institute. (1989) *Criteria for Permissible Ambient Noise during Audiometric Testing (ANSI S3.1-1991)*. New York: ANSI.
- American National Standards Institute. (1991) *Specifications for Audiometers (ANSI S3.6-1989)*. New York: ANSI.
- American Speech and Hearing Association. (1997) *Guidelines for Audiologic Screening*. Rockville, MD: ASHA.
- Brooks DN. (1979) Counseling and its effects in hearing aid use. *Scand Audiol* 8:101–107.
- Butler GS, Hurley CAM, Buchanan KL, Smith-VanHorne J. (1996) Prehospital education: effectiveness with total hip replacement surgery patients. *Patient Educ Couns* 29:189–197.
- Demorest ME, Erdman SA. (1987) Development of the communication profile for the hearing impaired. *J Speech Hear Disord* 52:129–142.
- Feste C, Anderson RM. (1995) Empowerment: from philosophy to practice. *Patient Educ Couns* 26:139–144.
- Fleiss JL. (1986) *The Design and Analysis of Clinical Experiments*. New York: Wiley.
- Folstein MF, Folstein SE, McHugh PR. (1975) Mini-mental status: a practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res* 12:189–198.
- Gatehouse S. (1997) Approaches to the evaluation of the benefits provided by hearing aids and other rehabilitative services. Paper presented at the Annual Summer Institute of the Academy of Rehabilitative Audiology, Magog, Quebec.
- Giolas TG, Owens E, Lamb SH, Shubert ED. (1979) Hearing Performance Inventory. *J Speech Hear Disord* 29:215–230.
- Hathaway D. (1986) Effect of preoperative instruction on postoperative outcomes: a meta-analysis. *Nurs Res* 35:269–275.
- High W, Fairbanks G, Glorig A. (1964) Scale for self-assessment of hearing handicap. *J Speech Hear Disord* 29:215–230.
- Hutton CL. (1991) Considerations in design and use of scales in rehabilitative audiology. *J Am Acad Audiol* 2:115–122.
- Kaplan H, Bally S, Brandt F. (1991) Communication scale for deaf adults. *J Am Acad Audiol* 2:164–182.

Kricos PB, Lesner SA, Sandridge SA. (1991) Expectations of older adults regarding the use of hearing aids. *J Am Acad Audiol* 2:129–133.

McCarthy PA, Alpiner JG. (1980) The McCarthy-Alpiner Scale of Hearing Handicap. Unpublished manuscript.

McCarthy PA, Montgomery A, Mueller HG. (1990) Decision making in rehabilitative audiology. *J Am Acad Audiol* 1:23–30.

Mumford E, Schlesinger HJ, Glass GV. (1982) The effects of psychological intervention on recovery from surgery and heart attacks: an analysis of the literature. *Am J Public Health* 72:141–151.

Newman C, Weinstein B. (1986) Judgements of perceived hearing handicap by hearing-impaired elderly men and their spouses. *J Acad Rehabil Audiol* 19:109–115.

Noble WG, Atherly GR. (1970) The hearing measure scale, a questionnaire for the assessment of auditory disability. *J Auditory Res* 10:229–250.

Rappaport J. (1987) Terms of empowerment/examples of prevention: toward a theory for community psychology. *Am J Couns Psychol* 15:121–149.

Schow RL, Balsara NR, Smedley TC, Whitcomb CJ. (1993) Aural rehabilitation by ASHA audiologists, 1980–1990. *Am J Audiol* 2:28–37.

Snedecor GW, Cochran WG. (1980) *Statistical Methods*. 7th ed. Ames: Iowa State University Press.

Speaks C, Jerger J, Trammell J. (1970) Measurement of hearing handicap. *J Speech Hear Res* 13:768–776.

Ventry I, Weinstein BE. (1983) Identification of elderly people with hearing problems. *ASHA* 25:37–42.

Wallerstein N, Bernstein E. (1988) Empowerment education: Freire's ideas adapted to health education. *Health Educ Q* 15:379–394.

Ward PR. (1981) Effectiveness of aftercare for older people prescribed a hearing aid for the first time. *Scand Audiol* 10:99–106.

Ward P, Gowers J. (1980) Fitting hearing aids: the effects of methods of instruction. *Br J Audiol* 14:15–18.

Webber GC. (1990) Patient education: a review of the literature. *Med Care* 28:1089–1103.

Weisberg S. (1980) Applied linear regression. *Residuals and Influence*. New York: Wiley, 106–113.

APPENDIX

Glasgow Hearing Aid Benefit Profile

GLASGOW HEARING AID BENEFIT PROFILE

Date of Assessment

Date of Review

Hospital Number.....
Name
Address

Does this situation happen in your life? **LISTENING TO THE TELEVISION WITH OTHER FAMILY OR FRIENDS WHEN THE VOLUME IS ADJUSTED TO SUIT OTHER PEOPLE**

0 ___ No 1 ___ Yes

1. How much difficulty do you have in this situation?	2. How much does any difficulty in this situation worry, annoy or upset you?	3. In this situation, what proportion of the time do you wear your hearing aid?	4. In this situation, how much does your hearing aid help you?	5. In this situation, with your hearing aid, how much difficulty do you now have?	6. For this situation, how satisfied are you with your hearing aid?
0 ___ N/A 1 ___ No difficulty 2 ___ Only slight difficulty 3 ___ Moderate difficulty 4 ___ Great difficulty 5 ___ Cannot manage at all	0 ___ N/A 1 ___ Not at all 2 ___ Only a little 3 ___ A moderate amount 4 ___ Quite a lot 5 ___ Very much indeed	0 ___ N/A 1 ___ Never/Not at all 2 ___ About _ of the time 3 ___ About _ of the time 4 ___ About _ of the time 5 ___ All the time	0 ___ N/A 1 ___ Hearing aid no use at all 2 ___ Hearing aid is some help 3 ___ Hearing aid is quite helpful 4 ___ Hearing aid is a great help 5 ___ Hearing is perfect with aid	0 ___ N/A 1 ___ No difficulty 2 ___ Only slight difficulty 3 ___ Moderate difficulty 4 ___ Great difficulty 5 ___ Cannot manage at all	0 ___ N/A 1 ___ Not satisfied at all 2 ___ A little satisfied 3 ___ Reasonably satisfied 4 ___ Very satisfied 5 ___ Delighted with aid

Does this situation happen in your life? **HAVING A CONVERSATION WITH ONE OTHER PERSON WHEN THERE IS NO BACKGROUND NOISE**

0 ___ No 1 ___ Yes

1. How much difficulty do you have in this situation?	2. How much does any difficulty in this situation worry, annoy or upset you?	3. In this situation, what proportion of the time do you wear your hearing aid?	4. In this situation, how much does your hearing aid help you?	5. In this situation, with your hearing aid, how much difficulty do you now have?	6. For this situation, how satisfied are you with your hearing aid?
0 ___ N/A 1 ___ No difficulty 2 ___ Only slight difficulty 3 ___ Moderate difficulty 4 ___ Great difficulty 5 ___ Cannot manage at all	0 ___ N/A 1 ___ Not at all 2 ___ Only a little 3 ___ A moderate amount 4 ___ Quite a lot 5 ___ Very much indeed	0 ___ N/A 1 ___ Never/Not at all 2 ___ About _ of the time 3 ___ About _ of the time 4 ___ About _ of the time 5 ___ All the time	0 ___ N/A 1 ___ Hearing aid no use at all 2 ___ Hearing aid is some help 3 ___ Hearing aid is quite helpful 4 ___ Hearing aid is a great help 5 ___ Hearing is perfect with aid	0 ___ N/A 1 ___ No difficulty 2 ___ Only slight difficulty 3 ___ Moderate difficulty 4 ___ Great difficulty 5 ___ Cannot manage at all	0 ___ N/A 1 ___ Not satisfied at all 2 ___ A little satisfied 3 ___ Reasonably satisfied 4 ___ Very satisfied 5 ___ Delighted with aid

Does this situation happen in your life? 0 ___ No 1 ___ Yes		CARRYING ON A CONVERSATION IN A BUSY STREET OR SHOP			
1. How much difficulty do you have in this situation?	2. How much does any difficulty in this situation worry, annoy or upset you?	3. In this situation, what proportion of the time do you wear your hearing aid?	4. In this how much does your hearing aid help you?	5. In this situation, <u>with your hearing aid</u> , how much difficulty do you <u>now</u> have?	6. For this situation, how satisfied are you with your hearing aid?
0___N/A 1___No difficulty 2___Only slight difficulty 3___Moderate difficulty 4___Great difficulty 5___Cannot manage at all	0___N/A 1___Not at all 2___Only a little 3___A moderate amount 4___Quite a lot 5___Very much indeed	0___N/A 1___Never/Not at all 2___About _ of the time 3___About _ of the time 4___About _ of the time 5___All the time	0___N/A 1___Hearing aid no use at all 2___Hearing aid is some help 3___Hearing aid is quite helpful 4___Hearing aid is a great help 5___Hearing is perfect with aid	0___N/A 1___No difficulty 2___Only slight difficulty 3___Moderate difficulty 4___Great difficulty 5___Cannot manage at all	0___N/A 1___Not satisfied at all 2___A little satisfied 3___Reasonably satisfied 4___Very satisfied 5___Delighted with aid
Does this situation happen in your life? 0 ___ No 1 ___ Yes		HAVING A CONVERSATION WITH SEVERAL PEOPLE IN A GROUP			
1. How much difficulty do you have in this situation?	2. How much does any difficulty in this situation worry, annoy or upset you?	3. In this situation, what proportion of the time do you wear your hearing aid?	4. In this how much does your hearing aid help you?	5. In this situation, <u>with your hearing aid</u> , how much difficulty do you <u>now</u> have?	6. For this situation, how satisfied are you with your hearing aid?
0___N/A 1___No difficulty 2___Only slight difficulty 3___Moderate difficulty 4___Great difficulty 5___Cannot manage at all	0___N/A 1___Not at all 2___Only a little 3___A moderate amount 4___Quite a lot 5___Very much indeed	0___N/A 1___Never/Not at all 2___About _ of the time 3___About _ of the time 4___About _ of the time 5___All the time	0___N/A 1___Hearing aid no use at all 2___Hearing aid is some help 3___Hearing aid is quite helpful 4___Hearing aid is a great help 5___Hearing is perfect with aid	0___N/A 1___No difficulty 2___Only slight difficulty 3___Moderate difficulty 4___Great difficulty 5___Cannot manage at all	0___N/A 1___Not satisfied at all 2___A little satisfied 3___Reasonably satisfied 4___Very satisfied 5___Delighted with aid

We have dealt with some of the situations which in our experience can lead to difficulty with hearing. What we would now like you to do is to nominate up to four new situations in which it is important for you as an individual to be able to hear as well as possible.

<p>1. How much difficulty do you have in this situation?</p>	<p>2. How much does any difficulty in this situation worry, annoy or upset you?</p>	<p>3. In this situation, what proportion of the time do you wear your hearing aid?</p>	<p>4. In this situation, how much does your hearing aid help you?</p>	<p>5. In this situation, <u>with your hearing aid</u>, how much difficulty do you now have?</p>	<p>6. For this situation, how satisfied are you with your hearing aid?</p>
<p>0__N/A 1__No difficulty 2__Only slight difficulty 3__Moderate difficulty 4__Great difficulty 5__Cannot manage at all</p>	<p>0__N/A 1__Not at all 2__Only a little 3__A moderate amount 4__Quite a lot 5__Very much indeed</p>	<p>0__N/A 1__Never/Not at all 2__About _ of the time 3__About _ of the time 4__About _ of the time 5__All the time</p>	<p>0__N/A 1__Hearing aid no use at all 2__Hearing aid is some help 3__Hearing aid is quite helpful 4__Hearing aid is a great help 5__Hearing is perfect with aid</p>	<p>0__N/A 1__No difficulty 2__Only slight difficulty 3__Moderate difficulty 4__Great difficulty 5__Cannot manage at all</p>	<p>0__N/A 1__Not satisfied at all 2__A little satisfied 3__Reasonably satisfied 4__Very satisfied 5__Delighted with aid</p>
<p>1. How much difficulty do you have in this situation?</p>	<p>2. How much does any difficulty in this situation worry, annoy or upset you?</p>	<p>3. In this situation, what proportion of the time do you wear your hearing aid?</p>	<p>4. In this situation, how much does your hearing aid help you?</p>	<p>5. In this situation, <u>with your hearing aid</u>, how much difficulty do you now have?</p>	<p>6. For this situation, how satisfied are you with your hearing aid?</p>
<p>0__N/A 1__No difficulty 2__Only slight difficulty 3__Moderate difficulty 4__Great difficulty 5__Cannot manage at all</p>	<p>0__N/A 1__Not at all 2__Only a little 3__A moderate amount 4__Quite a lot 5__Very much indeed</p>	<p>0__N/A 1__Never/Not at all 2__About _ of the time 3__About _ of the time 4__About _ of the time 5__All the time</p>	<p>0__N/A 1__Hearing aid no use at all 2__Hearing aid is some help 3__Hearing aid is quite helpful 4__Hearing aid is a great help 5__Hearing is perfect with aid</p>	<p>0__N/A 1__No difficulty 2__Only slight difficulty 3__Moderate difficulty 4__Great difficulty 5__Cannot manage at all</p>	<p>0__N/A 1__Not satisfied at all 2__A little satisfied 3__Reasonably satisfied 4__Very satisfied 5__Delighted with aid</p>

<p>1. How much difficulty do you have in this situation?</p>	<p>2. How much does any difficulty in this situation worry, annoy or upset you?</p>	<p>3. In this situation, what proportion of the time do you wear your hearing aid?</p>	<p>4. In this situation, how much does your hearing aid help you?</p>	<p>5. In this situation, <u>with your hearing aid</u>, how much difficulty do you now have?</p>	<p>6. For this situation, how satisfied are you with your hearing aid?</p>
<p>0__N/A 1__No difficulty 2__Only slight difficulty 3__Moderate difficulty 4__Great difficulty 5__Cannot manage at all</p>	<p>0__N/A 1__Not at all 2__Only a little 3__A moderate amount 4__Quite a lot 5__Very much indeed</p>	<p>0__N/A 1__Never/Not at all 2__About _ of the time 3__About _ of the time 4__About _ of the time 5__All the time</p>	<p>0__N/A 1__Hearing aid no use at all 2__Hearing aid is some help 3__Hearing aid is quite helpful 4__Hearing aid is a great help 5__Hearing is perfect with aid</p>	<p>0__N/A 1__No difficulty 2__Only slight difficulty 3__Moderate difficulty 4__Great difficulty 5__Cannot manage at all</p>	<p>0__N/A 1__Not satisfied at all 2__A little satisfied 3__Reasonably satisfied 4__Very satisfied 5__Delighted with aid</p>
<p>1. How much difficulty do you have in this situation?</p>	<p>2. How much does any difficulty in this situation worry, annoy or upset you?</p>	<p>3. In this situation, what proportion of the time do you wear your hearing aid?</p>	<p>4. In this situation, how much does your hearing aid help you?</p>	<p>5. In this situation, <u>with your hearing aid</u>, how much difficulty do you now have?</p>	<p>6. For this situation, how satisfied are you with your hearing aid?</p>
<p>0__N/A 1__No difficulty 2__Only slight difficulty 3__Moderate difficulty 4__Great difficulty 5__Cannot manage at all</p>	<p>0__N/A 1__Not at all 2__Only a little 3__A moderate amount 4__Quite a lot 5__Very much indeed</p>	<p>0__N/A 1__Never/Not at all 2__About _ of the time 3__About _ of the time 4__About _ of the time 5__All the time</p>	<p>0__N/A 1__Hearing aid no use at all 2__Hearing aid is some help 3__Hearing aid is quite helpful 4__Hearing aid is a great help 5__Hearing is perfect with aid</p>	<p>0__N/A 1__No difficulty 2__Only slight difficulty 3__Moderate difficulty 4__Great difficulty 5__Cannot manage at all</p>	<p>0__N/A 1__Not satisfied at all 2__A little satisfied 3__Reasonably satisfied 4__Very satisfied 5__Delighted with aid</p>

Source: Gatehouse, 1997.