

# Interventions after screening for hearing difficulties: a retrospective investigation of interventions other than hearing aids

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## Introduction

There have been a number of studies on screening of hearing in adult populations. Despite the high importance of interventions following screening for hearing (Wilson and Jungner, 1968) there is a dearth of information on the nature of interventions following such screening, other than hearing aid fitting (HA) or referral to audiology/ENT departments (Pronk *et al.*, 2011). In the late 1980s and early 1990s four studies were performed in Wales, which offered such other interventions to those individuals indicating hearing disabilities in screening questionnaires (eg Stephens *et al.*, 1990; Davis *et al.*, 1992). The majority of the patient notes from these studies were still accessible and have been examined to extract the following information:

- what interventions were used other than hearing aids?
- who received these interventions?
- would they have been more appropriate than HAs for some of those fitted?

The aim of this paper is to list the interventions provided in these studies and relate them to the initial complaints of those indicating hearing problems.

## Methods

We targeted three of these studies, for which most information was

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available. The studies concerned were:

- Glynccorrwg – 1987-88 – n=127 (National Study of Hearing closed set questionnaire (NHS) plus audiograms, Social Hearing Handicap Index [SHHI -Ewertsen & Birk Nielsen, 1973] and Emotional Response Scale [ERS - Noble and Atherley, 1970])
- Blaengwynfi – 1989-90 – n=93 (WHI open-set questionnaires, audiogram, SHHI, ERS)
- Llantrisant – 1990-92 – n=63 (Welsh Hearing Institute open-set questionnaires, audiogram, Hearing disability and Handicap scale [Hétu *et al.*, 1994])
- In each case, the screening questionnaires (Stephens *et al.*, 1990) were sent to all patients (males and females) registered with General Practitioner – GP (Primary Physician) and aged 50-65 years.

In the UK everyone is registered with a GP and must pass through them to be referred to hospital-based services, including audiology departments. Questionnaires were sent out from the Welsh Hearing Institute with an accompanying letter from the patient's GP encouraging responses. Those meeting criteria were then sent appointments for clinical history and examination by an Audiological Physician and testing by WHI staff in or near their local Health Centre. Those with worse ear hearing levels (WEHL), averaged across 500 Hz, 1, 2, 4 KHz, equal to or over 30dB were offered hearing aid/s. Those accepting hearing aids had impressions taken for earmoulds, with hearing aid fitting 2-4 weeks later by WHI staff. Those not meeting the criterion or refusing hearing aids were offered other advice. Such advice, with very few exceptions, comprised one session only. Those fitted with hearing aids were followed up by WHI staff until coping well. Those not fitted were not followed up. There was a later follow-up of those fitted with HAs by WHI staff member 2-5 years later and a long-term follow-up by a research fellow 6-9 years after fitting (Gianopoulos *et al.*, 2002; Davis *et al.*, 2007). The patient records available in 2009/10 were examined in detail by the first author, and information on interventions, hearing levels, and questionnaire results entered into a database.

## Results

In total, we have data for 283 individuals who failed the questionnaire screen. Table 1 shows the percentages of subjects receiving different interventions within the three studies.

As might be expected from the study criteria, those fitted with hearing aids had worse hearing than those who were not (BEHL - Glynccorrwg 29 dB vs. 17 dB; Blaengwynfi 32 dB vs. 15 dB; WEHL - Glynccorrwg 37 dB vs. 21 dB; Blaengwynfi 39 dB vs. 20 dB; All P<0.001). Similarly, they also had worse scores on the SHHI and ERS (SHHI - Glynccorrwg 25.5 vs. 15; Blaengwynfi 17 vs 15; ERS - Glynccorrwg 4.5 vs 1.0; Blaengwynfi 3.5 vs 0.5; All P<0.001).

Among the Glyncorrwg patients, 34 received formal interventions with hearing tactics or advice on environmental aids and 29 received just reassurance and explanation of their results. These two groups did not differ significantly in terms of their better or worse ear hearing, nor in their ERS scores. However, the hearing tactics/environmental aids group had significantly worse scores on the SHHI than the reassurance group (median scores 18 vs 11;  $P < 0.01$ ).

Table 1 shows that there were 12 patients from Glyncorrwg who received no intervention. These were essentially those who indicated a significant history of occupational noise exposure but reported no hearing disability. We compared them with the remainder of the non-hearing aid group in terms of BEHL, WEHL, SHHI and ERS but found no significant difference in any of the measures.

In the long-term follow-up, it was found that only 42% of those fitted with hearing aids continued to use them (Gianopoulos *et al.*, 2002; Davis *et al.*, 2007). We were interested as to how the long-term users and non-users differed and whether the non-users could have been helped by other types of interventions. These were considered in terms of the problems which the subjects listed in response to the WHI question used with the Blaengwynfi and Llantrisant patients, which was worded: *Do you have any difficulty with your hearing? If yes, please make a list of the difficulties which you have with your hearing.*

First we compared the hearing levels of the users and non-users and found no significant differences in their BEHLs or WEHLs. For the Blaengwynfi group, we were able to compare their SHHI and ERS scores and found significantly worse median scores in the users than

**Table 1. Interventions offered after screening (% of respondents in each study).**

	Glyncorrwg	Blaengwynfi	Llantrisant
Hearing aid fitting	27	46	55
Hearing tactics	24	24	16
Reassurance/results discussed	24	22	4
Tinnitus/balance therapy	1	7	7
Wax removal	3	2	9
ENT referral/medication	3	0	2
Environmental aids	3	0	5
Electrophysiological tests	2	0	2
No treatment	12	0	0

**Table 2. Number of specific complaints of those not using hearing aids on long term follow-up and possible alternative management.**

Complaint	Blaengwynfi	Llantrisant	Possible therapy
Blocked/bubbling ears	2	0	Medical
Hyperacusis	2	0	Medical
Tinnitus	0	4	Medical
TV/Telephone/Doorbell/Phone bell	7	8	Environmental aids
Hearing in noisy places or in groups	7	7	Hearing tactics
General conversation	4	3	Hearing tactics
Hearing without speechreading	3	0	Hearing tactics
Asking people to repeat	0	2	Hearing tactics
Hearing from a distance	2	2	Hearing aids only
Hearing soft voices	0	1	Hearing aids only
Hearing from the bad side	0	1	Hearing aids only
Miscellaneous	2	0	Hearing aids

in the non-users prior to intervention (SHHI 34 vs. 23.5,  $P < 0.05$ ; ERS 6 vs 2.5,  $P < 0.02$ ). The specific complaints (n) of the non-users are shown in Table 2. From this Table, it may be seen that in eight cases hearing aids would be needed to solve the particular problem, whereas the other 49 problems could be solved using other approaches. Of these, the most useful would be hearing tactics (26), with eight others amenable to medical approaches and fifteen to environmental aids.

## Discussion

The first matter to be addressed is the fact that the data analysed in this study were collected some 20 years ago, when the hearing aids being fitted were fairly basic analogue behind the ear aids. However it is notable that hearing aid use in the population has not changed materially with the introduction of digital signal processing hearing aids (Kochkin, 2007) and that hearing aids are still largely underused (Lupsakko *et al.*, 2005) and result in no more patient satisfaction (Gohar *et al.*, 2008). This applies to countries like Wales where hearing aids are provided free of charge (Stephens *et al.*, 2001). In addition the range of non hearing aid interventions has not changed notably over this time, with the possible exception of home-based auditory training (eg Kramer *et al.*, 2005; Sweetow and Sabes, 2006). We would thus argue that findings from this study remain valid today.

From both tables it may be seen that the intervention offered most frequently, and also most often appropriate for helping non-users of hearing aids, was that of hearing tactics. These are behavioural approaches first formulated by Von der Leith (1972) and classified by Field and Haggard (1989). More recently, we have taken a broader approach to these, as shown in Table 3 (Stephens and Kramer, 2009; 2010). We would argue that the use of such tactics has an important part to play as an intervention for patients indicating hearing disabilities on screening but either have mild hearing impairments or are unenthusiastic about hearing aid fitting. They should also be used to complement hearing aid fitting. Many individuals with mild hearing impairments but little speech hearing disability (SHHI) were managed with reassurance and explanation. In many cases this was undoubtedly all they sought in view of their emotional responses to their impairment, but careful probing of their concerns may be necessary. Others needed or received medical interventions, and it is inevitable that any screening involving disabilities, will highlight a number of such problems. Appropriate access to medical facilities where these concerns can be addressed is important. Environmental aids (assistive listening

Table 3. Types of hearing tactics.

Category of tactics	Examples
Observation	Watch the face of the speaker
	Take note of context
	Focus on the main points in the conversation
Manipulation of the social interaction	Tell others to get your attention before speaking
	Position oneself so that the face of speaker is close
	Ask talker to speak up, talk slowly or rephrase misheard sentences
Manipulating the physical environment	Ensure light is on the face of the speaker
	Move to a quiet area
	Turn off the radio
Self-advocacy	Admit hearing impairment
	Explain to others ways of facilitating communication
	Remind others about hearing difficulties
Manipulation of the conversation	Dominate conversations
	Interrupt when listening is difficult
	Pretend to understand
Avoidance	Avoid noisy situations
	Avoid talking to strangers
	Ignore people who are difficult to understand

devices) were offered to surprisingly few individuals, perhaps partly because of the sociomedical system involved in which hearing aids are provided free of charge, but environmental aids not always so. In addition the quality of such devices has improved considerably over the past 20 years and they should be considered as an important post-screening intervention in future investigations. Finally it may be noted in Table 1 that, in Glynorrwg, 12% received no intervention. When the results for these individuals were examined it became apparent that nearly all were called up because of the inclusion of a question on occupational noise exposure in the criteria. They all denied any disability, even though they did not differ from those receiving non-hearing aid interventions in any other way. This emphasises the importance of the criteria used in any screening questionnaire, and it is apparent from Table 1 that, in Blaengwynfi and Llantrisant, where the focus was specifically on hearing disabilities, the proportion of hearing aid fittings was higher. This was highest in Llantrisant, where an additional criterion question was *Do you think you want any help with your hearing?*, an indirect measure of motivation. We found that those fitted with hearing aids and not using them in the long-term had hearing levels which did not differ significantly from those of the long-term users, but had lesser hearing disabilities (SHHI and ERS). This highlights the need for the use of a questionnaire in any screening measure rather than the use of audiometric or speech recognition measures alone if we are to provide a cost-effective service. This is in agreement with the results of a large review of the literature on factors influencing hearing help seeking, hearing aid uptake, hearing aid use and satisfaction with the device (Knudsen *et al.*, 2010). In addition, it is important to realise that what we should be addressing are the problems and needs of the individuals screened rather than their hearing levels. A range of appropriate interventions should be available to meet the needs of the individuals within the population reporting hearing disabilities.

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