

The Evaluation of Handicap Secondary to Acquired Hearing Impairment

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It is generally accepted that measures of both pure tones and speech which are commonly employed in the clinical assessment of hearing can provide at best no more than a relative measure of social efficiency and that, indeed, traditional programs of aural rehabilitation have proved equally ineffective in meeting the needs of the hearing handicapped.

Implications both for clinical assessment and for programs of aural rehabilitation which resulted from a study evaluating the adequacy of presently available clinical measures as a basis for decisions concerning rehabilitative management are discussed.

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It is commonly accepted that standard clinical measures of hearing assessment provide at best no more than a relative measure of social efficiency. In cases where the reason for evaluation is assessment of rehabilitative need, this has meant that clinicians frequently complement hearing assessment with informal questions, and that subsequently, decisions concerning rehabilitative management in individual cases are largely based on 'clinical intuition'. That such a base is inadequate is clearly demonstrated in articles such as Rassi and Harford (1968) and Oyer et al (1976) which document the high percentage of patients who fail to heed audiologists' recommendations. Such studies also indicate that lack of precision has not been limited to point of identification, that is, to clinical assessment, but has extended also to examination of the actual problems

experienced by the adult hearing impaired. It is by now generally conceded that traditional aural rehabilitation approaches based on conventional assumptions have not been successful in attracting or in holding the population judged by the clinician to warrant the assistance they purport to offer.

Despite this unpromising record, few studies have attempted to assess the adequacy of currently available clinical measures in either standard or in modified form, as a basis for clinical decisions concerning rehabilitative need. A recent study (Rosen, 1977) attempted such evaluation. A secondary purpose was to examine hearing handicap in a more broadly based sample of adults with acquired hearing impairment than has previously been reported, in the hope that further insights into the nature of hearing handicap in this population might result. The major findings of the study have been reported elsewhere (Rosen, 1977). This paper considers the implications of those findings both for clinical assessment of hearing handicap, and for programs of aural rehabilitation.

METHOD

Subjects

Subjects were 60 males and 60 females who were drawn at random from 170 community volunteers who had responded to articles in two limited circulation local newspapers. The sex distribution of the volunteers had been almost exactly equal. For reasons other than demographic, all subjects were required to be between 16 and 65 years of age, to know of or suspect hearing impairment acquired after the development of normal speech and language, to be native speakers of English, and to have normal or corrected vision sufficient for viewing the tester's face without visual difficulty. However, in general terms, the composition of the self-selected Australian urban sample did in fact conform with all the major conclusions of the HEW sub-committee investigating public health aspects of human communication (NINDS, 1970, p.12) indicating that it was indeed considerably more representative of the adult hearing impaired in the community at large than have been previously reported studies of hearing handicap, with samples commonly limited either to all male veterans (Ingalls, 1946; Ramsdell, 1947; 1960; Knapp, 1948), to members of hard of hearing societies (Welles, 1932; Myklebust, 1964) or to clinical patients agreeing to participate in research (Nett, 1960; High, Fairbanks & Glorig, 1964).

Procedures

All subjects supplied a wide range of classifying data, completed a hearing handicap questionnaire (SHI; Ewertsen & Birk-Nielsen, 1973) and answered a series of standardised questions concerning their self-evaluation of hearing handicap in various life situations. In addition, starting in most instances with the right ear first for even numbered, left ear first for odd numbered subjects, each subject was given a complete hearing assessment as follows:

(a) SRT was established monaurally by live voice, using CID W-2 and according to Chaiklin and Ventry (1964).

(b) Pure tone air conduction thresholds were established monaurally throughout the standard clinical range and including some half-octave intervals, using a modified Hughson-Westlake approach (Carhart & Jerger, 1959).

(c) Suprathreshold speech discrimination was assessed monaurally by live voice using six lists with each subject, in random order, of Northwestern University Auditory Test No. 6 (Tillman & Carhart, 1966). The randomised lists were presented in the following order:

(1) SRT plus 40 dB (auditory only)

(2) MCL (auditory only)

(3) MCL (auditory plus visual)

(d) Pure tone bone conduction thresholds were established.

All data gathering was conducted by the investigator, a practising clinical audiologist experienced in monitored live voice testing techniques, in an established audiological unit at a Sydney metropolitan hospital. The audiometer used was a Kamplex DA 111A Clinical Audiometer (SN 1122) calibrated for pure tones to ISO standard (1964) and for speech material to 20 dB SPL (ANSI, 1969). All signals were presented via matched TDH 39 phones mounted in MX 41/AR cushions. Test environment, equipment and calibration in every instance met the appropriate standard.

RESULTS

The primary aim of the investigation was to explore the adequacy of firstly, the present standard evaluation, and secondly, the present evaluation complemented by specific additional information, as a basis for clinical decisions concerning rehabilitative need. If such information can in fact provide an adequate basis for predicting experienced handicap in individual cases, then exploration of the relationships between the available self-evaluating measures and the audiometric information should be revealing.

The qualitative measures (self-evaluation of hearing handicap in general, and in social situations, and the handicap index) were first compared in simple correlation with the audiometric measures available (see Table 1). In simple correlation, it can be seen that many variables reached levels of significance. In a subsequent regression of least squares, however, the NAL binaural percentage loss of hearing procedure (Macrae, 1976), the three frequency pure tone average (500, 1000 and 2000 Hz) of the better ear, and sex, in that order, proved to be the most relevant predictors of self-evaluated hearing handicap. None of the suprathreshold measures, either in standard or in modified form, retained significance in this regard. In fact, the NU Auditory Test No. 6 scored by a non-standard method aiming both to give credit for individual phonemes correct, and to be sensitive to differences between auditory only and audio-visual presentations of material (Duffy, 1967) resulted in an extraordinarily high level of correlation in all three conditions of presentation. It appeared that this method was less sensitive to differences between the lists presented in different mode than was the standard whole word scoring procedure (see Table 1).

Subsequently, the three qualitative variables (self-evaluation of hearing handicap in general, and in social situations, and the handicap index) were compared in canonical correlation with the quantitative variables. The aim of this procedure is to maximise the relationships between the two sets of variables. In this instance, the handicap index emerged as the broadest of the qualitative measures, giving evidence of encompassing aspects of both of the more general self-evaluative measures. Of the quantitative variables, the NAL binaural percentage again emerged as the dominant quantitative predictor of individual self-evaluated hearing handicap. This measure is influenced by generalised suprathreshold speech spectrum considerations (Macrae, 1974) but is computed solely from pure tone thresholds, primarily of the better ear (as classified from the pure tone threshold information). However, in each instance, comparatively high levels of unexplained variance remained.

DISCUSSION

It was clear that in this broadly based experimental sample, the suprathreshold speech discrimination measures which for so long have been assumed to provide at least a relative measure of social efficiency did not in fact relate significantly with any of the measures of self-perceived hearing handicap. It appeared that as an aid to clinical assessment of hearing handicap, they could only be considered to be irrelevant. Moreover, the quantitative measure that was consistently dominant, i.e., the NAL binaural percentage, is based purely on prediction from pure

Table 1
Correlations Among Audiometric Variables Available from Expanded Evaluation and Self-Evaluation of Hearing Handicap in General, and in Social Situations, and the SHI

	PTA			SRT			NU No 6 plus 40			NU No 6 MCL Auditory only			NU No 6 MCL Audio-visual			NAL Bin %	Self-Eval. Gen. Soc.	SHI
	B	P	I	B	P	I	B	P	I	B	P	I	B	P	I			
PTA	B	.68		B	.61		B	.54		B	.55		B	.48		.93	.53	.58
	P		.62	P	.95		P	.38		P	.42		P	.33		.77	.47	.46
	B			B	.64		B	.38		B	.40		B	.37		.81	.49	.50
	P			P		.67	P		.62	P		.62	P		.28	.68	.44	.41
	B			B			B		.56	B		.46	B		.84	.41	.33	.42
	P			P		.61	P		.86	P		.39	P		.45	.35	.40	.39
	I			I			I		.40	I		.99	I		.48	.98	.52	.53
	B			B			B		.50	B		.86	B		.41	.43	.40	.37
	P			P			P		.61	P		.89	P		.32	.59	.34	.31
	I			I			I		.37	I		.40	I		.30	.99	.52	.53
	B			B			B			B		.31	B		.40	.55	.37	.35
	P			P			P			P		.26	P		.46	.24	.39	.24
	I			I			I			I			I		.83	.51	.43	.52
NAL Bin %																	.56	.59
Self-Evaluation																	.66	.52
General																		
Social																		
SHI																		

r_{.05} = .18

r_{.01} = .23

¹Duffy Index

tone threshold information, primarily of the better ear. Individual clinical cases, for example, obvious differences between individuals with sensorineural loss including auditory distortion compared with individuals with purely conductive impairment of the same audiometrically determined degree, readily explain in large part the 'unexplained variance' remaining from this measure.

The broadest of the qualitative measures—the SHI—which involved questions concerning communicative adequacy in specific situations, encompassed aspects of both of the more general categorical measures of self-perceived handicap. There were indications that this measure was sensitive to differences in self-evaluated handicap in those with similar degree of audiometrically determined impairment. However, the comparatively low levels of correlation among the three qualitative measures (see Table 1) suggest that the SHI, while the most relevant of the three, still warrants considerable refinement. In its present form it cannot claim to provide reliable individual prediction of everyday hearing handicap.

CONCLUSIONS

If, as is strongly suggested by survey reports as recent as that of Oyer et al (1976) our time-honored measures remain the most common bases for clinical decisions concerning rehabilitative management, it is evident that it can only be expected that many recommendations will be inappropriate to individual experienced handicap, and thus can be expected to be disregarded in a significant proportion of cases. Similarly, in view of our obvious inability to select with any precision which of our clinical clients can be expected to benefit from aural rehabilitation, it is hardly surprising that many programs of aural rehabilitation are judged by their consumers to be equally imprecise.

The problem appears to be essentially circular; we need further information about how to select those who need rehabilitative measures, but equally, we need more precise information about the nature of the rehabilitative need we are attempting to meet. In the present study, a broadly based experimental sample demonstrated that of presently available clinical measures the best predictors, either qualitative or quantitative, still result in unacceptably high levels of unexplained variance. It must be a matter for serious conjecture whether the demonstrated imprecision of present clinical decisions concerning individual rehabilitative management is remediable until and unless in the audiologic setting generally, greater cognisance is taken of the broader dimensions of human communication, and of communication breakdown.

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