

## THE USE AND MISUSE OF AUDITORY PROFILES

### REPORT

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## Executive Summary

This project had two aims; To look at the reasons why older people with hearing difficulties may not use Audiology (hearing) services, and what makes them decide to seek help; and to evaluate whether the assessments carried out in Audiology clinics relate to the real life situations older people find difficult.

Ten participants were recruited via the Audiology clinical skills participants and COPA databases. The participants were interviewed about their experiences of hearing loss and had a full audiological assessment.

There were three stages of analysis. The audiological assessments were analysed, the interviews were coded and finally the results of the assessment were compared to the participants' subjective assessment of their hearing with the levels obtained on the objective tests.

The results indicate that although all the participants in this study have hearing loss, indicated by the audiological assessment, two of the participants did not feel they had a difficulty hearing.

Speech audiometry correlated with pure tone thresholds but did not assess one of the major complaints expressed by participants, that of listening in background noise, because it was tested in quiet.

In this cohort, the configuration of the audiogram seemed to have some bearing on the participants' subjective assessment of hearing. Participants seemed to differentiate between hearing difficulties, related to the loudness of the speech and communication difficulties, related to the clarity of the speech.

This suggests that in the earlier stages of hearing loss, where clarity rather than volume is a problem, individuals do not identify themselves as deaf and therefore do not seek help from Audiology services.

## **Introduction**

Many older people experience some degree of difficulty in hearing in everyday situations. Although the NHS provides services to help with hearing problems, for example by fitting hearing aids, many people who would be eligible for these services do not make use of them.

This project had two aims:

- (1) To look at the reasons why older people with hearing difficulties may not use Audiology (hearing) services, and what makes them decide to seek help
- (2) To evaluate whether the assessments carried out in Audiology clinics relate to the real life situations older people find difficult.

### **1.1 Method**

In the first part of the study participants took part in a one hour recorded interview. The purpose of the interview was to discuss the individual's experience of hearing problems and to explore possible reasons for not seeking help. These interviews were used to develop a theory about acquired hearing loss. In addition to the individual interviews, a small focus group was also facilitated.

In the second part of the study, a comprehensive hearing assessment was carried out. Each participant was given a report detailing the results of the assessment. The information from this part of the study was used to evaluate the relationship between the tests used in the assessment and the experience of hearing problems in real life situations. Compared to the protocol originally specified in the application, the assessment was slightly changed. We followed the assessment battery specified in Wolters et al. 2007. The TEN HL test was excluded due to problems with setting up the test. It was replaced by a standard speech audiometry test presented in silence

(Boothroyd 1968). Due to the length of the test battery, we only tested transient-evoked otoacoustic emissions, not distortion-product otoacoustic emissions.

## **1.2 Participants**

All participants were aged 50 or older, had reported noticing some difficulty communicating in everyday situations, but have not been assessed for or fitted with a hearing aid. Subjects were recruited via the Audiology clinical skills participants and COPA databases. 12 participants attended for interview, but two of these participants had already been fitted with hearing aids and this data was therefore excluded from the final analysis. The remaining 10 participants had a full audiological assessment. Following this assessment, a written report of the results was given to the participants.

## **2.1 Analysis of results.**

There were three stages of analysis

- The results of the audiological assessment were analysed
- Each interview was transcribed and coded to identify common themes.
- Finally, the interviews and audiological data were examined to compare the participants' subjective assessments of their hearing with the levels obtained on the objective tests.

## **3.1 Results**

10 participants were recruited, of which 5 were female, and 5 were male. The mean age was 67.5 (range: 54 – 83, SD: 8.89 ). Although we only recruited participants who had noticed difficulties with their hearing, two reported no problems with their hearing in the questionnaire. Four participants reported both problems with their hearing and noise in at least one ear.

Pure-tone audiometry results showed that all participants actually had sensorineural hearing losses of varying severity in both ears, except for one participant, who had a sensorineural loss in left ear and a mixed hearing loss in the right ear. One participant had a profound hearing loss on one ear. The extended high frequency (EHF) thresholds are almost uniformly high. Table 2 shows statistics for three thresholds:

- PTA4 0.5, 1, 2, 4 kHz
- PTA8 0.5, 1, 2, 3, 4, 6, 8 kHz
- EHF all extended high frequencies, with frequencies that could not be measured substituted by the maximum intensity plus 5. So, an EHF value of 78.13 indicates that the participant could not hear any of the extended high frequencies

Transient-evoked otoacoustic emissions were present in all ears. In general, participants had speech audiometry scores that are well within the expected range (Avg PTA plus/minus 6dB). Table 3 shows median gap detection scores. While PTA analyses showed clear problems with participants' hearing, most of the gap detection thresholds were within normal limits. For all five thresholds, at least seven out of all ten participants have thresholds lower than 20dB, which is considered normal. Those of our participants who had PTA8 thresholds of 25dB or better in their better ear, which corresponds to a mild hearing loss, were significantly more likely to have problems detecting gaps in noise or between two pure tones ( $p < 0.05$  for gaps between two pure tones, Kruskal-Wallis test). Participants with moderate losses tended to have no problems with gap detection; the person with profound hearing loss in one ear detected almost no gaps at all. Overall, the gap detection thresholds are not correlated with either PTA or speech audiometry thresholds. This indicates that they measure a different aspect of hearing. The ability to detect gaps between noise is not correlated with the ability to detect gaps between two pure tones.

Table 1: Hearing loss in participants

Thresholds	Left Ear				Right Ear			
	Mean	SD	Min	Max	Mean	SD	Min	Max
PTA4	24.44	10.3	( 6	- 44 )	25.7	12.53	( 9	- 45 )
		9						
PTA8	32.57	10.7	( 10.63	- 50.63 )	34.3	11.86	( 15	- 49.38 )
		6			8			
EHF	72.19	6.85	( 58.75	- 78.13 )	72.5	6.04	( 61.2	- 77.5 )
					6		5	

Table 2 Distribution of thresholds in COPA sample

Measure	Median	First Quantile	Third Quantile
500 Hz	10.00	5.00	20.20
1000 Hz	10.00	6.25	16.40
2000 Hz	7.50	5.00	14.50
4000 Hz	10.00	6.25	16.50
Noise	10.00	6.25	16.20

Table 3 Gap Detection Threshold

1	67 F	Mild to moderate high frequency	Mild to moderate
2	83 M	Moderate to severe	Mild to moderate
3	58 M	Moderate high frequency	Moderate to severe high frequency
4	76 F	profound	Moderate to severe high frequency
6	69 M	Moderate high frequency	Moderate to severe high frequency
7	67 F	moderate	Mild to moderate high frequency
8	76 M	Mild to moderate	Moderate to severe high frequency
9	62 F	Mild to moderate	Moderate high frequency
10	63 F	Mild high frequency	Moderate high frequency

The results on the speech synthesis test show that users get medication names wrong no matter what the voice ( $W=184, p<0.64$ ), they get times right, no matter what the voice ( $W=244, p<0.13$ ), and have more trouble with the synthetic voice when it comes to person names ( $W=320, p<0.0001$ ). This is in marked contrast to the findings reported in Wolters et al. 2007, where we tested mainly people with normal hearing or only very mild losses. In that population, people performed well

on person names and times, but on medication names, they performed worse for synthetic speech than for human speech.

Table 4: Percent Correct Recall per Answer Category

	Medication	Person Name	Time
Human Voice	30.00	100.00	92.50
Synthetic Voice	30.00	62.50	87.50

### 3.2 Qualitative data

Analysis of the interviews identified 5 main themes.

#### Adapting.

This theme centred around how people became aware that their hearing had changed, and the coping strategies they used to manage their daily tasks. First indications of difficulty in communication centred around clarity rather than volume, with difficulty noticed initially in noisy situations. This may be the reason two of the participants stated they had no difficulty in hearing but felt they had difficulty in communication. At this stage participants did not feel they needed to seek professional help but were aware that they naturally adapted their lifestyle to cope with the change. Either by avoiding situations or manipulating surroundings e.g. selecting specific venues for social situations.

#### Gathering information

This was the next stage in the coping process. Participants described moving from adapting their present lifestyle to realising they may need to do more. This theme centred around information; how information was accessed and the impact of useful and negative information. In the first instance, participants tended to seek information from internet sites, and friends. Primary care setting were not seen as a useful source of information. There appeared to be a lack of information available in GP surgeries and often, information given by GPs

was negative and was not felt to be helpful. One participant suggested that GP surgeries were perhaps not the best place to obtain information on deafness, as the majority of people may visit their GP only infrequently. It was felt it would be more appropriate for information to be freely available in other community settings such as libraries and leisure centres. In general participants were unaware that there were other strategies for dealing with hearing loss apart from hearing aids, and felt further information about communication skills might encourage people with mild hearing loss to access services.

#### Living with Hearing Loss

This theme was about coming to terms with hearing loss and the impact on everyday life, particularly relationships with others. Participants described the process by which they had realised that their life had now changed and how they communicated this to other people in their life. Issues such as deaf awareness were raised. It was felt that deafness is a social issue and society needed to be educated in order to reduce disability.

#### Accessing services

Participants described their feelings about accessing services and professional relationships. Positive and negative interactions were identified, and their impact on whether services continued to be used. Participants also identified areas where services could be developed or improved to meet the needs of people with acquired hearing loss. Not everyone with hearing loss requires hearing aid, but participants felt this was often the only option and only offered when professionals felt it was necessary. It was felt that services should focus on a wider range of helping techniques rather than just focus on hearing aids. Participants also felt that professionals needed to listen more to the individual and take their needs into account rather than make decisions about hearing aids on the basis of test results alone.

### Using personal experience

A very strong theme was the participants' desire to use their experience to help other people either avoid hearing loss or deal with it in a positive way. This was an important role for many of the participants. It was felt that hearing loss and hearing aids should be discussed more openly in society in order to project a more positive image.

Audiological assessment showed that all participants had some degree of hearing loss. All participants described themselves as having difficulty in communicating, but two of the participants felt they had no difficulty hearing. Both these participants had audiogram configurations that show a marked trough in the high frequencies. One of these two participants also has problems detecting gaps between tones. Gap detection thresholds tend to correlate with the ability to understand speech in noise. Speech intelligibility in noise was not tested due to time constraints. The EHF values of this participant show that he has lost the high frequencies completely in the left ear.

## **4.1 Discussion**

The results indicate that all the participants in this study have hearing loss as indicated by the auditory profile. However two of the participants did not feel they had a difficulty hearing

Speech audiometry correlated with pure tone thresholds but did not assess one of the major complaints expressed by participants, that of listening in background noise, because it was tested in quiet. However, the literature on gap detection suggests that the random gap detection test may correlate with the ability to hear speech in noise (Snell and Frisina 2000). Since it is significantly shorter than a full Speech Intelligibility in Noise assessment, it might be a useful addition to the Auditory Profile. Further work needs to be done to test this hypothesis.

In this cohort, audiological configuration seemed to have some bearing on the participants' subjective assessment of hearing. Participants seemed to differentiate between hearing difficulties, related to the loudness of the speech, and communication difficulties, related to the clarity of the speech.

This suggests that in the earlier stages of hearing loss, where clarity rather than volume is a problem, individuals do not identify themselves as deaf and therefore do not seek help from Audiology services. Further work is needed to explore the concepts of hearing loss, deafness and communication from the clients' perspective .

## **5.1 Dissemination of results**

A workshop is planned for early January 2009. Both participants and professionals will be invited. We will also submit brief reports on our findings to the British and American newsletters for audiologists.

In order to disseminate our findings to the research community, we will submit two papers to peer reviewed journals in Spring 2009. One paper will focus on the qualitative results, while the other paper will report the quantitative assessments, combining the audiological assessments with a database of older users' hearing that was gathered for a previous project (Wolters et al. 2007).

## **6.1 Further work**

A focus group will take place in early December. The purpose of this group is to explore the themes arising from the initial interviews in more detail.

Follow up interviews will also be arranged in December. In these interviews, participants will be invited to discuss themes

in relation to their own initial interview. The audiological findings will also be discussed to see if these have influenced the participants' feelings about their hearing and to explore the concepts of hearing loss, communication and deafness in more detail.

## 6.2 References

Snell, K. and Frisina, D. (2000): Relationships among age-related differences in gap detection and word recognition. *Journal of the Acoustical Society of America*, Vol. 107, pp. 1615-1626

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