

International Encyclopedia of Rehabilitation

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Audiology – Audiological Enablement/Rehabilitation

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Introduction

Audiology is generally defined as the ‘Science of Hearing’ with Clinical Audiology and Audiological Medicine being concerned with the diagnosis and treatment of hearing disorders (e.g., Martin and Summers 1999, Luxon et al. 2003, Jerger 2009). Normally clinical audiology covers the two main areas of ‘diagnostic audiology’ and ‘audiological enablement/rehabilitation’. Adult audiology and paediatric audiology are often separated, with the latter comprising newborn hearing screening, diagnostics and habilitation. In addition, the diagnosis and management of balance disorders and tinnitus may also be included. However, the scope of the present section is limited to the area of ‘audiological enablement’. The section is based largely on our recent book ‘Living with hearing difficulties: the process of enablement’ (Stephens and Kramer 2009). For further information on diagnostic audiology, the reader is referred to general texts edited by Gelfand (2009), Katz (2009), Luxon et al. (2003).

The function of audiological enablement was defined by Pauls and Hardy in 1948 (p97) as ‘to furnish the individual with the communication tools with which to offset his impairment to an optimum degree and to help him gain insight into his disability and the problems it raises’. More recently, we have defined the process as being ‘A problem-solving process aimed at:

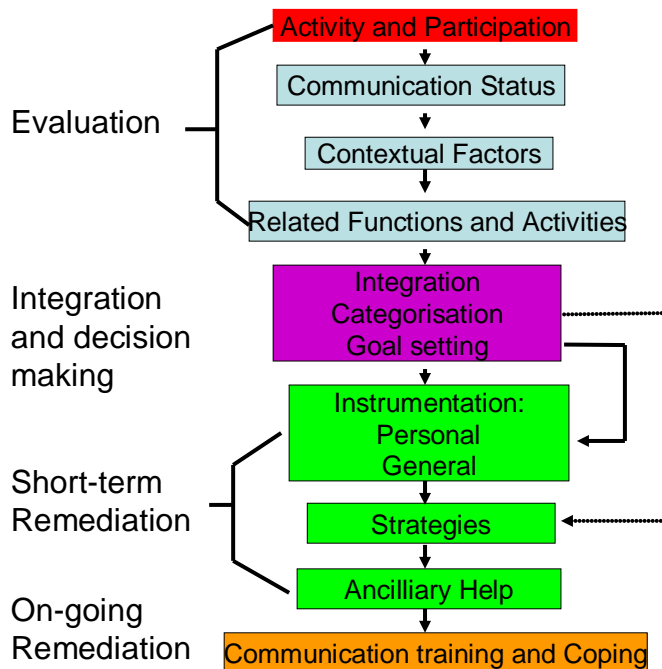
- Enhancing the activities and participation of an individual with hearing difficulties;
- Improving their quality of life;
- Minimising any effect on significant others;

- Facilitating their acceptance of any residual problems' (Stephens and Kramer 2009).

This has been based on a range of other definitions, including Bergman (1950), Goldstein and Stephens (1981) and Wade (2006) and ICF (WHO 2001).

This process can be considered to comprise the major components of 'Evaluation', 'Integration and decision making', 'Short term remediation' and 'Ongoing remediation'. These components are illustrated in Figure 1.

Figure 1: The active process of audiological enablement



Short term remediation, involving the use of appropriate instrumentation including hearing aids, cochlear implants and environmental aids (assistive listening devices) as well as a discussion of goals and tactics to achieve such goals, will usually take place over 2-3 sessions. Ongoing remediation, involving both patients and their communication partners (significant others), may last days, months or even years until optimal enablement has been achieved. It may often entail returning to earlier parts of the enablement process.

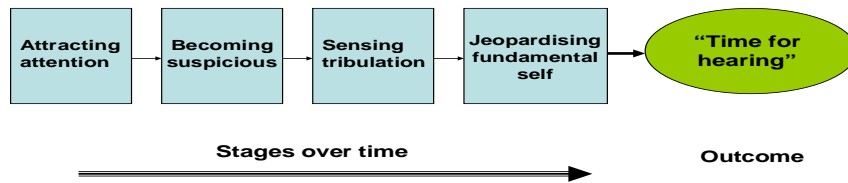
The basic philosophy is that the process should be inclusive, but tailored to meet the specific needs of the individual concerned.

Accessing the process

A person living in the community may develop a hearing impairment, but that does not necessarily mean that they obtain relevant help to reduce its effects on their life. This

process has been termed ‘help-seeking’ and has been discussed in detail by Stephens and Kramer (2009). In addition, the term, the ‘Patient Journey’ has also been used in this context (Engelund 2006) – see Figure 2 - and this has been further elaborated as a tool for understanding the process by the Ida Institute.
(www.idainstitute.com/tools/patient_journey)

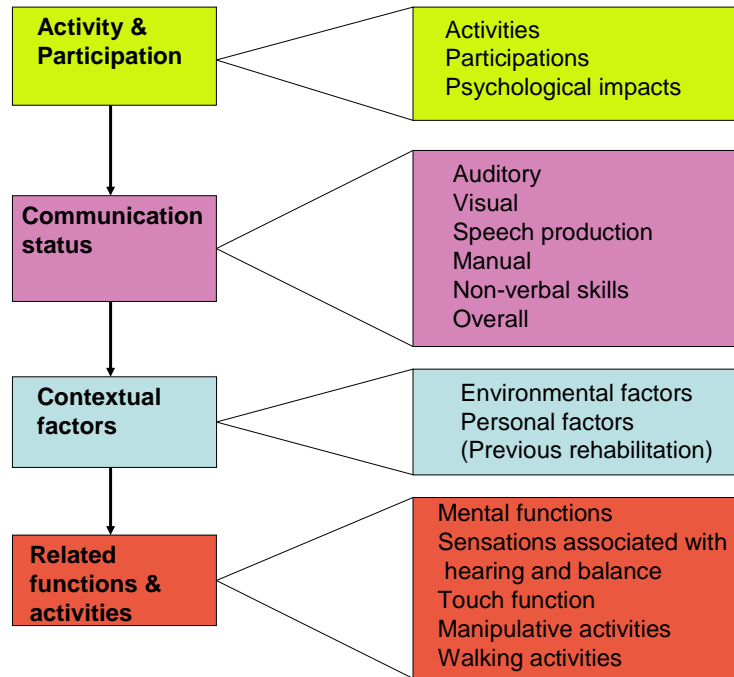
Figure 2: The Patient Journey (derived from Engelund, 2006)



Patient evaluation

Before any intervention takes place, the patient must be evaluated in a way to determine the most relevant interventions to meet the individual's needs. This evaluation may be divided into four main components, as shown in Figure 3.

Figure 3: Outline of Patient Evaluation



Each element of this must be considered, even if only briefly, to ensure that all pertinent aspects of the remedial process are highlighted (Goldstein and Stephens 1981, Stephens and Kramer 2009).

Activity and Participation

This is a key section of the process, which highlights the individual patient's needs and problems. We use the terminology from the World Health Organization's International Classification of Functioning, Disability and Health - ICF (WHO, 2001). We also specifically refer to the psychological impact of the condition at this stage, as this is often the main reason for the patient having sought help, and its position within ICF is not clear.

While in many cases the patient's problems are elucidated in a face to face interview, we find that this can be facilitated by sending the patient an open-ended questionnaire with their appointment letter worded "*Please make a list of the effects your hearing problems have on your life. Write down as many as you can think of*" (Stephens et al. 2001). This has the function of focusing the patient's thoughts on their real problems before the clinic appointment, when the clinician can ask them to elaborate on the more general points made. These can then be used as a basis of later outcome assessments, such as the Client Oriented Scale of Improvement – COSI (Dillon et al, 1997). In addition, it may be useful at this stage to consider the evaluation of the patient's main communication partner (significant other) using an approach parallel to that used with the patient.

Communication Status

This section is concerned with determining the relevant parts of the communicative ‘raw material’ with which the audiologist has to work in the enablement process. The key area concerns the individual’s *auditory* deficit and the focus must be on measures which will influence any interventions. Thus, pure tone audiometry is the usual starting point to define their auditory acuity (see Katz 2009, Luxon et al. 2003). A measure of the upper limit of the dynamic range of the ear, usually the Uncomfortable Loudness Level – ULL, will be necessary as this range can be markedly reduced in cochlear hearing impairment. Various measures of speech recognition are widely used, although often their impact on the intervention is minimal.

The patient’s *visual acuity* and discrimination can have a major influence on their speech-reading (lipreading ability) and should be checked, at least informally. Improving a visual deficit is certainly one of the most effective ways of improving such speech-reading, which in turn has a major impact on auditory communication (e.g., McGurk and MacDonald 1976). The formal testing of speech-reading ability is important for relatively few individuals, although informal assessment can be useful therapeutically. Similarly, relatively few individuals with hearing impairment have significant *speech production* deficits, and these abilities are usually assessed informally. It is, however, important to be aware at this stage of the patient’s first or dominant language and to ensure that, where possible, the service is provided in that language or using a qualified interpreter.

Likewise, *manual communication* (sign language) is relevant to few patients beyond the prelingually deaf, and most individuals will be familiar with the modes of *non-verbal communication* in their society. Those born in other countries with different cultural backgrounds may need help in this respect.

Contextual factors

This section comprises basically an assessment of attitudes towards the enablement process by the patient and their communication partners. These will have a major impact upon how the intervention is structured and the orientation to be used by the therapist. In addition, it is important at this stage to determine what, if any, previous interventions the patient has received and their response to such interventions.

The attitudes of and support given by important communication partners, at home, at work and elsewhere should be assessed, face to face if possible, but using the patient’s reports if they have attended the clinic alone. In addition, both the patient and communication partner’s perception of any positive consequences of the hearing impairment should be assessed at this stage, either informally or using a questionnaire (Stephens and Kerr, 2003), which can have the added advantage of making them aware of such experiences reported by others.

Related functions and activities

This covers aspects of the patient which may influence details of the instrumentation and other elements of intervention, rather than the broad-brush approach determined by the contextual factors. Thus the individual’s intellectual abilities as affected by dementia or

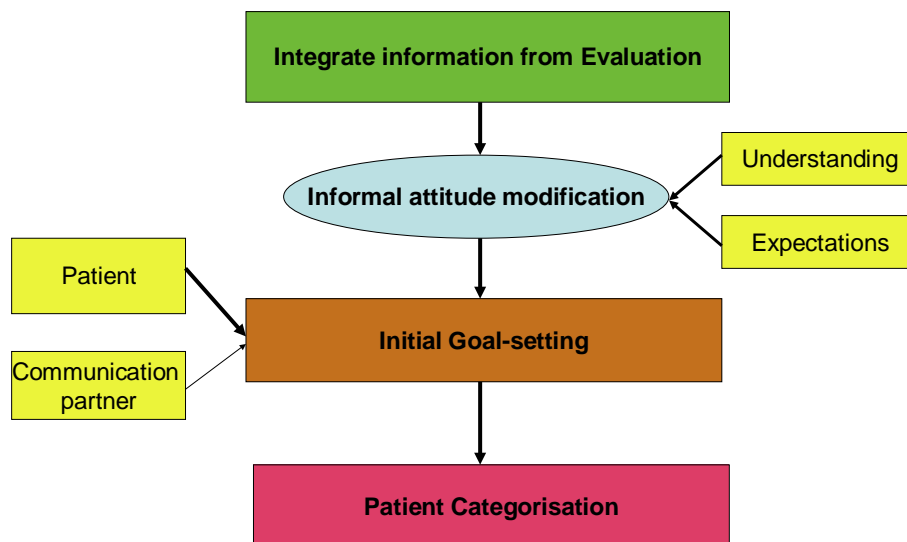
intellectual disability will necessitate differences in presentation and involvement of caregivers.

Whether they have discharging ears, tinnitus or other aural pathology can affect the choice of instrumentation to be used, as will their handling skills, possibly affected by tremor or impaired tactile sensitivity. Finally, if the individual is housebound or even bedbound, this will suggest that they may be better helped by environmental aids (assistive listening devices) rather than wearable hearing aids.

Decision making

Following the patient evaluation, the first important decisions must be made with regards to their management. The steps in this process are shown in Figure 4.

Figure 4: Summary of the decision-making process



The first stage is to pull together all the relevant information collected in the Evaluation stage and consider, in conjunction with the patient, how best to implement the enablement process in order to address their specific problems.

Informal attitude modification

At this stage it may be apparent that the individual has inappropriate attitudes towards the process. These may stem from their understanding of their underlying condition and of what the enablement process will comprise. In addition, they may have unrealistic expectations of what may be achieved through enablement. These may be over optimistic or the converse, and either can affect the patient's compliance with the process and their willingness to persist with different components of this. Many of these problems can be addressed in informal conversation with the audiologist, although more serious concerns

will be addressed in more detail in formal counseling sessions, which will precede other elements of enablement.

Initial goal-setting

This will take place initially with the patient and, subsequently, jointly with the patient and their main communication partner. In order to set such goals, it is important to consider the main difficulties reported by the patient as the starting point. These can then be addressed in terms of what the patient sees as their most important goals and also those which the audiologist also sees as achievable. Such goals may then be refined in conjunction with the communication partner. Any initial goals should be realistically achievable in order to maintain the motivation of the patient throughout the process.

Patient categorization

This is an important step for the therapist at this stage. It entails a triage, which has implications for the distribution of resources and time among patients. The idea is to get away from the concept of ‘one size fits all’.

Goldstein and Stephens (1981) proposed four categories, subsequently modified slightly by Piercy and Goldstein (1994), and which have stood the course of time. These are shown in Table 1.

Table 1 - Patient category types

Category	Description
1	Positively motivated and straightforward
2	Positively motivated with complicating factors
3	Want help, but are resistant to certain elements of the enablement process
4	Deny any disability

Category 1 patients have good motivation and are happy to accept the suggestions of the therapist. They have an essentially uncomplicated hearing impairment and will pass quickly through the system and require a small number of sessions.

Category 2 patients are also positively motivated, but have complicating factors. These may entail either a very mild or a very severe impairment; they may have other aural conditions such as tinnitus or discharging ears; they may have poor handling skills or tremor. In all cases they will need more prolonged attention and time in the context of ongoing remediation.

Category 3 patients have unrealistic attitudes towards certain components of the enablement process. They may want help but refuse categorically to consider hearing aids. They may expect hearing aids alone to resolve all their psychological and relational problems. In both instances, early fitting of hearing aids would be counterproductive and they should be routed quickly to counseling, including group sessions.

Category 4 patients deny any disabilities and oppose any intervention, usually having attended the clinic only at the behest of their communication partners. Any overt intervention will be counterproductive and, at this stage they should be told to return when they would like help. Separately, the communication partners should be given advice on communication tactics and possible environmental aids (sometimes referred to as assistive listening devices: ALDs) which could be introduced unobtrusively in a way acceptable to the patient.

Instrumental interventions

For most patients with hearing difficulties, this element of enablement is the most important component and the one which they expect. Instrumental intervention will not generally alter the underlying impairment but can markedly reduce the experienced disabilities.

Instrumental interventions comprise either '*Personal instruments*', designed and programmed for the particular individual and their hearing impairment, or '*General instrumentation*', (Environmental aids), which may be selected with a particular person in mind, but can equally well be used by other people with hearing difficulties.

The main types of Personal Instruments are shown in Table 2.

Table 2: Types of personal instruments

Hearing aids	Standard – Digital or Analogue
	CROS aids
	Frequency transposition aids
Implantable devices	Bone-anchored hearing aids
	Middle ear implants
	Cochlear implants
	Brainstem or midbrain implants
Tactile aids	Vibrotactile
	Electrotactile

Hearing Aids

The vast majority of personal instruments fitted are standard hearing aids, almost entirely digital signal processing aids (DSPs) in most developed countries. These are discussed in more detail elsewhere in this Encyclopaedia and in a range of books (e.g., Dillon 2001). It is important to consider a few points in their selection and decisions which need to be made, apart from the important electroacoustical considerations. These are:

- One hearing aid or two? – For most patients two is ideal from an acoustical point of view, but the majority will generally accept or be fitted with only one.
- Hearing aid type – Now nearly all hearing aids fitted are head-worn, either in-the-ear or behind-the ear. Body-worn aids are rarely used and for people with severe mixed hearing losses or handling difficulties.
- Colour – Coloured hearing aids are frequently used for children but rarely for adults, despite the fact that such approach may help reduce the associated stigma.
- Choice of earmoulds – This has a major effect on the acoustical characteristics of behind-the-ear hearing aids. With the development of electronic feedback suppression in hearing aids, open mould fittings have become more popular and widely used.
- CROS aids – CROS (Contralateral Routing of Signals) or BICROS can be helpful for some people with a severe hearing loss in one ear and relatively good hearing in the other. Sounds are taken from the poor ear and presented to the better one.
- Frequency transposition aids – Some patients with good hearing at the low-mid frequencies and a severe loss at the high frequencies may benefit from the high frequencies being electronically shifted to the mid-frequency band.

Implantable devices

These are used far less frequently than hearing aids and are indicated only in people with very specific types of hearing impairment.

Bone-anchored hearing aids are linked to the skull through a titanium screw and stimulate the inner ear by vibrating the skull with bone-conducted sound. They are used for people with atresia of the ear canal and the principle is to bypass the blockage to air-conducted sound arising from this. They are also used with patients with intractable chronic suppurative otitis media and severe otitis externa (eg Snik et al. 2005).

Cochlear implants entail an electrode array being surgically inserted into the cochlea which stimulates the endings of the cochlear nerve directly. They are widely used with people with severe-profound hearing impairment arising from the cochlea. The electrodes are stimulated by an external device usually located behind the ear and cochlea are particularly indicated for people with very poor speech recognition with standard hearing aids (eg Wilson and Dorman 2008).

Middle-ear implants are rarely used, but may be useful for some patients with severe chronic otitis externa. They entail stimulating the stapes in the middle ear, and hence the cochlea using a piezo-electric or electromagnetic device (eg Verhaegen et al. 2008, Haynes et al. 2009).

Brainstem or Midbrain implants have a very limited, but important role in patients with Neurofibromatosis 2 (NF2), who have bilateral tumours of the vestibulocochlear nerve which result in total hearing impairment. The aim is to stimulate the central auditory pathway rostral to the tumour, particularly the dorsal cochlear nucleus or the inferior colliculus using an implanted electrode array (eg Schwartz et al, 2008; Lim et al, 2009).

Tactile aids

These entail sensory substitution using either vibrotactile or electrotactile stimulation, usually of the hand or arm. They are used with patients with profound or total hearing impairment, but with the development of multi-channel cochlear implants are now rarely used. They may be indicated for such patients who are unable or unwilling to have a cochlear implant, but are generally far less effective (eg Miyamoto et al. 1995).

General Instrumentation – Environmental Aids – Assistive Listening Devices

These come in two broad categories, *Communication aids* and *Aids to Daily Living*. They are generally based either on making sounds more audible or on sensory substitution.

Communication Aids are used in circumstances where the individual is having difficulty hearing speech, particularly on the telephone, radio and television and in public places. They normally entail means of improving the signal to noise ratio at the patient's ear or providing the information in terms of text or signing.

Aids to Daily Living are mainly concerned with alerting and warning signals, such as alarm clocks or door and phone bells. They may entail the use of more audible types of sound or sensory substitution. The types of approach which may be used for these and for communication aids are shown in Table 3.

Table 3: Types of approaches used with environmental aids

Sensory Domain	Communication Aids		Aids to Daily Living	
	Principle	Examples	Principle	Examples
Auditory	Improving signal-noise ratio	Extension speakers	Low frequency	Alarm clock
		Amplifiers		Doorbell
		Loop	Loud	Phone bell
		Infra-red		Doorbell
		FM Radio		Alarm clock
				Baby alarm
Visual	Adding text	Subtitling/supratitling	Strobe lights	Alarm clock
		Teletext		Telephone bell
				Smoke alarm
		Text phones	Built-in light	Telephone bell
		Fax		Alarm clock
		e-mail	Flashing house lights	Telephone and doorbell
	Adding visual images	Signing		
		Video phones		
		Skype		
Tactile			Mobile/wearable vibrator	Telephone and doorbell
			Fan	Alarm clock

Short Term Non-Instrumental Intervention

The short-term non-instrumental intervention in the enablement process generally comprises two elements. One is *strategy* which entails a broader approach than hearing tactics alone. The second is referral for *ancillary help*.

Strategy

The key components of strategy are goal setting, communication partner and hearing tactics.

Goal setting

At this stage, the patient defines goals which are viewed as particularly important. In a patient-centred approach, goal setting will entail some degree of negotiation between the patient and professional to ensure that these are priorities for the patient and are likely to be achievable. Goals have to be refined during the instrumental stage to highlight what the patient's expressed residual problems are. Goal setting must take into account the patient's underlying philosophy of life and personality and the attitudes of their communication partners, as discussed below, before specific tactics are decided.

Communication partners

The attitudes and approach of those around the patient to their hearing difficulties may be relevant to the tactics recommended. However, it is essential that the patient's needs and feelings be always given priority over those of the communication partner, who may seek to control the patient. Héту et al. (1993) discussed the interactive role of the audiologist with the couple, where the audiologist should act as a facilitator, interacting with both members of the couple rather than with just one.

Hearing tactics

There is a wide range of behavioural strategies that can be applied by both the individual with hearing impairment and their communication partner(s) to solve the practical, technical and/or psychological problems experienced in daily life. These are referred to as 'hearing tactics' or 'hearing strategies'. A list of frequently used hearing tactics is presented in Table 4. Whereas many of these methods may be used spontaneously by both hearing and hearing-impaired people, they can also be taught. Such training usually comprises a component of aural enablement programmes.

Table 4: Behavioral strategies to solve the practical, technical and/or psychological problems experienced in daily life.

Category of strategies	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

Ancillary Help

Ancillary help covers areas related to the enablement process which are beyond the scope and expertise of the audiologists caring for the patient. This complements the audiologist's work, rather than handing over the management of the patient to a different type of professional. As such, it should be regarded as a multidisciplinary or integrated approach.

The elements of help which may be sought at this stage are

- Social Services
- Health services
 - Other Medical, Psychological etc
- Education and Training Services
- Labour and Employment Services
- Voluntary Organisations

Communication Training and Coping

Traditional audiological rehabilitation, comprising one or two individual sessions with a therapist as part of hearing aid fitting, may not be adequate or sufficient for every individual to hear optimally. Some patients may need additional training to reach that

goal. Examples of other forms of therapy are perceptual (or auditory) training, cognitive training, training in speech reading, clear speech and communication repair.

Auditory or perceptual training

The vast majority of people with hearing impairment using hearing aids (or cochlear implants), experience that their auditory perceptions are different from those experienced before the hearing impairment or before using amplification (Boothroyd 2007). The purpose of auditory training is to help people to acclimatize to the new sound perceptions, so that they will be better able to discriminate vowels and other phonemes. As such, they can make the most of their residual hearing and better understand sounds and comprehend degraded speech. Training involves the repetitive presentation of stimuli (sounds, phonemes, words).

Speech reading

Another important type of training concerns ‘speech reading’. Speech reading is seeing the sound of spoken language. It occurs in situations where the listener can both hear the speaker and see his or her face (Reisberg et al. 1987). Each phoneme has a particular facial and mouth position (viseme). The movements of lips and tongue, together with the facial expression and body language, are all cues for speech reading. Training requires a series of sessions.

Clear Speech

Features of clear speech are a slower speaking rate, frequent pauses, increased duration of phonemes, fuller differentiation between phonemes and good articulation. Several studies have demonstrated that ‘clear speech’ is easier to follow than conversational speech (e.g. Schum 1996). Speakers can be trained to produce clear speech. Talker training as an intervention for communication partners (spouses, family members, friends) of the person with hearing impairment has been advocated.

Communication Repair

Communication repair concerns clarification of the precise reason why the listener did not understand the conversation and why a communication breakdown occurred. Examples of communication repair strategies are : “Ask the speaker to talk a little slower” and “Ask the speaker to repeat (or to spell out) the last spoken word” (see www.hearingresearch.org/ross/aural_rehabilitation, (Ross 2002)).

Hearing tactics

Aspects of what had been covered in short-term remediation are extended and elaborated on in this section.

Coping

In addition to *practical* (or behavioral) strategies, *emotional* strategies are used to solve difficulties in daily life as a result of hearing impairment. Any emotional reaction towards hearing difficulties in the process of adjusting to hearing impairment and accepting it, may be regarded as an emotional coping strategy (Lazarus and Folkman 1984). Examples

are anger, sadness, distress and depressive symptoms. An individual with auditory difficulties usually goes through different stages in the patient journey. Any stage may be accompanied by different emotional states. Practical (behavioural) and emotional strategies together represent the concept of coping. Coping strategies are ways to handle the problems related to hearing impairment (i.e. external or internal demands) and these are conscious processes. Throughout the process of enablement, the concept of coping is essential.

The various forms of training, as presented here, are usually designed as components of a broader audiological enablement programme which may also encompass counseling in how to cope with hearing impairment. There are different settings for interventions within aural enablement programmes and these are discussed in the next section.

Interventional settings

The process of integrating hearing impairment into one's life usually involves ongoing remediation. It is a dynamic process which evolves over time. Ongoing remediation aimed at promoting lasting lifestyle, coping and attitude changes can be organized in different settings. These include individual settings, home-based programmes and group settings. Involvement of the communication partner of the patient in the enablement process is emphasized.

Individual counseling

The person in the clinic responsible for the content and carrying out of individual counseling is the enablement (or rehabilitation) worker. Usually an audiologist, a hearing therapist, a social worker, or a psychologist fulfills that role. Listening is an important skill of the enablement worker, as well as the willingness to work cooperatively with the patient towards individual and creative solutions. The worker's expression of empathy is essential. It is the enablement worker's task to identify the patient's problems and needs. The number of sessions may vary and also depend on the health care system.

Home-based programmes

Most of the training types described in the preceding section are computer-aided and hence, lend themselves to use at home. An advantage of a home-based programme is that patients are able to choose their preferred moment for training and to perform the training in their own environment. Home-based education and training also facilitates the involvement of the communication partner, as the patient and their communication partner are no longer dependent on tight schedules in the clinic. Home-based enablement programmes may also provide a solution for individuals with limited mobility and serious medical and physical problems. Such homebound patients otherwise often receive little attention to their enablement needs. With the increasing popularity and development of e-health, enablement programmes over the Internet may become more commonplace.

Home based training programmes exist for auditory training, speechreading, and hearing tactics (e.g. Sweetow and Sabes 2006, Kramer et al. 2005).

Group counseling

An advantage of group programmes over individual intervention is that the group itself provides a situation for practicing skills, interacting with others and learning from other group members. Those coping well can be invaluable role models for others. The synergy of the group makes it work better than the sum of the worth of its individual participants. A wide variety of group programmes, specifically designed for aural enablement, exist. Examples are self-help groups, educational-groups intervention, peer-discussion groups, and support groups.

Self-help groups

Self-help groups are usually organized by patient organizations, led by patients and are mostly change oriented. The key issue within self-help groups is social comparison. An individual's personality seems to be an essential factor determining whether one's participation in a self-help group will be successful (Buunk et al. 1990). In particular, group members who feel in control (high self-esteem) and are able to achieve positive social comparison (e.g. "When I compare myself with others who are experiencing fewer problems than me, I am pleased that things can get better") may benefit. However, those for whom making positive comparisons is difficult and, rather, tend to make negative comparisons (e.g. "When I compare myself with others who are experiencing fewer problems than me, I find it threatening to notice that I am not doing so well), self-help groups may constitute a risk. For those people, support groups may be a better option.

Support groups

Support groups are led by one or more facilitators. It is the facilitator's role to get the patients to talk, to express and share their feelings and to talk about ways of coping with hearing impairment. This is a problem-solving process. The majority of group programmes in the field of Audiology have been designed in connection with hearing aid fitting. The following elements are usually covered: education, skill building, hearing tactics, training in speechreading, auditory training, informational and psychological counseling, and sometimes relaxation techniques. Some programmes allow communication partners to participate, which enables patients to practice communication strategies with those with whom they interact most often.

Community-based groups

Some group programmes are community based and are organized in community settings, such as senior-citizen centres or a public library, rather than in audiology clinics. The main aim of this intervention is to reach people who experience communication difficulties, but who do not wish to wear hearing aids and have decided not to seek help (Hickson et al. 2007). As such, the group intervention can be regarded as an alternative to hearing-aid fitting, even though hearing aid users are also able to join the programmes.

The role of communication partners

Hearing impairment affects many aspects of life, not only for individuals with hearing impairment, but also for family and friends with whom they communicate. A communication partner is a person with whom such a regular and important relationship

is maintained. This is, in most cases, the spouse, but also siblings, friends and colleagues may have this role.

Communication requires a bidirectional transfer of information, meaning or intent between two or more people, and involves social interaction. Hence, the role of the communication partner is crucial. There is a range of strategies that can be applied by the communication partner to facilitate the communication process.

Effects of hearing impairment on communication partners

Aspects of the communication partner's life that may be affected by the hearing impairment of the person diagnosed are: communication (less spontaneous talks, less intimate contact, communication breakdowns due to the need to repeat), emotional functioning (embarrassment, frustration, conversational stress), the relationship (spouse changes into caregiver), social life (partner with hearing impairment just wants to stay at home, rather than going out) and routine everyday activities (increased television volume) (Scarinci et al. 2008).

Family history of hearing impairment

It is estimated that about 50% of the cases of acquired hearing impairment are attributable to genetic causes. Having a family history of hearing impairment may influence the life's of those diagnosed with the condition in many respects. Both negative and positive effects are reported (e.g., Stephens and Jones 2006).

Negative effects concern annoyance caused by the hearing impairment. Studies have demonstrated that people who have a family history of hearing impairment may be more conscious of hearing problems and more sensitive to them and, hence, may be more likely to report them and consider them to be annoying and severe. This is regarded as the 'psychological sensitisation' hypothesis.

Positive effects have been reported with the use of role modeling (Stephens and Jones, 2006, Kramer et al. 2006). Family members with hearing impairment may serve as appropriate role models to whom a person with hearing impairment may look for advice and support. Additionally, role models can be important in terms of the patient's acceptance of their condition and in terms of encouraging help-seeking.

Outcome measures

Outcome measures to assess the effectiveness of the enablement process cover a range of domains shown in Table 5.

Table 5: Types of relevant outcome measures used in audiology

Relevant outcome measures

- Improvement in Activity and Participation
- Residual Activity Participation and Activity Limitation
- Benefits/Shortcomings/Satisfaction

- Improvement in Quality of Life
- Others – Acceptance, Impact on Communication Partners, Related symptoms

A large number of measures, particularly of improvement in activity limitation and participation restriction have been discussed by Noble (1998) and by Bentler and Kramer (2000). Cox et al (2000) have discussed their specific functions, which are shown below.

Table 6: Uses of outcome measures in Audiology

Use	Circumstances
Assessing outcome for a particular patient	Patient orientated enablement
Assessing effectiveness of a particular service	Comparison of different audiological centres
Assessing a new technology or intervention	Comparisons of a new hearing aid processing system with more traditional systems
Assessing effects on quality of life	Comparison of cost-effectiveness of audiological versus other medical or related interventions
Research	Determination of which factors influence outcome

In practice the most widely-used measures aimed at assessing the outcome for a particular patient include a number of approaches to outcomes. These measures are the Client Oriented Scale of Improvement – COSI (Dillon et al. 1997), The International Outcome Inventory – Hearing Aids (IOI-HA – Cox et al. 2000) and the Glasgow Hearing Aid Benefit Profile – GHABP (Gatehouse 1999).

Summary

This chapter has set out to present and discuss the overall process of enabling adults with hearing difficulties. As such, it considers relevant aspects of the assessment process and decision making, followed by both instrumental and non-instrumental interventions. We emphasise that it is important to draw all these processes together for the benefit of the patient.

We have not attempted to address the problems of diagnostic audiology nor the enablement of children with hearing problems. Readers are referred to other publications for more information in these domains.

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